
**Information technology — Radio
frequency identification device
performance test methods —**

**Part 3:
Test methods for tag performance**

*Technologies de l'information — Méthodes d'essai des performances
du dispositif d'identification par radiofréquence —*

Partie 3: Méthodes d'essai des performances du tag

Document Preview

[ISO/IEC 18046-3:2020](https://standards.iteh.ai/catalog/standards/iso/f68215ad-5254-4250-a41e-e848088902c1/iso-iec-18046-3-2020)

<https://standards.iteh.ai/catalog/standards/iso/f68215ad-5254-4250-a41e-e848088902c1/iso-iec-18046-3-2020>



iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[ISO/IEC 18046-3:2020](https://standards.iteh.ai/catalog/standards/iso/f68215ad-5254-4250-a41e-e848088902c1/iso-iec-18046-3-2020)

<https://standards.iteh.ai/catalog/standards/iso/f68215ad-5254-4250-a41e-e848088902c1/iso-iec-18046-3-2020>



COPYRIGHT PROTECTED DOCUMENT

© ISO/IEC 2020

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier; Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword	vi
Introduction	vii
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Symbols and abbreviated terms	2
4.1 Symbols.....	2
4.2 Abbreviated terms.....	3
5 Conditions applicable to the test methods	4
5.1 Number of tags to be tested.....	4
5.2 Test environment.....	4
5.3 RF environment.....	4
5.4 Pre-conditioning.....	4
5.5 Default tolerance.....	4
5.6 Total measurement uncertainty.....	4
5.7 Test result reporting.....	5
5.8 Test mounting material.....	5
5.9 Test communication parameters.....	5
5.10 Test equipment limitations.....	5
5.11 Human exposure to EMF.....	5
6 Setup of test equipment for tag test	5
6.1 Test apparatus and test circuits for ISO/IEC 18000-2 tags.....	5
6.2 Test apparatus and test circuits for ISO/IEC 18000-3 tags.....	5
6.3 Test apparatus and test circuits for ISO/IEC 18000-61, ISO/IEC 18000-62, ISO/ IEC 18000-63 and ISO/IEC 18000-64 tags.....	6
6.3.1 Propagative UHF tags measurement.....	6
6.3.2 Inductive UHF tags measurement.....	8
6.4 Test apparatus and test circuits for ISO/IEC 18000-7 tags.....	8
7 Functional tests for inductive tags as defined in ISO/IEC 18000-2 and ISO/ IEC 18000-3, ISO/IEC 18000-61, ISO/IEC 18000-62, ISO/IEC 18000-63 and ISO/ IEC 18000-64	8
7.1 Identification magnetic field threshold ($H_{\text{THR Identification}}$).....	8
7.1.1 Purpose.....	8
7.1.2 Test procedure.....	8
7.2 Reading magnetic field threshold ($H_{\text{THR Read}}$).....	10
7.2.1 Purpose.....	10
7.2.2 Test procedure.....	10
7.2.3 Test report.....	11
7.3 Writing magnetic field threshold ($H_{\text{THR Write}}$).....	11
7.3.1 Purpose.....	11
7.3.2 Test procedure.....	11
7.4 Maximum operating magnetic field (H_{Max}).....	13
7.4.1 Purpose.....	13
7.4.2 Test procedure.....	13
7.5 Survival magnetic field (H_{Survival}).....	13
7.5.1 Purpose.....	13
7.5.2 Test procedure.....	13
7.6 Load modulation (LM).....	13
7.6.1 Purpose.....	13
7.6.2 Test procedure.....	13
7.7 Optional resonant frequency and Q factor measurement for inductive tag.....	14
7.7.1 Purpose.....	14

