IS 14202 (Part 10) : 2013
ISO/IEC 7816-10 : 1999

भारतीय मानक

पहचान कार्ड्स — एकीकृत परिपथ कार्ड्स

भाग 10 तुल्यकालिक कार्डों के लिये इलैक्ट्रॉनिक संकेत और रीसेट उत्तर

Indian Standard

IDENTIFICATION CARDS — INTEGRATED CIRCUIT CARDS

PART 10 ELECTRONIC SIGNALS AND ANSWER TO RESET FOR SYNCHRONOUS CARDS

ICS 35.240.15

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

September 2013 **Price Group 4**

NATIONAL FOREWORD

This Indian Standard (Part 10) which is identical with ISO/IEC 7816-10 : 1999 'Identification cards — Integrated circuit(s) cards with contacts — Part 10**:** Electronic signals and answer to reset for synchronous cards' issued by the International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC) jointly was adopted by the Bureau of Indian Standards on the recommendations of the Computer Hardware, Peripherals and Identification Cards Sectional Committee and approval of the Electronics and Information Technology Division Council.

This standard (Part 10) is one of the parts of a series of standards on 'Identification cards — Integrated circuit cards'. The other parts in this series are:

Part 1	Physical characteristics
Part 2	Dimensions and location of the contacts
Part 3	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 11	Personal verification through biometric methods
Part 12	USB electrical interface and operating procedures
Part 13	Commands for application management in a multi-application environment

The text of ISO/IEC Standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

"Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'."

In this adopted standard, reference appears to certain International Standards for which Indian Standards also exist. The corresponding Indian Standards which are to be substituted in their respective places are listed below along with their degree of equivalence for the editions indicated:

International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
ISO/IEC 7810 : 1995 Identification cards — Physical characteristics	IS 14172 : 1994 Identification cards — Physical characteristics	Identical with ISO/IEC 7810 : 1985
ISO/IEC 7816-2 : 1999 Information technology — Identification cards — Integrated circuit(s) cards with contacts — Part 2: Dimensions and location of the contacts	IS 14202 (Part 2) : 2003 Identification cards — Integrated circuit(s) cards with contacts: Part 2 Dimensions and location of the contacts (*first revision*)	Identical
ISO/IEC 7816-3 : 1997 Information technology — Identification cards — Integrated circuit(s) cards with contacts — Part 3: Electronic signals and transmission protocols	IS 14202 (Part 3) : 2013 Identification cards — Integrated circuit cards — Part 3 Cards with contacts — Electrical interface and transmission protocols	Identical with ISO/IEC 7816-3 : 2006

(*Continued on third cover*)

Indian Standard

IDENTIFICATION CARDS — INTEGRATED CIRCUIT CARDS

PART 10 ELECTRONIC SIGNALS AND ANSWER TO RESET FOR SYNCHRONOUS CARDS

1 Scope

This part of ISO/IEC 7816 specifies the power, signal structures, and the structure for the answer to reset between an integrated circuit(s) card with synchronous transmission and an interface device such as a terminal.

The specifications in ISO/IEC 7816-3 apply where appropriate, unless otherwise stated here.

It also covers signal rates, operating conditions, and communication with the integrated circuit(s) card.

This part of ISO/IEC 7816 specifies two types of synchronous cards: type 1 and type 2.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC 7816. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO/IEC 7816 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 1177:1985, *Information processing — Character structure for start/stop and synchronous character oriented transmission*.

ISO/IEC 7810:1995, *Identification cards — Physical characteristics*.

ISO/IEC 7816-2:1999, *Information technology — Identification cards — Integrated circuit(s) cards with contacts — Part 2: Dimensions and location of the contacts*.

ISO/IEC 7816-3:1997, *Information technology — Identification cards — Integrated circuit(s) cards with contacts — Part 3: Electronic signals and transmission protocols.*

ISO/IEC 7816-4:1995, *Information technology — Identification cards — Integrated circuit(s) cards with contacts — Part 4: Interindustry commands for interchange*.

ISO/IEC 7816-4:1995/Amd.1:1997, *Information technology — Identification cards — Integrated circuit(s) cards with contacts — Part 4: Interindustry commands for interchange — Amendment 1: Impact of secure messaging on the structures of APDU messages.*

3 Term and definition

For the purposes of this part of ISO/IEC 7816, the following term and definition applies.

