VHF air-ground Digital Link (VDL) Mode 4 radio equipment; Technical characteristics and methods of measurement for ground-based equipment; Part 5: Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU
Contents

1 Scope ................................................................................................................................. 7
2 References .......................................................................................................................... 7
2.1 Normative references .................................................................................................... 7
2.2 Informative references ................................................................................................ 7
3 Definitions and abbreviations ............................................................................................. 8
3.1 Definitions .................................................................................................................... 8
3.2 Abbreviations ............................................................................................................... 9
4 Technical requirements specifications ................................................................................ 10
4.1 Environmental profile .................................................................................................. 10
4.2 Conformance requirements ............................................................................................ 10
4.2.1 Receiver requirements .............................................................................................. 10
4.2.1.1 General: Reference Signal .................................................................................... 10
4.2.1.2 Sensitivity .............................................................................................................. 10
4.2.1.3 Adjacent Channel Rejection ................................................................................ 10
4.2.1.4 Spurious response rejection of signals within the VHF aeronautical band .......... 11
4.2.1.4.1 Definition ......................................................................................................... 11
4.2.1.4.2 Limits ................................................................................................................. 11
4.2.1.4.3 Conformance ..................................................................................................... 11
4.2.1.5 Spurious response rejection of signals outside the VHF aeronautical band .......... 11
4.2.1.5.1 Definition ......................................................................................................... 11
4.2.1.5.2 Limits ................................................................................................................. 11
4.2.1.5.3 Conformance ..................................................................................................... 11
4.2.1.6 Co-channel interference ....................................................................................... 11
4.2.1.7 Receiver Conducted spurious emission ................................................................. 12
4.2.1.7.1 Definition ......................................................................................................... 12
4.2.1.7.2 Limits ................................................................................................................. 12
4.2.1.8 In-band Intermodulation ..................................................................................... 12
4.2.1.8.1 Definition ......................................................................................................... 12
4.2.1.8.2 Limits ................................................................................................................. 12
4.2.1.9 Receiver Cabinet radiation ................................................................................... 12
4.2.1.9.1 Definition ......................................................................................................... 12
4.2.1.9.2 Limits ................................................................................................................. 12
4.2.2 Transmitter requirements .......................................................................................... 12
4.2.2.1 Manufacturer’s declared output power ................................................................. 12
4.2.2.1.1 Definition ......................................................................................................... 12
4.2.2.1.2 Limits ................................................................................................................. 12
4.2.2.2 RF power rise time ............................................................................................. 13
4.2.2.2.1 Definition ......................................................................................................... 13
4.2.2.2.2 Limits ................................................................................................................. 13
4.2.2.3 RF power release time ....................................................................................... 13
4.2.2.3.1 Definition ......................................................................................................... 13
4.2.2.3.2 Limits ................................................................................................................. 13
4.2.2.4 Transmitter Conducted Spurious emissions ....................................................... 13
4.2.2.4.1 Definition ......................................................................................................... 13
4.2.2.5 Adjacent channel power ..................................................................................... 13
4.2.2.5.1 Definition ......................................................................................................... 13
4.2.2.5.2 Limits ................................................................................................................. 14
4.2.2.6 Wide-band noise .............................................................................................. 14
4.2.2.6.1 Definition ......................................................................................................... 14
4.2.2.6.2 Limits ................................................................................................................. 14
4.2.2.7 Frequency Error ................................................................................................. 14
4.2.2.7.1 Definition .................................................................................................................................. 14
4.2.2.7.2 Limits ......................................................................................................................................... 14
4.2.2.8 Load VSWR capability .................................................................................................................. 14
4.2.2.8.1 Definition .................................................................................................................................. 14
4.2.2.8.2 Limits ......................................................................................................................................... 14
4.2.2.9 Transmitter Cabinet radiation ...................................................................................................... 15
4.2.2.9.1 Definition .................................................................................................................................. 15
4.2.2.9.2 Limits ......................................................................................................................................... 15
4.2.3 Transceiver requirements .................................................................................................................. 15
4.2.3.1 Receiver to transmitter turnaround time ......................................................................................... 15
4.2.3.1.1 Definition .................................................................................................................................. 15
4.2.3.1.2 Limits ......................................................................................................................................... 15
4.2.3.2 Transmitter to receiver turnaround time ....................................................................................... 15
4.2.3.2.1 Definition .................................................................................................................................. 15
4.2.3.2.2 Limits ......................................................................................................................................... 15
5 Testing for compliance with technical requirements .............................................................................. 15
5.1 Environmental conditions for testing ................................................................................................. 15
5.2 Interpretation of the measurement results .......................................................................................... 16

