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**Identification cards — Integrated circuit  
cards —**

**Part 3:  
Cards with contacts — Electrical  
interface and transmission protocols**

*Cartes d'identification — Cartes à circuit intégré —*

*Partie 3: Cartes à contacts — Interface électrique et protocoles  
de transmission*

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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 7816-3 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 17, *Cards and personal identification*.

This third edition cancels and replaces the second edition (ISO/IEC 7816-3:1997), which has been technically revised. It also incorporates the Amendment ISO/IEC 7816-3:1997/Amd.1:2002.

In addition, it incorporates material extracted from the first edition of Part 4 (ISO/IEC 7816-4:1995), so that the transmission protocols are no longer present in the second edition of Part 4 (ISO/IEC 7816-4:2005).

ISO/IEC 7816 consists of the following parts, under the general title *Identification cards — Integrated circuit cards*:

- *Part 1: Cards with contacts — Physical characteristics*
- *Part 2: Cards with contacts — Dimensions and location of the contacts*
- *Part 3: Cards with contacts — Electrical interface and transmission protocols*
- *Part 4: Organization, security and commands for interchange*
- *Part 5: Registration of application providers*
- *Part 6: Interindustry data elements for interchange*
- *Part 7: Interindustry commands for Structured Card Query Language (SCQL)*
- *Part 8: Commands for security operations*
- *Part 9: Commands for card management*
- *Part 10: Cards with contacts — Electronic signals and answer to reset for synchronous cards*
- *Part 11: Personal verification through biometric methods*
- *Part 12: Cards with contacts — USB electrical interface and operating procedures*
- *Part 13: Commands for application management in multi-application environment*
- *Part 15: Cryptographic information application*

## Introduction

ISO/IEC 7816 is a series of standards specifying integrated circuit cards and the use of such cards for interchange. These cards are identification cards intended for information exchange negotiated between the outside world and the integrated circuit in the card. As a result of an information exchange, the card delivers information (computation result, stored data), and/or modifies its content (data storage, event memorization).

Five parts are specific to cards with galvanic contacts and three of them specify electrical interfaces.

- ISO/IEC 7816-1 specifies physical characteristics for cards with contacts.
- ISO/IEC 7816-2 specifies dimensions and location of the contacts.
- ISO/IEC 7816-3 specifies electrical interface and transmission protocols for asynchronous cards.

**NOTE** The first and second editions of ISO/IEC 7816-3 specified an optional use of contact C6 to provide the card with programming power required to write or to erase internal non-volatile memory. As every card manufactured since 1990 internally generates programming power, this third edition deprecates this use, as well as the related indications in the Answer-to-Reset and the related controls in each transmission protocol.

- ISO/IEC 7816-10 specifies electrical interface and answer to reset for synchronous cards.
- ISO/IEC 7816-12 specifies electrical interface and operating procedures for USB cards.

All the other parts are independent of the physical interface technology. They apply to cards accessed by one or more of the following methods: contacts, close coupling and radio frequency.

- ISO/IEC 7816-4 specifies organization, security and commands for interchange.
- ISO/IEC 7816-5 specifies registration of application providers.
- ISO/IEC 7816-6 specifies interindustry data elements for interchange.
- ISO/IEC 7816-7 specifies commands for structured card query language.
- ISO/IEC 7816-8 specifies commands for security operations.
- ISO/IEC 7816-9 specifies commands for card management.
- ISO/IEC 7816-11 specifies personal verification through biometric methods.
- ISO/IEC 7816-13 specifies commands for application management in multi-application environment.
- ISO/IEC 7816-15 specifies cryptographic information application.

ISO/IEC 10536<sup>[3]</sup> specifies access by close coupling. ISO/IEC 14443<sup>[5]</sup> and ISO/IEC 15693<sup>[6]</sup> specify access by radio frequency. Such cards are also known as contactless cards.

ISO and 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 ISO and IEC. Information may be obtained from the following companies.

Patent holder	Patent number	Details	Foreign equivalents
Toshiba Corporation Intellectual Property Division 1-1, Shibaura 1-Chome Minato-ku, Tokyo 105-8001, Japan	JPN 2537199	<i>Integrated circuit card,</i> (priority date: 1986-06-20; publication date: 1996-07-08)	FRA 8708646, FRA 8717770, USA 4833595, USA 4901276
	USA 5 61231	<i>Processing system which transmits a predetermined error code upon detection of an incorrect transmission code,</i> (priority date: 1991-03-12; publication date: 1992-11-03)	FRA 8713306, FRA 9209880

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.

# Identification cards — Integrated circuit cards —

## Part 3:

## Cards with contacts — Electrical interface and transmission protocols

### 1 Scope

This part of ISO/IEC 7816 specifies the power and signal structures, and information exchange between an integrated circuit card and an interface device such as a terminal.

It also covers signal rates, voltage levels, current values, parity convention, operating procedure, transmission mechanisms and communication with the card.

It does not cover information and instruction content, such as identification of issuers and users, services and limits, security features, journaling and instruction definitions.

### 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 7816-2, *Identification cards — Integrated circuit cards — Part 2: Cards with contacts — Dimensions and location of the contacts*

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

### 3 Terms and definitions

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

#### 3.1

##### **block**

byte string comprising two or three fields defined as prologue field, information field and epilogue field

#### 3.2

##### **class of operating conditions**

set of values for voltage and current

#### 3.3

##### **cold reset**

first reset occurring after activation

#### 3.4

##### **destination node address**

portion of the node address byte, identifying the intended receiver of the block