

Draft ETSI EN 302 054-1 V1.2.0 (2015-06)



**Meteorological Aids (Met Aids);
Radiosondes to be used in the 400,15 MHz to 406 MHz
frequency range with power levels ranging up to 200 mW;
Part 1: Technical characteristics and
test methods**

Standard Review
iTech Standards
https://standards.iteh.ai/en/standards/etsi/302-054-1-2015-10-408f-abd0-9f64e11c1f08/

ReferenceREN/ERM-JTFEA-25

Keywordsradio, short range, testing, UHF

ETSI650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Important notice

The present document can be downloaded from:

<http://www.etsi.org/standards-search>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the only prevailing document is the print of the Portable Document Format (PDF) version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at

<http://portal.etsi.org/tb/status/status.asp>

If you find errors in the present document, please send your comment to one of the following services:

<https://portal.etsi.org/People/CommitteeSupportStaff.aspx>

Copyright Notification

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2015.

All rights reserved.

DECT™, PLUGTESTS™, UMTS™ and the ETSI logo are Trade Marks of ETSI registered for the benefit of its Members.

3GPP™ and LTE™ are Trade Marks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.

GSM® and the GSM logo are Trade Marks registered and owned by the GSM Association.

Contents

Intellectual Property Rights.....	5
Foreword.....	5
Modal verbs terminology.....	5
Introduction.....	6
1 Scope.....	7
2 References.....	7
2.1 Normative references.....	7
2.2 Informative references.....	7
3 Definitions, symbols and abbreviations.....	7
3.1 Definitions.....	7
3.2 Symbols.....	8
3.3 Abbreviations.....	8
4 Technical requirement specifications.....	8
4.1 Presentation of equipment for testing purposes.....	8
4.1.1 General Considerations.....	8
4.1.2 Choice of model for testing.....	8
4.1.3 Testing of equipment with alternative power levels.....	9
4.1.4 Testing of equipment that does not have an external 50 Ω RF connector (integral antenna equipment).....	9
4.1.4.1 Equipment with an internal permanent or temporary antenna connector.....	9
4.1.4.2 Equipment with an internal permanent antenna.....	9
4.2 Mechanical and electrical design.....	9
4.2.1 Marking (equipment identification).....	9
4.2.1.1 Equipment identification.....	9
4.2.1.2 Marking.....	9
4.2.2 Auxiliary test equipment.....	9
5 Test conditions, power sources and ambient temperatures.....	9
5.1 Normal and extreme test conditions.....	9
5.2 Test power source.....	10
5.2.1 External test power source.....	10
5.2.2 Internal test power source.....	10
5.3 Normal test conditions.....	10
5.3.1 Normal temperature and humidity.....	10
5.3.2 Normal test power source.....	10
5.4 Extreme test conditions.....	10
5.4.1 General.....	10
5.4.2 Procedure for tests at extreme conditions.....	11
5.4.3 Special Radiosondes.....	11
5.4.4 Extreme test source voltages.....	11
5.4.4.1 Power sources using batteries.....	11
5.4.4.2 Other power sources.....	11
6 General conditions.....	12
6.1 Normal test signals and test modulation.....	12
6.2 Artificial antenna.....	12
6.3 Test fixture.....	12
6.4 Test sites and general arrangements for radiated measurements.....	12
6.5 Modes of operation of the transmitter.....	12
6.6 Measuring receiver.....	13
7 Methods of measurement and limits for transmitter parameters.....	13
7.1 General.....	13
7.2 Frequency error.....	13
7.2.1 Definitions.....	13

7.2.2	Method of measurement	13
7.2.3	Limit	13
7.3	Carrier power (conducted)	13
7.3.1	Definition	13
7.3.2	Method of measurement	14
7.3.3	Limits	14
7.4	Effective radiated power	14
7.4.1	Definition	14
7.4.2	Methods of measurement	14
7.4.3	Limit	15
7.5	Modulation bandwidth	15
7.5.1	Definition	15
7.5.2	Method of measurement	15
7.5.3	Limits	15
7.6	Spurious emissions.....	16
7.6.1	Definition	16
7.6.2	Methods of measurement	16
7.6.2.0	General requirement	16
7.6.2.1	Method of measuring the power level in a specified load, clause 7.6.2.0 a) i)	16
7.6.2.2	Method of measuring the effective radiated power, clause 7.6.2.0 a) ii)	17
7.6.2.3	Method of measuring the effective radiated power, clause 7.6.2.0 b)	17
7.6.3	Limits	18
7.7	Frequency stability under low voltage conditions.....	18
7.7.1	Definition	18
7.7.2	Method of measurement	18
7.7.3	Limits	18
History	19

iTeh STANDARD PREVIEW
 (standards.iteh.ai)
 Full standard:
<https://standards.iteh.ai/catalog/standards/sist/dfee2150-c38f-408f-abd0-9f64e11c1f08/etsi-en-302-054-1-v1.2.0-2015-10>

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 (<http://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 draft European Standard (EN) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM), and is now submitted for the combined Public Enquiry and Vote phase of the ETSI standards EN Approval Procedure.

