



SLOVENSKI STANDARD
oSIST prEN 303 447 V1.2.0:2020
01-september-2020

Naprave kratkega dosega (SRD) - Sistemi z indukcijsko zanko za robotske kosilnice - Harmonizirani standard za dostop do radijskega spektra

Short Range Devices (SRD) - Inductive loop systems for robotic mowers - Harmonised Standard for access to radio spectrum

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Ta slovenski standard je istoveten z: ETSI EN 303 447 V1.2.0 (2020-07)

<https://standards.iteh.ai/catalog/standards/sist/29a9174e-d0d7-4fe2-b9ac-4cf8371820b7/osist-pren-303-447-v1-2-0-2021>

ICS:

33.060.01	Radijske komunikacije na splošno	Radiocommunications in general
-----------	----------------------------------	--------------------------------

oSIST prEN 303 447 V1.2.0:2020 **en**

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[oSIST prEN 303 447 V1.2.0:2021](https://standards.iteh.ai/catalog/standards/sist/29a9174e-d0d7-4fe2-b9ac-4cfe371820b7/osist-pren-303-447-v1-2-0-2021)

<https://standards.iteh.ai/catalog/standards/sist/29a9174e-d0d7-4fe2-b9ac-4cfe371820b7/osist-pren-303-447-v1-2-0-2021>

Draft ETSI EN 303 447 V1.2.0 (2020-07)



**Short Range Devices (SRD);
Inductive loop systems for robotic mowers;
Harmonised Standard for access to radio spectrum**

[oSIST prEN 303 447 V1.2.0:2021](https://standards.iteh.ai/catalog/standards/sist/29a9174e-d0d7-4fe2-b9ac-4cfe371820b7/osist-pren-303-447-v1-2-0-2021)

<https://standards.iteh.ai/catalog/standards/sist/29a9174e-d0d7-4fe2-b9ac-4cfe371820b7/osist-pren-303-447-v1-2-0-2021>

Reference

REN/ERM-TG28-552

Keywords

harmonised standard, inductive, measurement,
radio**ETSI**650 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° 7803/88iTeh STANDARD PREVIEW
(standards.iteh.ai)**Important notice**

<https://standards.iteh.ai/catalog/standards/sist/29a9174e-d0d7-4fe2-b9ac-4c1e31182016/osse-prn-303-447-v1-2-0-2021>
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 prevailing version of an ETSI deliverable is the one made publicly available in PDF format at www.etsi.org/deliver.

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 <https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx>

If you find errors in the present document, please send your comment to one of the following services:
<https://portal.etsi.org/People/CommiteeSupportStaff.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.

© ETSI 2020.

All rights reserved.

DECT™, **PLUGTESTS™**, **UMTS™** and the ETSI logo are trademarks of ETSI registered for the benefit of its Members. **3GPP™** and **LTE™** are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.

oneM2M™ logo is a trademark of ETSI registered for the benefit of its Members and of the oneM2M Partners.

GSM® and the GSM logo are trademarks 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 Definition of terms, symbols and abbreviations.....	8
3.1 Terms.....	8
3.2 Symbols.....	10
3.3 Abbreviations	10
4 Technical requirements specifications	11
4.1 Environmental profile.....	11
4.2 General	11
4.2.1 Wanted technical performance criteria	11
4.2.2 RMI modes	11
4.2.2.1 General	11
4.2.2.2 Operational Modes.....	11
4.2.2.3 Safe Mode	12
4.2.3 Presentation of equipment for testing purposes.....	12
4.3 Transmitter conformance requirements.....	12
4.3.1 Operating Frequency Range (OFR).....	12
4.3.1.1 Applicability.....	12
4.3.1.2 Description.....	12
4.3.1.3 Limits.....	13
4.3.1.4 Conformance.....	13
4.3.2 Transmitter H-field requirements	13
4.3.2.1 Applicability.....	13
4.3.2.2 Description.....	13
4.3.2.3 Limits.....	13
4.3.2.4 Conformance.....	13
4.3.3 Transmitter spurious emissions.....	13
4.3.3.1 Applicability.....	13
4.3.3.2 Description	14
4.3.3.3 Limits	14
4.3.3.4 Conformance.....	15
4.3.4 Transmitter Out Of Band (OOB) emissions	15
4.3.4.1 Applicability.....	15
4.3.4.2 Description.....	15
4.3.4.3 Limits.....	15
4.3.4.4 Conformance.....	15
4.4 Receiver conformance requirements	15
4.4.1 Introduction.....	15
4.4.2 Receiver Baseline Sensitivity	15
4.4.2.1 Applicability.....	15
4.4.2.2 Description	16
4.4.2.3 Limits	16
4.4.2.4 Conformance.....	16
4.4.3 Receiver Baseline Resilience.....	16
4.4.3.1 Applicability.....	16
4.4.3.2 Description.....	16
4.4.3.3 Limits.....	16
4.4.3.4 Conformance.....	16

