

---

---

**Identification cards — Contactless  
integrated circuit cards — Proximity  
cards —**

**Part 4:  
Transmission protocol**

*Cartes d'identification — Cartes à circuit(s) intégré(s) sans contact —  
Cartes de proximité —*

*Partie 4: Protocole de transmission*

**PDF disclaimer**

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

Withdrawn

**COPYRIGHT PROTECTED DOCUMENT**

© ISO/IEC 2008

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Case postale 56 • CH-1211 Geneva 20  
Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.org](mailto:copyright@iso.org)  
Web [www.iso.org](http://www.iso.org)

Published in Switzerland

# Contents

Page

Foreword.....	v
Introduction .....	vi
<b>1</b> <b>Scope</b> .....	<b>1</b>
<b>2</b> <b>Normative references</b> .....	<b>1</b>
<b>3</b> <b>Terms and definitions</b> .....	<b>1</b>
<b>4</b> <b>Symbols and abbreviated terms</b> .....	<b>2</b>
<b>5</b> <b>Protocol activation of PICC Type A</b> .....	<b>4</b>
5.1 <b>Request for answer to select</b> .....	<b>5</b>
5.2 <b>Answer to select</b> .....	<b>6</b>
5.2.1 <b>Structure of the bytes</b> .....	<b>7</b>
5.2.2 <b>Length byte</b> .....	<b>7</b>
5.2.3 <b>Format byte</b> .....	<b>7</b>
5.2.4 <b>Interface byte TA(1)</b> .....	<b>8</b>
5.2.5 <b>Interface byte TB(1)</b> .....	<b>9</b>
5.2.6 <b>Interface byte TC(1)</b> .....	<b>9</b>
5.2.7 <b>Historical bytes</b> .....	<b>10</b>
5.3 <b>Protocol and parameter selection request</b> .....	<b>10</b>
5.3.1 <b>Start byte</b> .....	<b>10</b>
5.3.2 <b>Parameter 0</b> .....	<b>11</b>
5.3.3 <b>Parameter 1</b> .....	<b>11</b>
5.4 <b>Protocol and parameter selection response</b> .....	<b>12</b>
5.5 <b>Activation frame waiting time</b> .....	<b>12</b>
5.6 <b>Error detection and recovery</b> .....	<b>12</b>
5.6.1 <b>Handling of RATS and ATS</b> .....	<b>12</b>
5.6.2 <b>Handling of PPS request and PPS response</b> .....	<b>13</b>
5.6.3 <b>Handling of the CID during activation</b> .....	<b>13</b>
<b>6</b> <b>Protocol activation of PICC Type B</b> .....	<b>14</b>
<b>7</b> <b>Half-duplex block transmission protocol</b> .....	<b>14</b>
7.1 <b>Block format</b> .....	<b>14</b>
7.1.1 <b>Prologue field</b> .....	<b>15</b>
7.1.2 <b>Information field</b> .....	<b>18</b>
7.1.3 <b>Epilogue field</b> .....	<b>18</b>
7.2 <b>Frame waiting time</b> .....	<b>18</b>
7.3 <b>Frame waiting time extension</b> .....	<b>18</b>
7.4 <b>Power level indication</b> .....	<b>19</b>
7.5 <b>Protocol operation</b> .....	<b>20</b>
7.5.1 <b>Multi-Activation</b> .....	<b>20</b>
7.5.2 <b>Chaining</b> .....	<b>20</b>
7.5.3 <b>Block numbering rules</b> .....	<b>21</b>
7.5.4 <b>Block handling rules</b> .....	<b>22</b>
7.5.5 <b>PICC presence check</b> .....	<b>23</b>
7.5.6 <b>Error detection and recovery</b> .....	<b>23</b>
<b>8</b> <b>Protocol deactivation of PICC Type A and Type B</b> .....	<b>24</b>
8.1 <b>Deactivation frame waiting time</b> .....	<b>24</b>
8.2 <b>Error detection and recovery</b> .....	<b>24</b>
<b>Annex A</b> (informative) <b>Multi-Activation example</b> .....	<b>25</b>

<b>Annex B (informative) Protocol scenarios</b> .....	<b>26</b>
<b>B.1 Notation</b> .....	<b>26</b>
<b>B.2 Error-free operation</b> .....	<b>26</b>
<b>B.2.1 Exchange of I-blocks</b> .....	<b>26</b>
<b>B.2.2 Request for waiting time extension</b> .....	<b>27</b>
<b>B.2.3 DESELECT</b> .....	<b>27</b>
<b>B.2.4 Chaining</b> .....	<b>27</b>
<b>B.2.5 PICC Presence check</b> .....	<b>28</b>
<b>B.3 Error handling</b> .....	<b>29</b>
<b>B.3.1 Exchange of I-blocks</b> .....	<b>29</b>
<b>B.3.2 Request for waiting time extension</b> .....	<b>30</b>
<b>B.3.3 DESELECT</b> .....	<b>32</b>
<b>B.3.4 Chaining</b> .....	<b>32</b>
<b>Annex C (informative) Block and frame coding overview</b> .....	<b>35</b>
<b>Bibliography</b> .....	<b>37</b>

Withdrawn

## 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 14443-4 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology, Subcommittee SC 17, Cards and personal identification*.

