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Cards and security devices for personal identification — Contactless proximity objects —

Part 2: Radio frequency power and signal interface

Cartes et dispositifs de sécurité pour l'identification personnelle — Objets sans contact de proximité —

Partie 2: Interface radiofréquence et des signaux de communication

Reference number
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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.

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 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.

This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 17, *Cards and security devices for personal identification*.

This fourth edition cancels and replaces the third edition (ISO/IEC 14443-2:2016), which has been technically revised.

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

— amendment of active and passive PICC transmissions;

— amendment of electromagnetic disturbance levels for all PICC classes.

A list of all parts in the ISO/IEC 14443 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.

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Introduction

ISO/IEC 14443 (all parts) is one of a group of International Standards describing the parameters for identification cards as defined in ISO/IEC 7810 and the use of such cards for international interchange.

This document describes the electrical characteristics of two types of contactless interface between a proximity card and a proximity coupling device. The interface includes both power and bi-directional communication. It is intended to be used in conjunction with other parts of the ISO/IEC 14443 series.

Contactless card standards cover a variety of types as embodied in ISO/IEC 10536 (all parts) (close-coupled cards), ISO/IEC 14443 (all parts) (proximity cards), and ISO/IEC 15693 (all parts) (vicinity cards). These are intended for operation when very near, nearby and at a longer distance from associated coupling devices, respectively.

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Cards and security devices for personal identification — Contactless proximity objects —

Part 2: Radio frequency power and signal interface

1 Scope

This document specifies the characteristics of the fields to be provided for power and bi-directional communication between proximity coupling devices (PCDs) and proximity cards or objects (PICCs).

This document does not specify the means of generating coupling fields, nor the means of compliance with electromagnetic radiation and human exposure regulations, which can vary depending on the country.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 10373-6, *Cards and security devices for personal identification — Test methods — Part 6: Contactless proximity objects*

ISO/IEC 14443-1:2018, *Cards and security devices for personal identification — Contactless proximity objects — Part 1: Physical characteristics*

ISO/IEC 14443-3:2018, *Cards and security devices for personal identification — Contactless proximity objects — Part 3: Initialization and anticollision*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
bit duration
time during which a logic level is defined, at the end of which a new bit starts

3.2
BPSK
phase shift keying where the phase shift is 180°, resulting in two phase state possibilities

3.3
modified Miller
method of bit coding whereby a logic level during a *bit duration* (3.1) is represented by the position of a pulse within the bit frame

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3.4
modulation index
m
[1 − *b*] / [1 + *b*], where *b* is the ratio between the modulated amplitude and the initial signal amplitude

Note 1 to entry: The value of the index may be expressed as a percentage.

3.5
NRZ-L
method of bit coding whereby a logic level during a *bit duration* (3.1) is represented by one of two defined physical states of a communication medium

3.6
operating volume
positions, for each PICC class, where the corresponding Reference PICC and Active Reference PICC show PCD compliance with all requirements of this document for this class

3.7
subcarrier
signal of frequency, f_s, used to modulate a carrier of frequency, f_c

3.8
Manchester
method of bit coding whereby a logic level during a *bit duration* (3.1) is represented by a sequence of two defined physical states of a communication medium, the order of the physical states within the sequence defining the logical state

3.9
TR0
guard time between the end of a PCD transmission and the start of the PICC *subcarrier* (3.7) generation

3.10
TR1
synchronization time between the start of the PICC *subcarrier* (3.7) generation and the start of the PICC subcarrier modulation

4 Symbols and abbreviated terms

a	pulse shape factor, Type A
ACP	actual constellation point
AP	actual phase value
ASK	amplitude shift keying
b	ratio between the modulated and initial signal amplitude, Type B
BPSK	binary phase shift keying
EMD	electromagnetic disturbance, parasitically generated by the PICC
EPI	elementary phase interval
etu	elementary time unit
f_c	frequency of operating field (carrier frequency)
f_s	frequency of subcarrier

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