

Fourth edition
2020-07

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
ISO/IEC 14443-2:2020(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
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

This is a preview of "ISO/IEC 14443-2:2020". Click here to purchase the full version from the ANSI store.

Contents

	Page
Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Symbols and abbreviated terms	2
5 General considerations	5
5.1 Initial dialogue.....	5
5.2 Compliance.....	5
5.2.1 PICC compliance.....	5
5.2.2 PCD compliance.....	5
6 Power transfer	6
6.1 General.....	6
6.2 Frequency.....	6
6.3 Operating field strength.....	6
7 Signal interface	7
8 Communication signal interface Type A	9
8.1 Communication PCD to PICC.....	9
8.1.1 Bit rate.....	9
8.1.2 Modulation.....	9
8.1.3 Bit representation and coding.....	18
8.2 Communication PICC to PCD.....	23
8.2.1 Bit rate.....	23
8.2.2 PICC load modulation transmission.....	23
8.2.3 Subcarrier.....	27
8.2.4 Subcarrier modulation.....	28
8.2.5 PCD load modulation reception.....	28
8.2.6 Bit representation and coding.....	32
9 Communication signal interface Type B	32
9.1 Communication PCD to PICC.....	32
9.1.1 Bit rate.....	32
9.1.2 Modulation for bit rates of $f_c/128$, $f_c/64$, $f_c/32$, $f_c/16$, $f_c/8$, $f_c/4$, and $f_c/2$	33
9.1.3 Bit representation and coding.....	41
9.2 Communication PICC to PCD.....	41
9.2.1 Bit rate.....	41
9.2.2 PICC load modulation transmission.....	42
9.2.3 Subcarrier.....	42
9.2.4 Subcarrier modulation.....	42
9.2.5 PCD load modulation reception.....	42
9.2.6 Bit representation and coding.....	42
10 Electromagnetic disturbance levels	42
10.1 PCD limits.....	42
10.2 PICC limits.....	42
Annex A (informative) Complex envelope and constellation diagram	44
Annex B (informative) Inter symbol interference	45
Bibliography	47

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.

This is a preview of "ISO/IEC 14443-2:2020". [Click here to purchase the full version from the ANSI store.](#)

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.