This second edition cancels and replaces the first edition (ISO/IEC 14443-4:2001). It also incorporates the Amendment ISO/IEC 14443-4:2001/Amd.1:2006.

ISO/IEC 14443 consists of the following parts, under the general title *Identification cards — Contactless integrated circuit cards — Proximity cards*:

- *Part 1: Physical characteristics*
- *Part 2: Radio frequency power and signal interface*
- *Part 3: Initialization and anticollision*
- *Part 4: Transmission protocol*

## Introduction

ISO/IEC 14443 is one of a series of International Standards describing the parameters for identification cards as defined in ISO/IEC 7810, and the use of such cards for international interchange.

The protocol as defined in this part of ISO/IEC 14443 is capable of transferring the application protocol data units as defined in ISO/IEC 7816-4. Thus, application protocol data units may be mapped as defined in ISO/IEC 7816-4 and application selection may be used as defined ISO/IEC 7816-5.

ISO/IEC 14443 is intended to allow operation of proximity cards in the presence of other contactless cards conforming to ISO/IEC 10536 and ISO/IEC 15693 and Near Field Communication (NFC) devices conforming to ISO/IEC 18092 and ISO/IEC 21481.

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.

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

The holders of these patent rights have assured ISO and IEC that they are willing to negotiate licences under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statements of the holders of these patent rights are registered with the ISO and IEC. Information may be obtained from:

US Patent US5359323

FRANCE TELECOM  
Centre National d'Études des Télécommunications  
38-40 rue de Général Leclerc  
92794 Issy-les-Moulineaux  
Cedex 9  
France

MOTOROLA  
Motorola ESG  
207 route de Ferney  
P O Box 15  
1218 Grand-Saconnex  
Geneva  
Switzerland

JP 2129209, JP 2561051, JP 2981517

Contactless Responding Unit

OMRON  
Intellectual Property Department  
Law & Intellectual Property H.Q.  
20, Igadera Shimokaiinji  
Nagaokakyo City  
Kyoto 617-8510  
Japan

Patent EP 0 492 569 B1

A system and method for the non-contact transmission of data

ON-TRACK INNOVATIONS  
Z.H.R. Industrial Zone  
P O Box 32  
Rosh-Pina 12000  
Israel

The following companies may hold patents relating to this document but have not provided details of the patents or agreed to provide licences.

US 4 650 981

WAYNE S FOLETTA  
CA 95129, USA  
4760 Castlewood Drive  
San Jose, California CA 9512  
USA

US Patent No. 4, 661,691

JOHN W HALPERN  
C/O Vincent M DeLuca  
Rothwell, Figg, Ernst & Kurz, p.c.  
555 Thirteenth Street, N.W.  
Suite 701 East Tower  
Washington, D.C. 20004

WO 89 05549 A

MAGELLAN CORPORATION  
8717 Research Drive  
Irvine  
CA 92618  
USA

Attention is drawn to the possibility that some of the elements of this part of ISO/IEC 14443 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.

Withold@M

# Identification cards — Contactless integrated circuit cards — Proximity cards —

## Part 4: Transmission protocol

### 1 Scope

This part of ISO/IEC 14443 specifies a half-duplex block transmission protocol featuring the special needs of a contactless environment and defines the activation and deactivation sequence of the protocol.

This part of ISO/IEC 14443 is intended to be used in conjunction with other parts of ISO/IEC 14443 and is applicable to proximity cards or objects of Type A and Type B.

### 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 7816-3, *Identification cards — Integrated circuit cards — Part 3: Cards with contacts — Electrical interface and transmission protocols*

ISO/IEC 7816-4, *Identification cards — Integrated circuit cards — Part 4: Organization, security and commands for interchange*

ISO/IEC 14443-2, *Identification cards — Contactless integrated circuit cards — Proximity cards — Part 2: Radio frequency power and signal interface*

ISO/IEC 14443-3, *Identification cards — Contactless integrated circuit cards — Proximity cards — Part 3: Initialization and anticollision*