

Second edition  
2020-03

---

---

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

## Part 2: Test methods for interrogator performance

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

*Partie 2: Méthodes d'essai des performances de l'interrogateur*



Reference number  
ISO/IEC 18046-2:2020(E)

© ISO/IEC 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  
Fax: +41 22 749 09 47  
Email: [copyright@iso.org](mailto:copyright@iso.org)  
Website: [www.iso.org](http://www.iso.org)

Published in Switzerland

This is a preview of "ISO/IEC 18046-2:2020". Click here to purchase the full version from the ANSI store.

## Contents

	Page
Foreword .....	v
Introduction .....	vi
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>1</b>
<b>4 Symbols and abbreviated terms</b> .....	<b>2</b>
4.1 Symbols .....	2
4.2 Abbreviated terms .....	2
<b>5 Conditions applicable to the test methods</b> .....	<b>3</b>
5.1 Number of interrogators to be tested .....	3
5.2 Test environment .....	3
5.3 RF environment .....	3
5.4 Pre-conditioning .....	3
5.5 Default tolerance .....	3
5.6 Total measurement uncertainty .....	3
5.7 Test result reporting .....	4
5.8 Test communication parameters .....	4
5.9 TE limits .....	4
5.10 Human exposure to EMF .....	4
<b>6 Setup of TE for interrogator test</b> .....	<b>4</b>
6.1 Test apparatus and test circuits for ISO/IEC 18000-3 interrogators .....	4
6.2 Test apparatus and test circuits for ISO/IEC 18000-61, ISO/IEC 18000-62, ISO/ IEC 18000-63, ISO/IEC 18000-64 interrogators .....	5
6.3 Test apparatus and test circuits for ISO/IEC 18000-7 interrogators .....	5
<b>7 Functional tests for inductive interrogators as defined in ISO/IEC 18000-2 and ISO/ IEC 18000-3</b> .....	<b>7</b>
7.1 Interrogator sensitivity in Listen mode (Receiving mode) .....	7
7.1.1 Purpose .....	7
7.1.2 Test procedure .....	7
7.1.3 Test report .....	7
7.2 Interference rejection ( $I_{\text{Rejection}}$ ) .....	8
7.2.1 Purpose .....	8
7.2.2 Test procedure .....	8
7.2.3 Test report .....	9
7.3 Maximum EMF exposure ( $E_{\text{max}}$ ) .....	10
7.3.1 Purpose .....	10
7.3.2 Test procedure .....	10
7.3.3 Test report .....	10
7.4 Ratio between field radiated and power consumption .....	10
7.4.1 Purpose .....	10
7.4.2 Test procedure .....	10
7.4.3 Test report .....	10
7.5 Field strength distribution .....	11
7.5.1 Purpose .....	11
7.5.2 Test procedure .....	11
7.5.3 Test report .....	11
<b>8 Functional tests for interrogators as defined in ISO/IEC 18000-6 and in particular ISO/IEC 18000-63</b> .....	<b>12</b>
8.1 Receiver sensitivity for UHF interrogators using wave propagation .....	12
8.1.1 Purpose .....	12
8.1.2 Test procedure .....	12

This is a preview of "ISO/IEC 18046-2:2020". Click here to purchase the full version from the ANSI store.

8.1.3	Test report.....	15
8.2	Inductive UHF interrogators.....	16
<b>9</b>	<b>Functional tests for 433,920 MHz propagative interrogators as defined in ISO/IEC 18000-7.....</b>	<b>17</b>
9.1	Identification electromagnetic field threshold ( $E_{\text{THR Identification}}$ ) and frequency tolerance.....	17
9.1.1	Purpose.....	17
9.1.2	Test procedure.....	17
9.1.3	Test report.....	18
9.2	Reading/writing electromagnetic field threshold ( $E_{\text{THR Read/Write}}$ ) and frequency tolerance.....	18
9.2.1	Purpose.....	18
9.2.2	Test procedure.....	18
9.2.3	Test report.....	19
9.3	Sensitivity directivity ( $S_{\text{Directivity}}$ ).....	20
9.3.1	Purpose.....	20
9.3.2	Test procedure.....	20
9.3.3	Test report.....	21
9.4	Interference rejection ( $I_{\text{Rejection}}$ ).....	22
9.4.1	Purpose.....	22
9.4.2	Test procedure.....	22
9.4.3	Test report.....	23
9.5	Maximum operating electromagnetic field ( $E_{\text{Max Operating}}$ ).....	23
9.5.1	Purpose.....	23
9.5.2	Test procedure.....	23
9.5.3	Test report.....	24
9.6	Survival electromagnetic field ( $E_{\text{Survival}}$ ).....	24
9.6.1	Purpose.....	24
9.6.2	Test procedure.....	25
9.6.3	Test report.....	25
	<b>Annexe A (normative) Backscatter power measurement.....</b>	<b>27</b>
	<b>Bibliography.....</b>	<b>28</b>

This is a preview of "ISO/IEC 18046-2:2020". Click here to purchase the full version from the ANSI store.

## 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](http://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](http://www.iso.org/patents)) or the IEC list of patent declarations received (see <http://patents.iec.ch>).

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](http://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 second edition cancels and replaces the first edition (ISO/IEC 18046-2:2011), which has been technically revised.

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

- addition of test methods for UHF RFID in the 860-930 MHz in [Clause 7](#).

A list of all parts in the ISO 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](http://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.