

Identification cards — Contactless integrated circuit(s) cards — Proximity cards — Part 2: Radio frequency power and signal interface

AMENDMENT 2

Bit rates of *fc/64*, *fc/32* and *fc/16*

Cartes d'identification — Cartes à circuit(s) intégré(s) sans contact - Cartes de proximité — Partie 2: Interface radio fréquence

AMENDEMENT 2

*Débits binaires de *fc/64*, *fc/32* et *fc/16**

Warning

This document is not an ISO International Standard. It is distributed for review and comment. It is subject to change without notice and may not be referred to as an International Standard.

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Document type: International Standard
Document subtype: Amendment
Document stage: (30) Committee
Document language: E

Copyright notice

This ISO document is a working draft or committee draft and is copyright-protected by ISO. While the reproduction of working drafts or committee drafts in any form for use by participants in the ISO standards development process is permitted without prior permission from ISO, neither this document nor any extract from it may be reproduced, stored or transmitted in any form for any other purpose without prior written permission from ISO.

Requests for permission to reproduce this document for the purpose of selling it should be addressed as shown below or to 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
Web www.iso.org

Reproduction for sales purposes may be subject to royalty payments or a licensing agreement.

Violators may be prosecuted.

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.

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.

Amendment 2 to ISO/IEC 14443-2:2001 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information Technology*, Subcommittee SC 17, *Identification cards and related devices*.

Identification cards — Contactless integrated circuit(s) cards — Proximity cards — Part 2: Radio frequency power and signal interface

AMENDMENT 2

Bit rates of $fc/64$, $fc/32$ and $fc/16$

Page 1, subclause 3.1

Replace the existing definition with the following:

"bit duration

one elementary time unit (etu), calculated by the following formula:

$$1 \text{ etu} = 128 / (D \times fc) \text{ where } D \in \{1,2,4,8\}$$

Page 4, clause 7

Replace figure 1 with the following:

	Type A	Type B
PCD to PICC <i>fc/128 to fc/16</i>	ASK 100% Modified Miller 	ASK 10% NRZ
PICC to PCD <i>fc/128</i>	Load Modulation Subcarrier <i>fc/16</i> OOK Manchester 	Load Modulation Subcarrier <i>fc/16</i> BPSK NRZ-L
PICC to PCD <i>fc/64</i>	Load Modulation Subcarrier <i>fc/16</i> BPSK NRZ-L 	
PICC to PCD <i>fc/32</i>	Load Modulation Subcarrier <i>fc/16</i> BPSK NRZ-L 	
PICC to PCD <i>fc/16</i>	Load Modulation Subcarrier <i>fc/16</i> BPSK NRZ-L 	

Page 4, subclause 8.1.1

Add the following text at the end of the subclause:

"The bit rate for the transmission after initialization and anticollision shall be one of the following:

- $fc/128$ (~106 kbit/s),
- $fc/64$ (~212 kbit/s),
- $fc/32$ (~424 kbit/s),
- $fc/16$ (~847 kbit/s)."

Page 4, subclause 8.1.2

Insert new subclause 8.1.2.1 with the following title and move all existing text and figures of subclause 8.1.2 into this new subclause 8.1.2.1:

"8.1.2.1 Modulation for a bit rate of $fc/128$ "

Page 5, subclause 8.1.2 that has been renumbered to 8.1.2.1

Replace the title of figure 2 with the following: **"Pause for a bit rate of $fc/128$ "**

Page 6, subclause 8.1.2

Insert new subclause 8.1.2.2 after subclause 8.1.2.1. Note that new subclause 8.1.2.2 includes new additional figure 4 and consequently all subsequent figures shall be renumbered.

8.1.2.2 Modulation for bit rates of $fc/64$, $fc/32$ and $fc/16$

Communication from PCD to PICC for bit rates of $fc/64$ (~212 kbit/s), $fc/32$ (~424 kbit/s) and $fc/16$ (~847 kbit/s) shall use the modulation principle of ASK of the RF operating field to create a pause as shown in figure 4.

The envelope of the PCD field shall decrease monotonically to less than 60% of its initial value. This envelope shall comply with figure 4.