5	Testing for compliance with technical requirements.....	17
5.1	Environmental conditions for testing	17
5.2	General conditions for testing	17
5.3	Artificial antenna.....	17
5.4	Measuring receiver	17
6	Conformance methods of measurement for transmitters and receivers	18
6.1	General	18
6.2	Transmitter conformance methods	18
6.2.1	OFR	18
6.2.2	H-field.....	19
6.2.3	Transmitter unwanted emissions (spurious and OOB emissions).....	20
6.3	Receiver conformance methods	20
6.3.1	Receiver spurious emissions	20
6.3.2	Receiver Baseline Sensitivity	20
6.3.2.1	General	20
6.3.2.2	Receiver-Baseline Sensitivity Test.....	22
6.3.3	Receiver Baseline Resilience	22
6.3.3.1	General	22
6.3.3.2	Test 1: if robotic mower can handle a lost signal	22
6.3.3.3	Test 2: if robotic mower can handle a passage of the boundary wire.....	24
Annex A (informative):	Relationship between the present document and the essential requirements of Directive 2014/53/EU	26
Annex B (normative):	Test sites and procedures	27
B.1	Boundary and dependent guidance loops.....	27
B.1.1	Artificial antenna for conducted measurements below 30 MHz	27
B.1.2	General setup and measurement procedure for the current measurement with artificial antenna	29
B.1.3	Differential mode measurement	30
B.1.4	Common mode measurement	31
B.1.5	The reference test garden.....	31
B.2	Radiated measurements using anechoic chamber or open area test site.....	31
Annex C (informative):	Justification for missing RX-requirements from ETSI EG 203 336	33
C.1	Justification Receiver unwanted emissions	33
C.2	Justification for other RX-requirements.....	33
Annex D (informative):	TX spurious emission limit assessment below 9 kHz.....	35
Annex E (informative):	Change history	36
History		37

Intellectual Property Rights

Essential patents

IPRs essential or potentially essential to normative deliverables 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.

Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

Foreword

This draft Harmonised 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.

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.6] 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.3].

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.

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

The present document covers Robotic Mowers with Inductive loop systems (RMI) using the frequency range below 148,5 kHz. An RMI system includes:

- RMI docking station: charging stations for the robotic mower and the signal generator/antenna connecting point for the signals on the integral antenna and boundary wire.
- Robotic Mower: receiving part inside the RMI.
- Boundary Wire: user installed antenna.