3.1
interface device
a terminal, communication device or machine to which the integrated circuit(s) card is electrically connected during operation

[ISO/IEC 7816-3:1997, 3.1.1]

4 Symbols and abbreviated terms

For the purposes of this part of ISO/IEC 7816, the following notation applies:

state H: High state logic level,

state L: Low state logic level,

state Z: Mark (as defined in ISO 1177),

state A: Space (as defined in ISO 1177),

'XY': Hexadecimal notation, equal to XY to the base 16.

5 Electrical characteristics of the contacts

5.1 Contact assignments

In addition to those contacts assigned in ISO/IEC 7816-2 the contact C4 is assigned to function code (FCB) for type 2 synchronous cards. FCB is used in conjunction with RST in order to indicate the type of command to be executed in the card (e.g. reset, read, write).

5.2 Voltage and current values

All voltage and current values are those defined in ISO/IEC 7816-3 for class A operating conditions. The electrical characteristics of the FCB contact (synchronous card type 2) are the same of those of RST contact.

5.3 Card type selection

The interface device may start with type 1 or type 2 operating conditions. If the card does not provide an Answer-to-Reset, or provides an inconsistent answer (see subclause 7.4), then the interface device shall deactivate the contacts and, after a delay of at least 10 ms, may apply other operating conditions.

6 Reset of the card

6.1 Synchronous card type 1

The interface device sets all lines to state L. See figure 1. VCC is then powered, VPP is set to idle state, CLK and RST remain in state L, I/O is put in reception mode in the interface device. RST shall be maintained in state H for at least 50 µs (t_{12}), before returning to state L again. The maximum value for fall/rise time is 0,5 µs (t_f and t_r in figures 1 and 2).

The clock pulse is applied after an interval (t_{10}) from the rising edge of the reset signal. The duration for the state H of the clock pulse can be any value between 10 µs and 50 µs; no more than one clock pulse during reset high is allowed. The time interval between the falling edges on CLK and RST is t_{11}.

The first data bit is obtained as an answer on I/O while CLK is in state L and is valid after an interval t_{13} from the falling edge on RST.

6.2 Synchronous card type 2

The interface device sets all the lines to state L. See figure 2. VCC is then powered, VPP is set to idle state, CLK, RST and FCB remain in state L, I/O is put in reception mode in the interface device. The clock pulse is applied after an interval (t_{20}) from the rising edge of the VCC. The duration of the clock pulse is t_{25}. FCB shall be maintained to L at least during the time t_{22} after the rising edge of clock pulse.

The first data bit is obtained as an answer on I/O while CLK is in state L and is valid after an interval t_{27} from the falling edge of CLK.

When FCB is set to state H, each clock pulse allows the reading on I/O of the next data bit.

7 Answer-to-Reset

In synchronous transmission, a series of bits is transmitted on the I/O line in half duplex mode in synchronization with the clock signal on CLK.

7.1 Clock frequency and bit rate

There is a linear relationship between the bit rate on the I/O line and the clock frequency delivered by the interface device on CLK e.g. a clock frequency of 7 kHz corresponds to 7 kbit/s.

The maximum value for fall/rise time is 0,5 µs (t_r and t_f in figures 1 and 2).

For card type 1 - any frequency below 50 kHz may be used.

For card type 2 - any frequency below 280 kHz may be used.

7.2 Structure of the Answer-to-Reset header

The reset operation results in an answer from the card containing a header transmitted from the card to the interface. The header has a fixed length of 32 bits and begins with two mandatory fields of 8 bits, H1 and H2.

The chronological order of transmission of the information bits shall correspond to bit identification b1 to b32 with the least significant bit transmitted first. The numerical meaning corresponding to each information bit considered in isolation is that of the digit

— 0 for a unit corresponding to state A (space);

— 1 for a unit corresponding to state Z (mark).

7.3 Timing of the header

7.3.1 Synchronous card type 1

After the reset procedure, see 6.1, the output information is controlled by clock pulses. The first clock pulse is applied between 10 µs and 100 µs (t_{14}) after the falling edge on RST. The duration of state H of clock pulses can be varied between 10 µs and 50 µs (t_{15}) and the duration of state L between 10 µs and 100 µs (t_{16}).

