
**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

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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. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

ISO/IEC 18046-3 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 18046-3:2007) which has been technically revised.

ISO/IEC 18046 consists of the following parts, under the general title *Information technology — Radio frequency identification device performance test methods*:

- *Part 1: Test methods for system performance*
- *Part 2: Test methods for interrogator performance*
- *Part 3: Test methods for tag performance*

Introduction

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 may include:

- Freight containers
- Returnable Transport Items (RTI)
- Transport units
- Product packaging
- Product tagging

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

The performance characteristics of devices (tags and interrogation equipment) may 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 International Standard provides a framework for meeting the above noted concern and challenges. To this end, clear definitions of performance as relate 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 having one antenna. It is common practice to have products with both single and multiple antennas to define an RFID transaction zone sufficient for the application. The defined methods can easily be extended from equipment with a single antenna to apply to equipment with multiple antennas, in order to evaluate performance under conditions more closely matching those of a particular application.

The International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC) draw attention to the fact that it is claimed that compliance with this document may involve the use of patents.

The ISO and IEC take no position concerning the evidence, validity and scope of these patent rights.

The holder of this patent right has assured the ISO and IEC that he is prepared to grant a free license to an unrestricted number of applicants on a worldwide, non-discriminatory basis and under other reasonable terms and conditions to make, use, and sell RFID reader antenna design / patterns for implementations of this ISO/IEC International Standard, which is related to testing. In this respect, the statements of the holder of this patent right are registered with the ISO and IEC. Information may be obtained from the following company.

Contact details	Patent number	Affected subclause(s) in this part of ISO/IEC 18046
Impinj inc 701 N. 34 th Street, Suite 300 Seattle, WA 98103 Tel: 206/517-5300 Fax: 206/517-5262	Patent pending	6.3.2, 7.1.2.3, 7.3.2.3, 7.4.2.1, 7.5.2.1, 7.6.2.3

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights other than those identified above. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

The latest information on IP that may be applicable to this part of ISO/IEC 18046 can be found at www.iso.org/patents.

Information technology — Radio frequency identification device performance test methods —

Part 3: Test methods for tag performance

1 Scope

This International Standard defines test methods for performance characteristics of RFID tags for item management, and specifies the general requirements and test requirements for tags which are applicable to the selection of the devices for an application. The summary of the test reports form a unified tag datasheet. It does not apply to testing in relation to regulatory or similar requirements.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 18000-1, *Information technology — Radio-frequency identification for item management — Part 1: Reference architecture and definition of parameters to be standardized*

ISO/IEC 18000-2, *Information technology — Radio-frequency identification for item management — Part 2: Parameters for air interface communications below 135 kHz*

ISO/IEC 18000-3, *Information technology — Radio-frequency identification for item management — Part 3: Parameters for air interface communications at 13,56 MHz*

ISO/IEC 18000-6, *Information technology — Radio-frequency identification for item management — Part 6: Parameters for air interface communications at 860 MHz to 960 MHz*

ISO/IEC 18000-7, *Information technology — Radio-frequency identification for item management — Part 7: Parameters for active air interface communications at 433 MHz*

ISO/IEC 18047-2, *Information technology — Radio frequency identification device conformance test methods — Part 2: Test methods for air interface communications below 135 kHz*

ISO/IEC TR 18047-3, *Information technology — Radio frequency identification device conformance test methods — Part 3: Test methods for air interface communications at 13,56 MHz*

ISO/IEC TR 18047-4, *Information technology — Radio frequency identification device conformance test methods — Part 4: Test methods for air interface communications at 2,45 GHz*

ISO/IEC TR 18047-6, *Information technology — Radio frequency identification device conformance test methods — Part 6: Test methods for air interface communications at 860 MHz - 960 MHz*

ISO/IEC TR 18047-7, *Information technology — Radio frequency identification device conformance test methods — Part 7: Test methods for air interface communications at 433 MHz*

ISO/IEC 19762 (all parts), *Information technology — Automatic identification and data capture (AIDC) techniques — Harmonized vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions found in ISO/IEC 19762 apply.

4 Symbols and abbreviated terms

$H_{\text{THR Identification}}$	Identification magnetic field threshold
$H_{\text{THR Read}}$	Reading magnetic field threshold
$H_{\text{THR Write}}$	Writing magnetic field threshold
H_{max}	Maximum operating magnetic field
H_{Survival}	Survival magnetic field
L_m	Load Modulation
$E_{\text{THR Identification}}$	Identification electromagnetic field threshold
$E_{\text{THR Read}}$	Reading electromagnetic field threshold
$E_{\text{THR Write}}$	Writing electromagnetic field threshold
$S_{\text{Degradation}}$	Sensitivity degradation
E_{max}	Maximum operating electromagnetic field
E_{Survival}	Survival electromagnetic field
ΔRCS	Delta radar cross section
$I_{\text{Rejection}}$	Interference rejection
G	Antenna gain
D	Distance between the tag and the antenna
MPE	Maximum Permissible human Exposure
SAR	Specific Absorption Rate

5 Conditions applicable to the test methods

5.1 Number of tags to be tested

Unless otherwise specified, testing shall be performed on 30 randomly chosen tags among a population of 1000 functional tags.