Annex A (normative): Relationship between the present document and the essential requirements of Directive 2014/53/EU ................................................................. 17

History ........................................................................................................................................................ 19
Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for ETSI members and non-members, and can be found in ETSI SR 000 314: “Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards”, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (https://ipr.etsi.org/).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Foreword

This Harmonised European Standard (EN) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM).

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.1] to provide one voluntary means of conforming to the essential requirements of Directive 2014/53/EU on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC [i.2].

Once the present document is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of the present document given in table A.1 confers, within the limits of the scope of the present document, a presumption of conformity with the corresponding essential requirements of that Directive, and associated EFTA regulations.

The present document provides the technical procedures and limits for compliance with article 3.2 of the Directive 2014/53/EU [i.2] for the ground equipment only.

The present document is part 5 of a multi-part deliverable covering the VHF air-ground Digital Link (VDL) Mode 4 radio equipment; Technical characteristics and methods of measurement for ground-based equipment, as identified below:

Part 1: "EN for ground equipment";
Part 2: "General description and data link layer";
Part 3: "Additional broadcast aspects";
Part 4: "Point-to-point functions";
Part 5: "Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU".

<table>
<thead>
<tr>
<th>National transposition dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of adoption of this EN:</td>
</tr>
<tr>
<td>Date of latest announcement of this EN (doa):</td>
</tr>
<tr>
<td>Date of latest publication of new National Standard or endorsement of this EN (dop/e):</td>
</tr>
<tr>
<td>Date of withdrawal of any conflicting National Standard (dow):</td>
</tr>
</tbody>
</table>
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.
1 Scope

The present document applies to Very High Frequency (VHF) Digital Link (VDL) Mode 4 ground-based radio transmitters and receivers for air-ground 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 VHF Digital Link (VDL) Standards and Recommended Practices (SARPs) [i.5].

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

The present document contains requirements to demonstrate that “… Radio equipment shall be so constructed that it both effectively uses and supports the efficient use of radio spectrum in order to avoid harmful interference” [i.2].

In addition to the present document, other ENs that specify technical requirements in respect of essential requirements under other parts of Article 3 of the Directive 2014/53/EU [i.2] as well as essential requirements under the Single European Sky Interoperability Regulation 552/2004 [i.10] and related implementing rules and/or essential requirements under the EASA basic regulation No 216/2008 [i.3] as amended by Regulation No 1108/2009 [i.4] may apply to equipment within the scope of the present document.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

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.

[1] ETSI EN 301 842-1 (V1.4.1) (04-2015): “VHF air-ground Digital Link (VDL) Mode 4 radio equipment; Technical characteristics and methods of measurement for ground-based equipment; Part 1: EN for ground equipment”.

[2] ETSI EN 300 113-1 (V1.7.1) (11-2011): “Electromagnetic compatibility and Radio spectrum Matters (ERM); Land mobile service; Radio equipment intended for the transmission of data (and/or speech) using constant or non-constant envelope modulation and having an antenna connector; Part 1: Technical characteristics and methods of measurement”.

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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 not necessary for the application of the present document but they assist the user with regard to a particular subject area.
3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in the Radio Equipment Directive [i.2], ISO/IEC 7498-1 [i.6], ISO/IEC 10731 [i.7] and the following apply:

adjacent channel power: amount of the modulated RF signal power which falls within a given adjacent channel

NOTE: Adjacent channel power includes discrete spurious, signal sidebands, and noise density (including phase noise) at the transmitter output.