The first data bit is obtained as defined in 6.1. The second and the following data bits are valid between t_{17} measured from the falling edge on CLK. The data bits can therefore be sampled at the rising edge of subsequent clock pulses.

7.3.2 Synchronous card type 2

After the reset procedure, see 6.2, the output information is controlled by clock pulses. The first clock pulse is applied at t_{24} measured from the rising edge on FCB. The duration of state H of clock pulses is t_{25} and the duration of state L is at least 1 µs (t_{26}).

The first data bit is obtained as defined in 6.2. The second and the following data bits are obtained on I/O while the clock is low and are valid between the time t_{27} (measured from the falling edge on CLK) and the next falling edge on CLK. The data bits can therefore be sampled at the rising edge of subsequent clock pulses.

7.4 Data content of the header

The header comprises four fields (H1 to H4) and allows an early determination of whether the card and the interface device are compatible. If there is no compatibility, the contacts shall be deactivated according to clause 8.

The first field H1 codes the protocol type. The values of the codes and the corresponding protocol types are specified in table 1.

Table 1 — Coding of H1

b 8	b 7	b 6	b 5	b 4	b 3	b 2	b 1	Meaning
0	0	0	0	0	0	0	0	Not to be used
0	x	x	x	0	0	0	0	Reserved for protocols defined by ISO/IEC JTC1/SC17
x	x	x	x	x	x	x	1	Structure and coding of H1 and H2 assigned by registration authority
1	1	1	1	1	1	1	1	Not to be used
Other values								Proprietary

The second field H2 codes parameters for the protocol type coded in field H1. The values of H2 are to be assigned by ISO/IEC JTC 1/SC17, if H1 = ´x0´ (x = 1, ..., 7).

The specification of H3 and H4 falls outside the scope of this part of ISO/IEC 7816.

8 Deactivation of the contacts

When information exchange is terminated or aborted (unresponsive card or detection of card removal), the electrical contacts shall be deactivated. The deactivation by the interface device shall consist of the consecutive operations (RST is already in state L):

- State L on CLK,
- State L on FCB (card type 2 only),
- VPP inactive,
- State A on I/O,
- VCC inactive.