7.7.2	Test procedure	14
8	Functional tests for propagative tags as defined in ISO/IEC 18000-61, ISO/IEC 18000-62, ISO/IEC 18000-63 and ISO/IEC 18000-64	15
8.1	Minimum power operation threshold (P_{Min}) for identification, read and write	15
8.1.1	Purpose	15
8.1.2	Test procedure	15
8.1.3	Test report	16
8.2	Sensitivity degradation ($S_{Degradation}$)	17
8.2.1	Purpose	17
8.2.2	Test procedure	17
8.2.3	Test report	18
8.3	Maximum operating power of tag (P_{Max})	20
8.3.1	Purpose	20
8.3.2	Test procedure	20
8.3.3	Test report	20
8.4	Survival electromagnetic power of tag ($P_{Survival}$)	21
8.4.1	Purpose	21
8.4.2	Test procedure	21
8.4.3	Test report	22
8.5	Interference rejection ($I_{Rejection}$)	22
8.5.1	Purpose	22
8.5.2	Test procedure	23
8.5.3	Test report	23
8.6	Maximum fade rate ($P_{Min,Fade}$)	24
8.6.1	Purpose	24
8.6.2	Test procedure	25
8.6.3	Test report	26
9	Functional tests for 433,920 MHz propagative tags as defined in ISO/IEC 18000-7	26
9.1	Identification electromagnetic field threshold ($E_{THR Identification}$) and frequency tolerance	26
9.1.1	Purpose	26
9.1.2	Test procedure	26
9.1.3	Test report	27
9.2	Reading electromagnetic field threshold ($E_{THR Read}$) and frequency tolerance	28
9.2.1	Purpose	28
9.2.2	Test procedure	28
9.2.3	Test report	29
9.3	Writing electromagnetic field threshold ($E_{THR Write}$)	30
9.3.1	Purpose	30
9.3.2	Test procedure	30
9.3.3	Test report	31
9.4	Sensitivity Directivity ($S_{Directivity}$)	31
9.4.1	Purpose	31
9.4.2	Test procedure	32
9.4.3	Test report	33
9.5	Interference rejection ($I_{Rejection}$)	34
9.5.1	Purpose	34
9.5.2	Test procedure	34
9.5.3	Test report	37
9.6	Maximum operating electromagnetic field (E_{Max})	37
9.6.1	Purpose	37
9.6.2	Test procedure	37
9.6.3	Test report	39
9.7	Survival electromagnetic field ($E_{Survival}$)	39
9.7.1	Purpose	39
9.7.2	Test procedure	39
9.7.3	Test report	40

Annex A (informative) Resonant frequency and Q factor measurement for inductive tag	41
Annex B (normative) Test apparatus modification for ISO/IEC 18000-3 tags for field strengths >5 A/m	44
Annex C (normative) Test apparatus modification for ISO/IEC 18000-61, ISO/IEC 18000-62, ISO/IEC 18000-63 and ISO/IEC 18000-64 tags	45
Annex D (informative) Inventory command for all parts of ISO/IEC 18000	48
Annex E (normative) Backscatter power measurement	49
Bibliography	50

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[ISO/IEC 18046-3:2020](https://standards.iteh.ai/catalog/standards/iso/f68215ad-5254-4250-a41e-e848088902c1/iso-iec-18046-3-2020)

<https://standards.iteh.ai/catalog/standards/iso/f68215ad-5254-4250-a41e-e848088902c1/iso-iec-18046-3-2020>

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents) or the IEC list of patent declarations received (see <https://patents.iec.c>).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 31, *Automatic identification and data capture techniques*.

This third edition cancels and replaces the second (ISO/IEC 18046-3:2012), which has been technically revised.

The main changes compared to the previous edition are as follows:

- Change of the frequency range to 860 MHz to 930 MHz, as no countries, including Japan, support a frequency in the 930 MHz to 960 MHz range anymore;
- Adaptation of the test method for 860 MHz to 930 MHz band based on 10 years experience of the use of this document.

A list of all parts in the ISO/IEC 18046 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Radio frequency identification (RFID) technology has broad applicability to the automatic identification and data capture (AIDC) industry in item management. As a wireless communication technique based on radio frequency technology, the applications cover multiple levels of the industrial, commercial and retail supply chains. These can include:

- freight containers,
- returnable transport items (RTI),
- transport units,
- product packaging, and
- product tagging.

Performance tests define test methods which deliver results that allow the comparison of different RFID systems, interrogators and tags in order to select among them for use in a particular application.

The performance characteristics of devices (tags and interrogation equipment) can vary drastically due to application factors as well as the particular RFID air interface (frequency, modulation, protocol, etc.) being supported. Of key concern is the matching of the various performance characteristics to the user application. Additionally, in an open environment, users of such technology demand multiple sources for these devices from technology providers. A key challenge is a method of evaluating the differences between various technology providers' products in a consistent and equitable manner.

This document provides a framework for meeting the above noted concerns and challenges. To this end, clear definitions of performance as related to user application of RFID technology in the supply chain are provided. Based on such application-based definitions, test methods are defined with attention to the test parameters required for a consistent evaluation of RFID devices.

Of particular significance, these tests are defined for RFID devices with one antenna. It is common practice to have products with both single and multiple antennae to define an RFID transaction zone sufficient for the application. The defined test methods used are for a single antenna but can equivalently be extended to equipment with multiple antennae, in order to evaluate performance under conditions more closely matching those of a particular application. However, it is important to exercise care in multiple-antenna measurement since multiple antennae can cause antenna-to-antenna interactions, physical packaging limitations, mutual coupling issues, shadowing issues, directivity issues and other impacts, even with respect to interrogators since these can be limited in size, shape and mounting method for many RFID applications.