Bit Error Rate (BER): ratio between the number of erroneous bits received and the total number of bits received

data rate: maximum amount of data that can be transmitted in a specified amount of time, typically expressed as bits per second

NOTE: The nominal data rate for VDL Mode 4 is 19 200 bits/s.

environmental profile: range of environmental conditions under which equipment within the scope of the present document is required to comply with the provisions of the present document
ground base station: aeronautical station equipment, in the aeronautical mobile service, for use with an external antenna and intended for use at a fixed location

integral antenna equipment: radio communications equipment with an antenna integrated into the equipment without the use of an external connector and considered to be part of the equipment

NOTE: An integral antenna may be internal or external to the equipment. In equipment of this type, a 50 Ω RF connection point is provided for test purposes.

non-integral antenna equipment: radio communications equipment with a connector intended for connection to an antenna

radiated measurements: measurements which involve the measurement of a radiated field

reference signal level: signal level used in the receiver performance specifications except otherwise stated

spurious emissions: conducted RF emissions on a frequency or frequencies which are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information

NOTE: Spurious emissions include parasitic emissions, intermodulation products and frequency conversion products.

station: VDL Mode 4 Specific Services (VSS)-capable entity

NOTE: A station may be either a mobile station or a ground station. A station is a physical entity that transmits and receives bursts over the RF interface (either A/G or A/A) and comprises, at a minimum: a physical layer, media access control sublayer, and a unique VSS address. A station which is also a DLS station has the same address.

VDL Mode 4: VHF data link using a Gaussian Filtered Frequency Shift Keying modulation scheme and self-organizing time division multiple access

VDL Mode 4 station: physical entity that transmits and receives VDL Mode 4 bursts over the RF interface (either A/G or A/A) and comprises, as a minimum: a physical layer, Media Access Control sublayer and a VSS sublayer

NOTE: A VDL Mode 4 station may either be a mobile VDL Mode 4 station or a ground VDL Mode 4 station.

VDL Station: VDL-capable entity that transmits and receives VDL bursts over the RF interface (either A/G or A/A) and comprises, as a minimum: a physical layer, Media Access Control sublayer and a VSS sublayer

NOTE: A station may either be a mobile station or a ground station. A station is a physical entity that transmits and receives frames over the air/ground (A/G) interface and comprises, at a minimum: a physical layer, media access control sublayer, and a unique DLS address. The particular initiating process (i.e. DLE or LME) in the station cannot be determined by the source DLS address. The particular destination process cannot be determined by the destination DLS address. These can be determined only by the context of these frames as well as the current operational state of the DLEs.

VDL System: VDL-capable entity comprising one or more stations and the associated VDL management entity

NOTE: A system may either be a mobile system or a ground system.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

A/A  Air-to-Air
A/G  Air/Ground
BER  Bit Error Rate
DLE  Data Link Entity
DLS  Data Link Service
EASA  European Aviation Safety Agency
EN  European Norm
GFSK  Gaussian Filtered Frequency Shift Keying
ICAO  International Civil Aviation Organization
4 Technical requirements specifications

4.1 Environmental profile

The technical requirements of the present document apply under the environmental profile for operation of the equipment, which shall be declared by the manufacturer. The equipment shall comply with all the technical requirements of the present document at all times when operating within the boundary limits of the declared operational environmental profile.

4.2 Conformance requirements

4.2.1 Receiver requirements

4.2.1.1 General: Reference Signal

The reference signal level applied at the receiver input for all the receiver requirements below described, unless otherwise stated, shall be as specified in clause 6.1.3 of ETSI EN 301 842-1 [1].

4.2.1.2 Sensitivity

4.2.1.2.1 Definition

The radio receiver sensitivity is defined as the power level at the receiver input at which the Bit Error Ratio (BER) is as specified in clause 6.1.2 of ETSI EN 301 842-1 [1].

4.2.1.2.2 Limits

The sensitivity shall be as specified in ETSI EN 301 842-1 [1], clause 6.1.4.

4.2.1.2.3 Conformance

To demonstrate conformance, the equipment shall pass the test procedure described in ETSI EN 301 842-1 [1], clause 9.1.2.

4.2.1.3 Adjacent Channel Rejection

4.2.1.3.1 Definition

The adjacent channel rejection is a measure of the capability of the receiver to receive a wanted modulated signal without exceeding a given degradation due to the presence of an unwanted signal which differs in frequency from the wanted signal by an amount equal to the adjacent channel separation for which the equipment is intended.