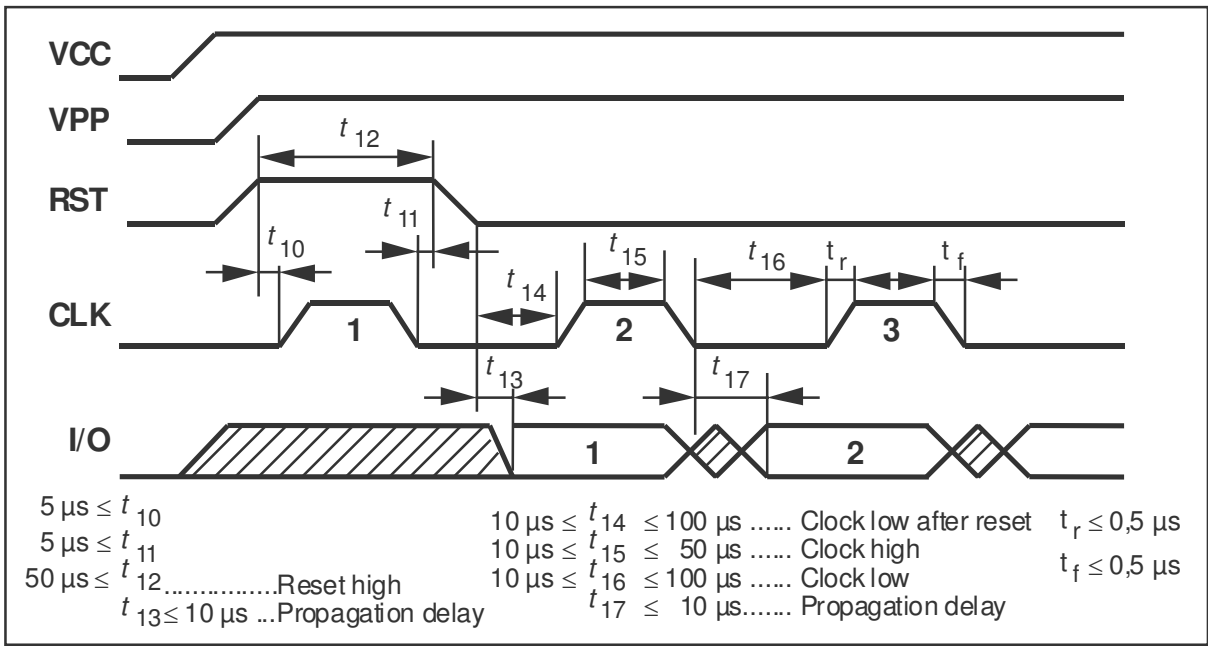

Figure 1 — Reset of a synchronous card type 1

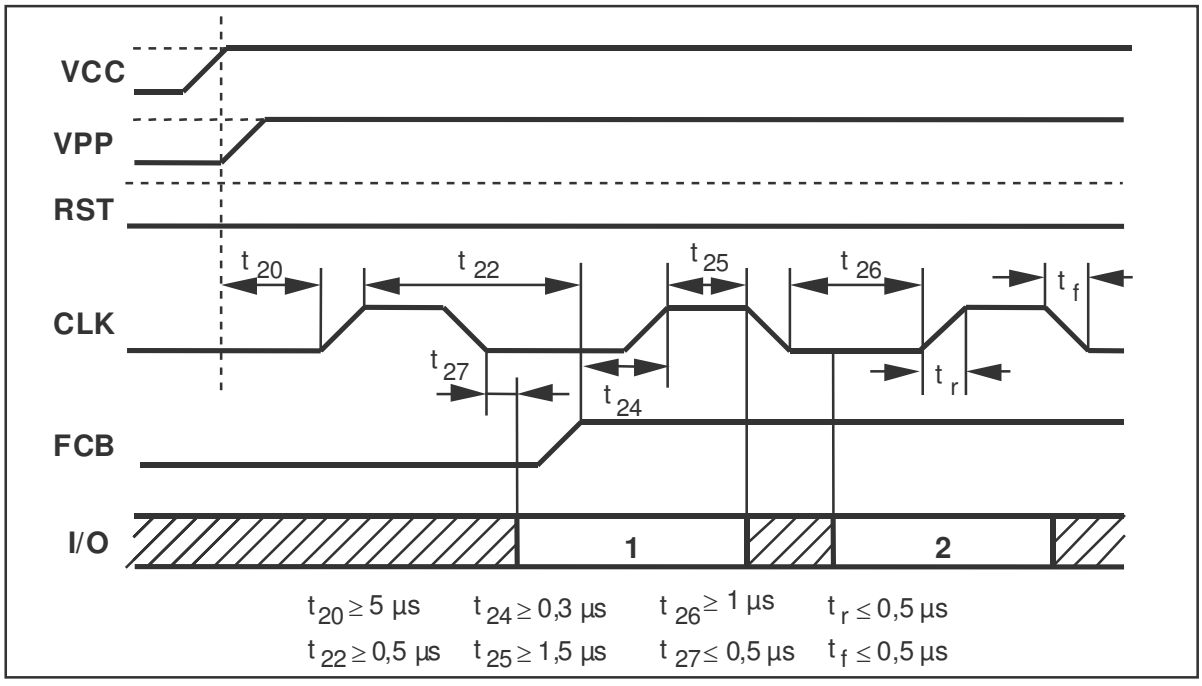

Figure 2 — Reset of a synchronous card type 2

Annex A
(informative)

Example of data structure introduced by H3 = '10'

The role of the fields H3 and H4 is similar to that of the historical bytes mentioned in ISO/IEC 7816-3. The third field H3 when set to ´10´ together with field H4 (see ISO/IEC 7816-4) may define the subsequent data structure.

Figure A.1 shows an example of a general application independent structure of the memory of a synchronous card seen at the interface between card and interface device. It contains the following fields:

- ATR
- ATR data section
- DIR(ectory) data section
- Application data section
- Extension area.