The present document is structured as follows:

- Clauses 1 through 3 provide a general description on the types of equipment covered by the present document and the definitions, symbols and abbreviations used.
- Clause 4 provides the technical requirements specifications, limits and conformance relative to transmitter and receiver.
- Clause 5 specifies the conditions and information for testing of the equipment and interpretation of the measurement results.
- Clause 6 specifies the required measurement methods.
- Annex A (informative) provides the relationship between the present document and the essential requirements of Directive 2014/53/EU [i.3].
- Annex B (normative) provides necessary information on used test sites and procedures.
- Annex C (informative) provides the justification for missing RX-requirements from ETSI EG 203 336 [i.5].
- Annex D (informative) provides information on TX spurious emission limit assessment below 9 kHz.
- Annex E (informative) provides information on Change history.

iteh STANDARD PREVIEW
(standards.iteh.ai)

SIST prEN 303 447 V1.2.0:2020
<https://standards.iteh.ai/catalog/standards/sist/29a9174e-d0d7-4fe2-b9ac-2020-07>

1 Scope

The present document specifies technical characteristics and methods of measurements for Robotic Mowers with Inductive loop systems (RMI) below 148,5 kHz.

These radio equipment types are capable of operating in all or part of the frequency bands given in table 1.

Table 1: Permitted range of operation

Permitted range of operation	
Transmit	100 Hz to 148,5 kHz
Receive	100 Hz to 148,5 kHz
NOTE:	It should be noted that the frequency range between 9 kHz and 148,5 kHz is EU wide harmonised for inductive Short Range Devices according to EC Decision 2017/1483/EU [i.2].

NOTE 1: The relationship between the present document and essential requirements of article 3.2 of Directive 2014/53/EU [i.3] is given in Annex A.

The present document only covers RMI systems with antenna sizes smaller than 1,67 km, see CEPT/ERC/REC 70-03 [i.1], Annex 9.

NOTE 2: The antenna size is described by the distance between those two points on the antenna that have the largest distance between them (e.g. for a rectangle shaped antenna the largest diagonal; for a circular shaped antenna the diameter).

iTeh STANDARD PREVIEW

2 References (standards.iteh.ai)

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 <https://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 300 330 (V2.1.1) (02-2017): "Short Range Devices (SRD); Radio equipment in the frequency range 9 kHz to 25 MHz and inductive loop systems in the frequency range 9 kHz to 30 MHz; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU".

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.

- [i.1] CEPT/ERC/REC 70-03: "Relating to the use of Short Range Devices (SRD)".
- [i.2] EC Decision 2017/1483/EU: "Commission Implementing Decision (EU) 2017/1483 of 8 August 2017 amending Decision 2006/771/EC on harmonisation of the radio spectrum for use by short-range devices and repealing Decision 2006/804/EC".
- [i.3] Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 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.4] CEPT/ERC/REC 74-01: "Unwanted emissions in the spurious domain".
- [i.5] ETSI EG 203 336 (V1.2.1): "Guide for the selection of technical parameters for the production of Harmonised Standards covering article 3.1(b) and article 3.2 of Directive 2014/53/EU".
- [i.6] Commission Implementing Decision C(2015) 5376 final of 4.8.2015 on a standardisation request to the European Committee for Electrotechnical Standardisation and to the European Telecommunications Standards Institute as regards radio equipment in support of Directive 2014/53/EU of the European Parliament and of the Council.
- [i.7] EGMF Robotic Mowers Boundary Wire Standard RLM003-1.1/2016.
- [i.8] EN 50636-2-107:2015: "Safety of household and similar appliances - Part 2-107: Particular requirements for robotic battery powered electrical lawnmowers", produced by CENELEC.
- [i.9] ETSI EN 303 348: "Induction loop systems intended to assist the hearing impaired in the frequency range 10 Hz to 9 kHz; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU".
- [i.10] ETSI EN 303 454 (V1.1.1): "Short Range Devices (SRD); Metal and object detection sensors in the frequency range 1 kHz to 148,5 kHz; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU".
- [i.11] Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC (recast).
- [i.12] Void.
- [i.13] EN 55016-1-1:2010 + A1:2010 + A2:2014: "Specification for radio disturbance and immunity measuring apparatus and methods -Part 1-1: Radio disturbance and immunity measuring apparatus - Measuring apparatus", produced by CENELEC.
- [i.14] ETSI TS 103 567 (V1.1.1): "Requirements on signal interferer handling".
- [i.15] ETSI TS 103 051 (V1.1.1) (08-2011): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Expanded measurement uncertainty for the measurement of radiated electromagnetic fields".