4.2.1.3.2 Limits

The adjacent channel rejection shall be as specified in ETSI EN 301 842-1 [1], clause 6.1.5.
4.2.1.3.3 Conformance
To demonstrate conformance, the equipment shall pass the test procedure described in ETSI EN 301 842-1 [1], clause 9.1.3.

4.2.1.4 Spurious response rejection of signals within the VHF aeronautical band

4.2.1.4.1 Definition
Within the context of the present document, this can be defined as the ability of the equipment to achieve a given BER requirement in the presence of an unwanted signal within the VHF aeronautical band.

4.2.1.4.2 Limits
The BER requirement as defined in clause 6.1.2 of ETSI EN 301 842-1 [1] shall be achieved when the wanted signal, set at the reference level, is combined with an unmodulated interfering signal as specified in clause 6.1.6 of ETSI EN 301 842-1 [1].

4.2.1.4.3 Conformance
To demonstrate conformance, the equipment shall pass the test procedure described in ETSI EN 301 842-1 [1], clause 9.1.4.

4.2.1.5 Spurious response rejection of signals outside the VHF aeronautical band

4.2.1.5.1 Definition
Within the context of the present document, this can be defined as the ability of the equipment to achieve a given BER requirement in the presence of an unwanted signal outside the VHF aeronautical band.

4.2.1.5.2 Limits
The BER requirement as defined in clause 6.1.2 of ETSI EN 301 842-1 [1] shall be achieved when the wanted signal, set at the reference level, is combined with an unmodulated interfering signal as specified in clause 6.1.7 of ETSI EN 301 842-1 [1].

4.2.1.5.3 Conformance
To demonstrate conformance, the equipment shall pass the test procedure described in ETSI EN 301 842-1 [1], clause 9.1.5.

4.2.1.6 Co-channel interference

4.2.1.6.1 Definition
The level of co-channel interference is a measure of the capability of the receiver to receive a wanted signal without exceeding a given degradation due to the presence of an unwanted modulated signal at the same carrier frequency.

4.2.1.6.2 Limits
The co-channel interference level shall be as specified in ETSI EN 301 842-1 [1], clause 6.1.11.

4.2.1.6.3 Conformance
To demonstrate conformance, the equipment shall pass the test procedure described in ETSI EN 301 842-1 [1], clause 9.1.9.
4.2.1.7 Receiver Conducted spurious emission

4.2.1.7.1 Definition
Conducted spurious emissions from the receiver are signals at any frequency, emitted from the antenna port.

4.2.1.7.2 Limits
The conducted spurious emission - measured by its power level at the antenna connector - shall be as specified in ETSI EN 301 842-1 [1], clause 6.1.12.

4.2.1.7.3 Conformance
To demonstrate conformance, the equipment shall pass the test procedure described in ETSI EN 301 842-1 [1], clause 9.1.10.

4.2.1.8 In-band Intermodulation

4.2.1.8.1 Definition
In-band intermodulation refers to the BER performance which needs to achieved in the presence of two interfering signals, displaced in frequency, from the desired signal.

4.2.1.8.2 Limits
The in-band intermodulation shall be as specified in ETSI EN 301 842-1 [1], clause 6.1.14.

4.2.1.8.3 Conformance
To demonstrate conformance, the equipment shall pass the test procedure described in ETSI EN 301 842-1 [1], clause 9.1.11.

4.2.1.9 Receiver Cabinet radiation

4.2.1.9.1 Definition
The receiver cabinet radiation is the effective radiated power when radiated by the cabinet and structure of the receiver.

4.2.1.9.2 Limits
The receiver cabinet radiation limits shall be as specified in clause 6.1.15 of ETSI EN 301 842-1 [1].

4.2.1.9.3 Conformance
To demonstrate conformance, the equipment shall pass the test procedure described in in ETSI EN 300 113-1 [2], clauses 8.10.1 b) and c), and 8.10.3.

4.2.2 Transmitter requirements

4.2.2.1 Manufacturer's declared output power

4.2.2.1.1 Definition
The manufacturer's declared output power of the transmitter is the mean output power of the transmitter.