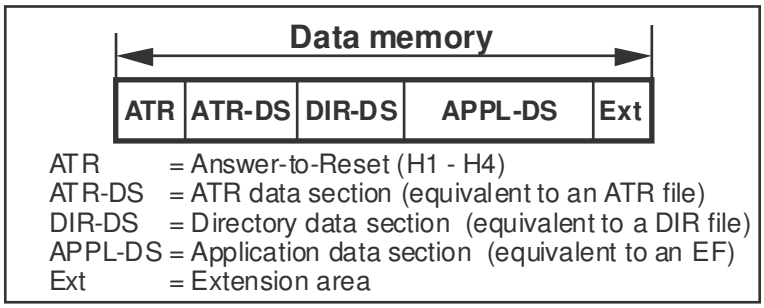

Figure A.1 — Example of data structure introduced by H3 = ‘10’

Annex B
(informative)

Example of coding of H1 and H2

Table B.1 — Coding of H1

b8	b7	b6	b5	b4	b3	b2	b1	Meaning
0	0	0	0	0	0	0	0	Not to be used
0	x	x	x	0	0	0	0	Reserved for ISO/IEC protocols, structure and coding of H2 reserved for ISO/IEC
								Structure and coding of H1 and H2 according to this table and table 2
0	x	x	x	0	0	1	0	Reserved for ISO/IEC protocols
1	x	x	x	0	0	1	0	Industry specific protocols
x	x	x	x	x	x	x	1	Structure and coding of H1 and H2 assigned by registration authority of chip industry
1	1	1	1	1	1	1	1	Not to be used
Other values								Proprietary structure and coding of H1 and H2

Table B.2 — Coding of H2 (b4 - b1 of H1 = 2)

b8	b7	b6	b5	b4	b3	b2	b1	Meaning
1	x	x	x	x	x	x	x	RFU
								Number of data units, coded in b7 - b4
0	0	0	0	0	x	x	x	No indication
0	0	0	0	1	x	x	x	128
0	0	0	1	0	x	x	x	256
0	0	0	1	1	x	x	x	512
0	0	1	0	0	x	x	x	1024
0	0	1	0	1	x	x	x	2048
0	0	1	1	0	x	x	x	4096
0								...
0	1	1	1	1	x	x	x	RFU
0	x	x	x	x	x	x	x	Length of data units in bits of 2**, coded in b3 - b1 (e.g. 011 = 8 bits = 1 byte)

(*Continued from second cover*)

International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
ISO/IEC 7816-4 : 1995 Information technology — Identification cards — Integrated circuit(s) cards with contacts — Part 4: Interindustry commands for interchange	IS 14202 (Part 4) : 2013 Identification cards — Integrated circuit cards: Part 4 Organization, security and commands for interchange (*under print*)	Identical with ISO/IEC 7816-4 : 2013

The technical committee has reviewed the provisions of the following International Standard referred in this adopted standard and has decided that it is acceptable for use in conjunction with this standard:

International Standard	*Title*
ISO 1177 : 1985	Information processing — Character structure for start/stop and synchronous character oriented transmission

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 1986 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

This Indian Standard has been developed from Doc No.: LITD 16 (3110).

Amendments Issued Since Publication

Amendment No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones: 2323 0131, 2323 3375, 2323 9402 *Website*: www.bis.org.in

Regional Offices: *Telephones*

Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002 — 2323 7617, 2323 3841

Eastern : 1/14, C.I.T. Scheme VII M, V.I.P. Road, Kankurgachi, KOLKATA 700054 — 2337 8499, 2337 8561, 2337 8626, 2337 9120

Northern : SCO 335-336, Sector 34-A, CHANDIGARH 160022 — 260 3843, 260 9285

Southern : C.I.T. Campus, IV Cross Road, CHENNAI 600113 — 2254 1216, 2254 1442, 2254 2519, 2254 2315

Western : Manakalaya, E9 MIDC, Marol, Andheri (East), MUMBAI 400093 — 2832 9295, 2832 7858, 2832 7891, 2832 7892

Branches: AHMEDABAD. BANGALORE. BHOPAL. BHUBANESHWAR. COIMBATORE. DEHRADUN. FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD. JAIPUR. KANPUR. LUCKNOW. NAGPUR. PARWANOO. PATNA. PUNE. RAJKOT. THIRUVANATHAPURAM. VISAKHAPATNAM.

Published by BIS, New Delhi