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in ETSI EN 300 330 [1] and the following apply:

99 % OBW function: measurement function of a spectrum analyser to measure the OBW

antenna: integral antenna, boundary loop, and/or guidance loop (both dependent and independent) which are used in the RMI

NOTE 1: The inductive wire loops are installed dependent from the shape of the garden.

NOTE 2: To clarify the different loops see figure 2.

boundary loop: inductive wire loop which is defined by manufacturer and prepared by the user

NOTE 1: It can be implemented as a single or multiple turn coil installed by the user in accordance with instruction from the manufacturer for the purpose of generating magnetic fields to determine the working area.

NOTE 2: To clarify the different loops see figure 2.

dependent guidance loop: guidance loop which is connected to boundary loop (e.g. via a T-junction) and the RMI docking station

NOTE: To clarify the different loops see figure 2.

guidance loop: inductive wire loop which is defined by manufacturer and prepared by the user

NOTE: To clarify the different loops see figure 2.

inductive loop: electrical loop either wire or coil, where current is fed in order to generate a magnetic field intended for guidance and/or communication with the robotic mower

NOTE: To clarify the different loops see figure 2.

integral antenna: single or multiple turn inductive loop preinstalled inside the RMI docking station

NOTE: To clarify the different loops see figure 2.

integral receiving antenna: single or multiple turn inductive loop preinstalled inside the robotic mower

Occupied BandWidth (OBW): width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to 0,5 % of the total mean power of a given emission

NOTE: To clarify Occupied BandWidth (OBW), see figure 1.

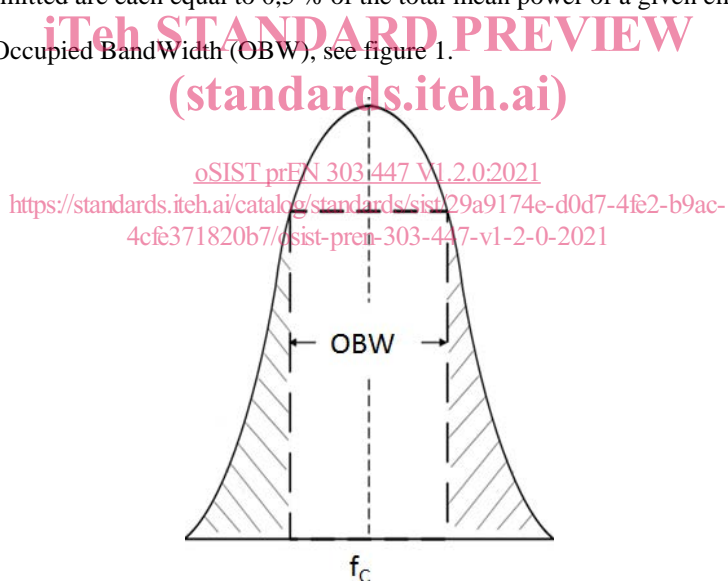


Figure 1: Occupied BandWidth (OBW)

RMI docking station: charging station for the robotic mower and the signal generator for the inductive loop(s) and, if applicable, integral antenna(s)

NOTE: The RMI docking station can be seen as the signal generator/antenna connecting point. In addition, it is the automatic battery charging facility located on or within the working area.

robotic mower: mobile part of the RMI including cutting means

NOTE: It is the receiving part inside the RMI.