4.2.2.1.2 Limits
The manufacturer's declared output power shall be as specified in clause 6.2.4 of ETSI EN 301 842-1 [1].
4.2.2.1.3 Conformance

To demonstrate conformance, the equipment shall pass the test procedure described in ETSI EN 301 842-1 [1], clause 9.2.2.

4.2.2.2 RF power rise time

4.2.2.2.1 Definition

The RF power rise time is the time taken for the transmitter power level to reach no less than 90 % of the mean output power level measured during signal transmission.

4.2.2.2.2 Limits

The RF power rise time shall be as specified in clause 6.2.5 of ETSI EN 301 842-1 [1].

4.2.2.3 RF power release time

4.2.2.3.1 Definition

The RF power release time is the time taken for the transmitted power level to decay by a given value below the manufacturer declared output power level.

4.2.2.3.2 Limits

The RF power release time shall be as specified in clause 6.2.6 of ETSI EN 301 842-1 [1].

4.2.2.3.3 Conformance

To demonstrate conformance, the equipment shall pass the test procedure described in ETSI EN 301 842-1 [1], clause 9.2.4.

4.2.2.4 Transmitter Conducted Spurious emissions

4.2.2.4.1 Definition

Conducted spurious emissions from the transmitter are signals at any frequency emitted from the antenna port.

4.2.2.4.2 Limits

The conducted spurious emissions is measured by their power levels at the antenna connector and their limits shall be as specified in clause 6.2.7 of ETSI EN 301 842-1 [1].

4.2.2.4.3 Conformance

To demonstrate conformance, the equipment shall pass the test procedure described in ETSI EN 301 842-1 [1], clause 9.2.5.

4.2.2.5 Adjacent channel power

4.2.2.5.1 Definition

The adjacent channel power is the RF power measured over the channel bandwidth of adjacent channels.
4.2.2.5.2 Limits
The adjacent channel power shall be as specified in clause 6.2.8 of ETSI EN 301 842-1 [1].

4.2.2.5.3 Conformance
To demonstrate conformance, the equipment shall pass the test procedure described in ETSI EN 301 842-1 [1], clause 9.2.6.

4.2.2.6 Wide-band noise

4.2.2.6.1 Definition
The wide-band noise is the RF power measured over the 25 kHz channel bandwidth for channels other than the adjacent channels.

4.2.2.6.2 Limits
The adjacent channel power shall be as specified in clause 6.2.9 of ETSI EN 301 842-1 [1].

4.2.2.6.3 Conformance
To demonstrate conformance, the equipment shall pass the test procedure described in ETSI EN 301 842-1 [1], clause 9.2.7.

4.2.2.7 Frequency Error

4.2.2.7.1 Definition
The frequency error is the difference between the measured carrier frequency and its nominal value.

4.2.2.7.2 Limits
The frequency error shall be as specified in clause 6.2.10 of ETSI EN 301 842-1 [1].

NOTE: In ETSI EN 301 842-1 [1], this is referred to as 'Frequency Tolerance'.

4.2.2.7.3 Conformance
To demonstrate conformance, the equipment shall pass the test procedure described in ETSI EN 301 842-1 [1], clause 9.2.8.

4.2.2.8 Load VSWR capability

4.2.2.8.1 Definition
The load VSWR capability is the ability of the transmitter to maintain the limits of wide-band noise and adjacent channel power when a 2:1 mismatch to the transmitter output terminals is applied by a length of feeder, which is varied in electrical length by up to half a wavelength.

4.2.2.8.2 Limits
Limits shall be as specified in clause 6.2.11 of ETSI EN 301 842-1 [1].

4.2.2.8.3 Conformance
To demonstrate conformance, the equipment shall pass the test procedure described in ETSI EN 301 842-1 [1], clause 9.2.9.
4.2.2.9 Transmitter Cabinet radiation

4.2.2.9.1 Definition
The transmitter cabinet radiation is the effective radiated power when radiated by the cabinet and structure of the transmitter.

4.2.2.9.2 Limits
The transmitter cabinet radiation shall be as specified in clause 6.2.12 of ETSI EN 301 842-1 [1].

4.2.2.9.3 Conformance
To demonstrate conformance, the equipment shall pass the test procedure described in ETSI EN 300 113-1 [2], clauses 7.5.1 b) and c), and 7.5.3.