For non EU countries the present document may be used for regulatory (Type Approval) purposes.

The present document is part 1 of a multi-part deliverable covering digitally modulated Radiosonde transmitters in the Meteorological Aids frequency band from 400,15 MHz to 406 MHz, as identified below:

- Part 1:** "Technical characteristics and test methods";
- Part 2: "Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU".

Proposed national transposition dates	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	18 months after doa

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

Meteorological aids, Radiosondes, are light weight, disposable precision measurement instruments mainly used for *in situ* upper air measurements of meteorological variables (pressure, temperature, relative humidity, wind speed and direction) in the atmosphere up to an altitude of 36 km. The measurements are vital to international weather forecasting capability (and hence severe weather warning services for the public involving protection of life and property). The Radiosonde systems provide simultaneous measurements of the vertical profile of temperature, relative humidity as well as wind speed and direction. The variation of these meteorological variables in the vertical contains the majority of the critical information for weather forecasting. These systems are the only meteorological observing systems able to regularly provide the vertical resolution that meteorologists need for all five variables.

Typically the Radiosonde observations are produced by Radiosondes measuring atmosphere for approximately 2 hours and carried by ascending balloons launched from land stations or ships. Radiosonde observations are carried out routinely by almost all countries, two to four times a day. The observation data is then circulated immediately to all other countries within a few hours via the WMO (World Meteorological Organization) Global Telecommunications System (GTS). The observing systems and data dissemination are all organized under the framework of the World Weather Watch Programme of WMO.

The observation stations are required, worldwide, at a horizontal spacing of less than or equal to 250 km, during the first decade of the twenty-first century, with a frequency of observation of from one to four times per day.

Remotely sensed measurements from satellites do not have the vertical resolution available from Radiosondes. Successful derivation of vertical temperature structure from these satellite measurements usually requires a computation initialized either directly from Radiosonde statistics or from the numerical weather forecast itself. In the latter case, the Radiosonde measurements ensure that the vertical structure in these forecasts remains accurate and stable with time. In addition, the Radiosonde measurements are used to calibrate satellite observations by a variety of techniques.

Radiosonde observations are thus seen to remain absolutely necessary for meteorological operations for the foreseeable future.

Other applications, independent of the main civilian meteorological organizations include environmental pollution, hydrology, radioactivity in the free atmosphere, significant weather phenomena (e.g. winter storms, thunderstorms, etc.) and investigation of a range of physical and chemical properties of the atmosphere.

About 150 000 Radiosondes are annually used in Europe, about 90 % of them are in 403 MHz band. This use is not decreasing with time, since with modern automation it is now much easier to successfully operate systems without highly skilled operators and a large amount of supporting equipment.

The Radiosondes use unidirectional transmission on two frequency bands: 403 MHz band covers primary and co-primary allocations from 400,15 MHz to 406 MHz and 1 680 MHz band from 1 668,4 MHz to 1 690 MHz. The 403 MHz Radiosonde technology applies GNSS (Global Navigation Satellite Systems) for wind measurement, whereas the 1 680 MHz systems may base the wind measurement on balloon tracking with a Radio Direction Finding antenna. Because the 403 MHz wind measurement depends on the availability of the GNSS signals, many operators do not consider this technology secure enough for critical applications (e.g. defence and national security), and consequently prefer 1 680 MHz systems.

National regulatory conditions may apply regarding the, channel/frequency separations, and the inclusion of an automatic transmitter shut-off feature as a condition of an individual or general license, or, as a condition of use under license exemption. The automatic transmitter shut-off facility of the Radiosonde may be based on elapsed time from the beginning of the sounding, or atmospheric pressure or height measured by the Radiosonde.

1 Scope

The present document defines the technical requirements for transmitters used in Radiosondes operating in the range from 400,15 MHz to 406 MHz and with power levels ranging up to 200 mW.