Robotic Mower with Inductive loop system (RMI): system that include robotic mower, power supply, docking station, and inductive loop(s)

working area: area in which the RMI can function

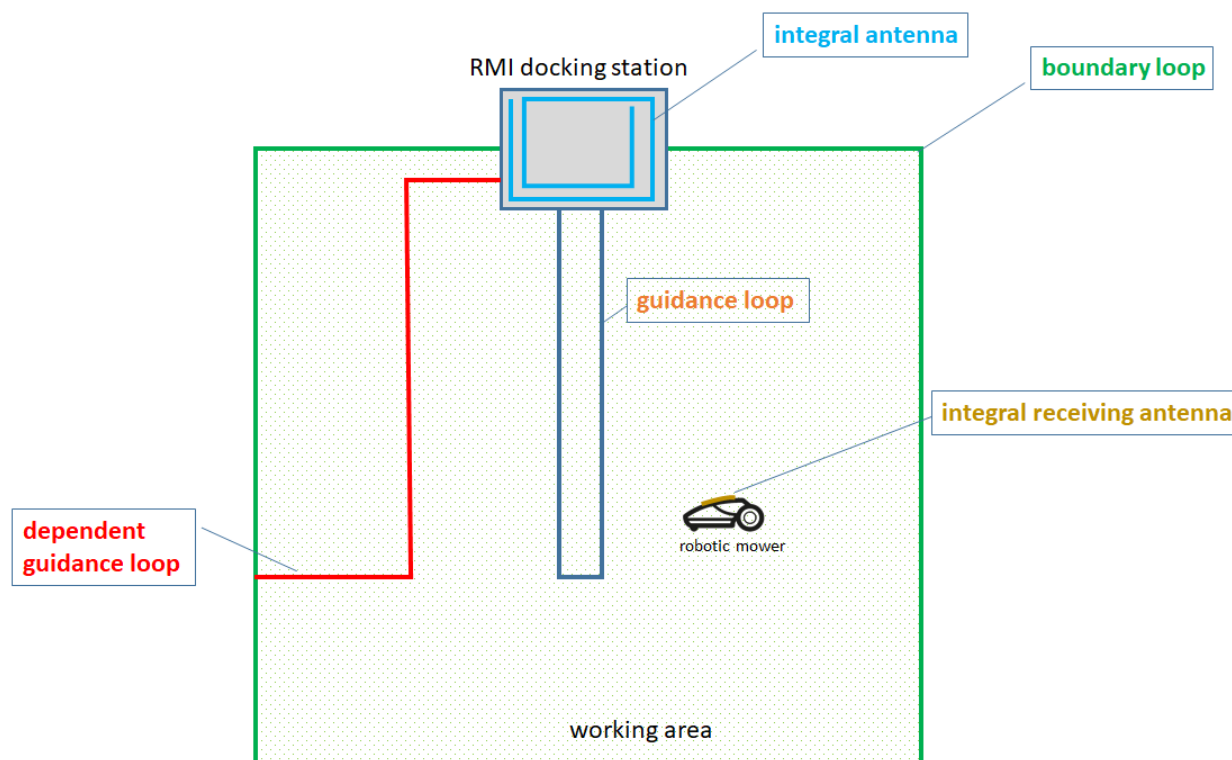


Figure 2: Overview of an RMI system, including the different possible antenna/loops

STANDARD PREVIEW
(standards.iteh.ai)

3.2 Symbols

For the purposes of the present document, the symbols given in ETSI EN 300 330 [1] and the following apply:

C_A	filtering capacitors of the artificial antenna
f_C	centre frequency of the OFR
f_H	highest frequency of the OFR
f_L	lowest frequency of the OFR
f_{SH}	higher frequency border between OOB and spurious domain
f_{SL}	lower frequency border between OOB and spurious domain
I_{CM}	Common mode current
I_{DM}	Differential mode current
L_A	inductive part of the artificial antenna
R_A	low frequency resistive part of the artificial antenna
R_C	common mode resistive part of the artificial antenna
R_D	high frequency resistive part of the artificial antenna
t_{SWT}	sweep time for TX measurement

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI EN 300 330 [1] and the following apply:

CM	Common Mode
DM	Differential Mode
EGMF	European Garden Machinery industry Federation
IHR	Interferer Handling Requirements
OBW	Occupied BandWidth
OFR	Operating Frequency Range
OOB	Out Of Band
RMI	Robotic Mower with Inductive loop system
RX	Receiver
TX	Transmitter