4.2.3 Transceiver requirements

4.2.3.1 Receiver to transmitter turnaround time

4.2.3.1.1 Definition
This is the time between the termination of the receiver function, and the capability to begin transmission of the transmitter power stabilization sequence.

4.2.3.1.2 Limits
The receiver to transmitter turnaround time shall be as specified in clause 6.3.3 of ETSI EN 301 842-1 [1].

4.2.3.1.3 Conformance
To demonstrate conformance, the equipment shall pass the test procedure described in ETSI EN 301 842-1 [1], clause 9.3.1.

4.2.3.2 Transmitter to receiver turnaround time

4.2.3.2.1 Definition
This is the time between the completion of a transmission, and the capability of receiving and demodulating with nominal performance an incoming signal.

4.2.3.2.2 Limits
The transmitter to receiver turnaround time shall be as specified in clause 6.3.4 of ETSI EN 301 842-1 [1].

4.2.3.2.3 Conformance
To demonstrate conformance, the equipment shall pass the test procedure described in ETSI EN 301 842-1 [1], clause 9.3.2.

5 Testing for compliance with technical requirements

5.1 Environmental conditions for testing
Tests defined in the present document shall be carried out at representative points within the boundary limits of the declared operational environmental profile.
Where technical performance varies subject to environmental conditions, tests shall be carried out under a sufficient variety of environmental conditions (within the boundary limits of the declared operational environmental profile) to give confidence of compliance for the affected technical requirements.

5.2 Interpretation of the measurement results

The interpretation of the results recorded in a test report for the measurements described in the present document shall be as follows:

- the measured value related to the corresponding limit will be used to decide whether an equipment meets the requirements of the present document;
- the value of the measurement uncertainty for the measurement of each parameter shall be included in the test report;
- the recorded value of the measurement uncertainty shall be, for each measurement, equal to or lower than the figures in the tables 1, 2 and 3.

For the test methods, according to the present document, the measurement uncertainty figures shall be calculated and shall correspond to an expansion factor (coverage factor) \( k = 1.96 \) or \( k = 2 \) (which provide confidence levels of respectively 95 % and 95.45 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)). Principles for the calculation of measurement uncertainty are contained in ETSI TR 100 028 [i.8] and [i.9], in particular in annex D of the ETSI TR 100 028-2 [i.9].

Tables 1, 2 and 3 are based on such expansion factors.

### Table 1: Transmitter measurement uncertainty: maximum values

<table>
<thead>
<tr>
<th>Measurement uncertainties</th>
<th>Maximum values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer's declared output power (normal and extreme test conditions)</td>
<td>±0.75 dB</td>
</tr>
<tr>
<td>RF power rise and release time</td>
<td>±20 % of the limits values</td>
</tr>
<tr>
<td>Conducted spurious emissions:</td>
<td></td>
</tr>
<tr>
<td>below 1 GHz</td>
<td>±3 dB</td>
</tr>
<tr>
<td>between 1 GHz and 4 GHz</td>
<td>±6 dB</td>
</tr>
<tr>
<td>Adjacent channel power</td>
<td>±2.5 dB</td>
</tr>
<tr>
<td>Wide band noise</td>
<td>±2.5 dB</td>
</tr>
<tr>
<td>Frequency error</td>
<td>±1 x 10^-9</td>
</tr>
<tr>
<td>Cabinet radiation</td>
<td>±6 dB</td>
</tr>
</tbody>
</table>

### Table 2: Receiver measurement uncertainty: maximum values

<table>
<thead>
<tr>
<th>Measurement uncertainties</th>
<th>Maximum values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity</td>
<td>±3 dB</td>
</tr>
<tr>
<td>Adjacent channel rejection</td>
<td>±4 dB</td>
</tr>
<tr>
<td>Spurious response rejection</td>
<td>±4 dB</td>
</tr>
<tr>
<td>Co-channel interference</td>
<td>±3 dB</td>
</tr>
<tr>
<td>Conducted spurious emissions:</td>
<td></td>
</tr>
<tr>
<td>below 1 GHz</td>
<td>±3 dB</td>
</tr>
<tr>
<td>between 1 GHz and 4 GHz</td>
<td>±6 dB</td>
</tr>
<tr>
<td>in-band intermodulation</td>
<td>±3 dB</td>
</tr>
<tr>
<td>Cabinet radiation</td>
<td>±6 dB</td>
</tr>
</tbody>
</table>