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 reference 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] CISPR 16-1-1: "Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-1: Radio disturbance and immunity measuring apparatus - Measuring apparatus".
- [2] ETSI TS 103 052 (V1.1.1) (2011-03): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Radiated measurement methods and general arrangements for test sites up to 100 GHz".
- [3] ETSI EN 300 220-1 (V2.4.1) (2012-05): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD); Radio equipment to be used in the 25 MHz to 1 000 MHz frequency range with power levels ranging up to 500 mW; Part 1: Technical characteristics and test methods".

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 reference 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.

Not applicable.

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

conducted measurements: measurements which are made using a direct 50 Ω connection to the equipment under test

dedicated antenna: removable antenna supplied and type tested with the radio equipment, designed as an indispensable part of the equipment

integral antenna: permanent fixed antenna, which may be built-in, designed as an indispensable part of the equipment

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

telemetry: use of radio communication for indicating or recording data at a distance

3.2 Symbols

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

dB	decibel
E	Field strength
°C	Temperature in degrees Celsius
hPa	Atmospheric pressure in hecto Pascal
%RH	Air relative humidity in percentage
λ	Wavelength

3.3 Abbreviations

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

CISPR	International Special Committee on Radio Interference
EU	European Union
EUT	Equipment Under Test
FAR	Fully Anechoic Room
GNSS	Global Navigation Satellite Systems
GTS	Global Telecommunications System
ICAO	International Civil Aviation Organization
ITU-R	International Telecommunication Union - Radiocommunication Sector
MSS	Mobile Satellite Service
RF	Radio Frequency
RH	Relative Humidity
VSWR	Voltage Standing Wave Ratio
WMO	World Meteorological Organization

4 Technical requirement specifications

4.1 Presentation of equipment for testing purposes

4.1.1 General Considerations

Each equipment submitted for testing shall fulfil the requirements of the present document on all frequencies over which it is intended to operate.

Testing shall be carried out on the highest and lowest frequencies within the equipment's intended operating range. If an equipment is designed to operate with different carrier powers, measurement of each transmitter parameter shall be performed at the highest power level at which the transmitter is intended to operate.

To simplify and harmonize the testing procedures between the different testing laboratories, measurements shall be performed, according to the present document.

4.1.2 Choice of model for testing

The manufacturer shall provide one or more samples of the equipment, as appropriate, for testing.

If an equipment has several optional features, considered not to affect the RF parameters then tests need only be performed on the equipment configured with that combination of features considered to be the most complex, as proposed by the manufacturer and agreed by the test laboratory.

Where practicable, equipment offered for testing shall provide a 50 Ω connector for conducted RF power measurements.

In the case of integral antenna equipment, if the equipment does not have an internal permanent 50 Ω connector then it is permissible to supply a second sample of the equipment with a temporary 50 Ω antenna connector fitted to facilitate testing.

4.1.3 Testing of equipment with alternative power levels

If a family of equipment has alternative output power levels provided by the use of separate power modules or add on stages, then each module or add on stage shall be tested in combination with the equipment. The necessary samples and tests shall be proposed by the manufacturer and/or test laboratory and shall be agreed with the Administration(s), based on the requirements of clause 4.1.

4.1.4 Testing of equipment that does not have an external 50 Ω RF connector (integral antenna equipment)

4.1.4.1 Equipment with an internal permanent or temporary antenna connector

The means to access and/or implement the internal permanent or temporary antenna connector shall be stated by the manufacturer and the access method shall be recorded in the test report.

No connection shall be made to any internal permanent or temporary antenna connector during the performance of radiated emissions measurements.

4.1.4.2 Equipment with an internal permanent antenna

Manufacturer shall state and describe the method to connect test equipment to antenna port and this method shall be recorded in the test report.

4.2 Mechanical and electrical design

4.2.1 Marking (equipment identification)

4.2.1.1 Equipment identification

The marking shall include as a minimum:

- the name of the manufacturer or his trademark;
- the type designation.

4.2.1.2 Marking

The equipment shall be marked in a visible place, unless the equipment is too small to carry the marking. This marking shall be legible and durable. Relevant information shall be provided in the user manual.

4.2.2 Auxiliary test equipment

All necessary auxiliary test equipment and set-up information shall accompany the EUT, when it is submitted for testing.

5 Test conditions, power sources and ambient temperatures

5.1 Normal and extreme test conditions

Testing shall be performed under normal test conditions, and also, where stated, under extreme test conditions.

The test conditions and procedures shall be as specified in clauses 5.2 to 5.4.