### Table 3: Transceiver measurement uncertainty: maximum values

<table>
<thead>
<tr>
<th>Measurement uncertainties</th>
<th>Maximum values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receiver to transmitter turn-around time</td>
<td>±20 % of the limits values</td>
</tr>
<tr>
<td>Transmitter to receiver turn-around time</td>
<td>±20 % of the limits values</td>
</tr>
</tbody>
</table>
Annex A (normative):
Relationship between the present document and the essential requirements of Directive 2014/53/EU

The present document has been prepared under the Commission’s standardisation request C(2015) 5376 final [i.1] to provide one voluntary means of conforming to the essential requirements of Directive 2014/53/EU on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC [i.2].

Once the present document is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of the present document given in table A.1 confers, within the limits of the scope of the present document, a presumption of conformity with the corresponding essential requirements of that Directive, and associated EFTA regulations.

Table A.1: Relationship between the present document and the essential requirements of Directive 2014/53/EU

<table>
<thead>
<tr>
<th>Harmonised Standard ETSI EN 301 842-5</th>
<th>The following requirements are relevant to the presumption of conformity under the article 3.2 of Directive 2014/53/EU [i.2]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requirement</td>
<td>Requirement Conditionality</td>
</tr>
<tr>
<td>No</td>
<td>Description</td>
</tr>
<tr>
<td>1</td>
<td>Sensitivity</td>
</tr>
<tr>
<td>2</td>
<td>Adjacent Channel Rejection</td>
</tr>
<tr>
<td>3</td>
<td>Spurious Response rejection</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Co-channel interference</td>
</tr>
<tr>
<td>5</td>
<td>Receiver Conducted spurious emission</td>
</tr>
<tr>
<td>6</td>
<td>In-band Intermodulation</td>
</tr>
<tr>
<td>7</td>
<td>Receiver Cabinet radiation</td>
</tr>
<tr>
<td>8</td>
<td>Manufacturer's declared power output</td>
</tr>
<tr>
<td>9</td>
<td>RF power rise time</td>
</tr>
<tr>
<td>10</td>
<td>RF power release time</td>
</tr>
<tr>
<td>11</td>
<td>Transmitter Conducted spurious emissions</td>
</tr>
<tr>
<td>12</td>
<td>Adjacent channel power</td>
</tr>
<tr>
<td>13</td>
<td>Wide-band noise</td>
</tr>
<tr>
<td>14</td>
<td>Frequency error</td>
</tr>
<tr>
<td>15</td>
<td>Load VSWR capability</td>
</tr>
<tr>
<td>16</td>
<td>Transmitter Cabinet radiation</td>
</tr>
<tr>
<td>17</td>
<td>Receiver to transmitter turnaround time</td>
</tr>
<tr>
<td>18</td>
<td>Transmitter to receiver turnaround time</td>
</tr>
</tbody>
</table>

Key to columns:

Requirement:

No A unique identifier for one row of the table which may be used to identify a requirement.

Description A textual reference to the requirement.

Clause Number Identification of clause(s) defining the requirement in the present document unless another document is referenced explicitly.

Requirement Conditionality:

U/C Indicates whether the requirement shall be unconditionally applicable (U) or is conditional upon the manufacturer's claimed functionality of the equipment (C).

Condition Explains the conditions when the requirement shall or shall not be applicable for a requirement which is classified "conditional".
Presumption of conformity stays valid only as long as a reference to the present document is maintained in the list published in the Official Journal of the European Union. Users of the present document should consult frequently the latest list published in the Official Journal of the European Union.

Other Union legislation may be applicable to the product(s) falling within the scope of the present document.
## History

<table>
<thead>
<tr>
<th>Document History</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>V1.1.1</strong></td>
</tr>
<tr>
<td><strong>V2.1.0</strong></td>
</tr>
<tr>
<td><strong>V2.1.1</strong></td>
</tr>
</tbody>
</table>