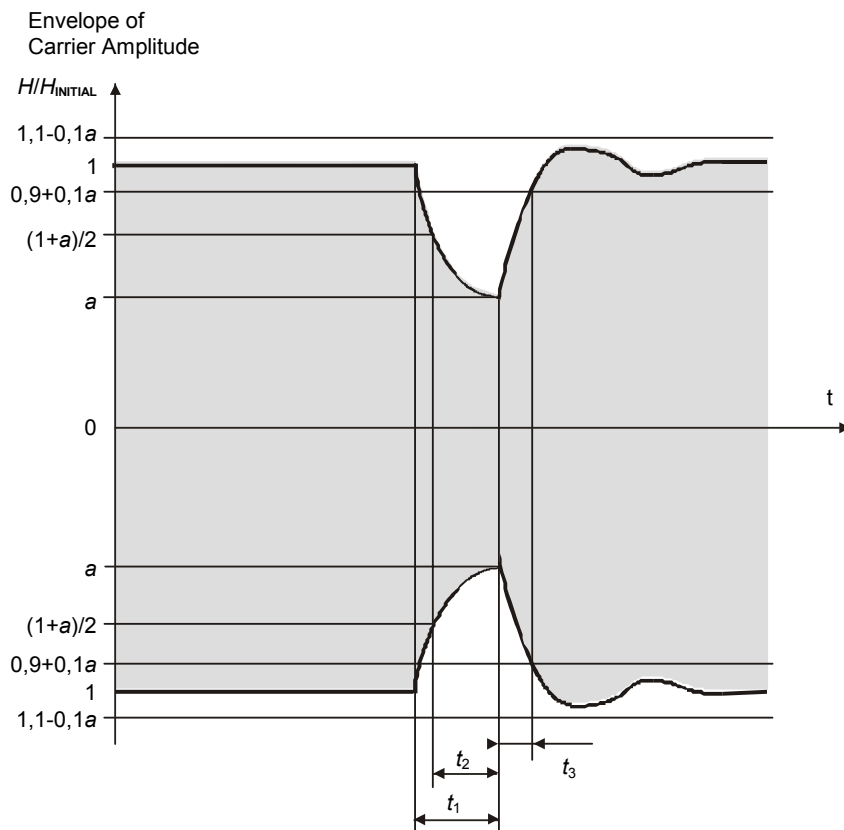


Figure 4 — Pause for bit rates of $fc/64$, $fc/32$ and $fc/16$

Overshoots shall remain within $\pm 0,1 \times (1-a)$ of $H_{INITIAL}$.

The parameter a in figure 4 shall be less than 0,6 for bit rates of $fc/64$, $fc/32$ and $fc/16$.

Table 1 — Modulation timing

Timing parameter	$fc/64$		$fc/32$		$fc/16$	
	Min	Max	Min	Max	Min	Max
t_1	$17/fc$	$21/fc$	$10/fc$	$12/fc$	$6/fc$	$7/fc$
t_2	$5/fc$	t_1	$4/fc$	t_1	$3/fc$	t_1
t_3	0	$10/fc$	0	$9/fc$	0	$8/fc$

Page 7, subclause 8.2.1

Add the following text at the end of the subclause:

"The bit rate for the transmission after initialization and anticollision shall be one of the following:

- $fc/128$ (~106 kbit/s),
- $fc/64$ (~212 kbit/s),

- $fc/32$ (~424 kbit/s),
- $fc/16$ (~847 kbit/s)."

Page 7, subclause 8.2.4

Replace the last sentence of the subclause with the following:

"At the bit rate of $fc/128$ the subcarrier is modulated using OOK with the sequences defined in 8.2.5.1. At bit rates of $fc/64$, $fc/32$ and $fc/16$ the subcarrier is modulated using BPSK with the sequences defined in 8.2.5.2."

Page 7, subclause 8.2.5

Insert new subclause 8.2.5.1 with the following title and move all existing text of subclause 8.2.5 into this new subclause 8.2.5.1:

"8.2.5.1 Bit representation and coding for a bit rate of $fc/128$ "

Page 7, subclause 8.2.5

Insert following new subclause 8.2.5.2 after subclause 8.2.5.1:

"8.2.5.2 Bit representation and coding for bit rates of $fc/64$, $fc/32$ and $fc/16$ "

Bit coding shall be BPSK with the following definitions:

- Logic "1": the carrier shall be modulated with the subcarrier for one bit duration,
- Logic "0": the carrier shall be modulated with the inverted subcarrier for one bit duration,
- Start of communication: burst of 32 subcarrier cycles (phase as logic "1") followed by inverted subcarrier for one bit duration (phase as logic "0"),
- End of communication: the carrier is not modulated with the subcarrier for one bit duration,
- No information: the carrier is not modulated with the subcarrier."

Page 8, subclause 9.1.1

Add the following text between the first and the second sentence of the subclause:

"The bit rate for the transmission after initialization and anticollision shall be one of the following:

- $fc/128$ (~106 kbit/s),
- $fc/64$ (~212 kbit/s),
- $fc/32$ (~424 kbit/s),
- $fc/16$ (~847 kbit/s)."

Page 8, subclause 9.1.2

Replace the table in figure 5 (original figure 4 becomes figure 5 after renumbering) with the following table:

Parameter	Bit rate			
	$fc/128$	$fc/64$	$fc/32$	$fc/16$
1 etu	~9,44 μ s	~4,72 μ s	~2,36 μ s	~1,18 μ s
$t_{f, \max}$	2 μ s	2 μ s	1 μ s	0,8 μ s
$t_{r, \max}$	2 μ s	2 μ s	1 μ s	0,8 μ s
γ	0,1(a-b)	0,1(a-b)	0,1(a-b)	0,1(a-b)
$h_{f, \max}, h_{r, \max}$	0,1(a-b)	0,1(a-b)	0,1(a-b)	0,1(a-b)

Page 9, subclause 9.2.1

Add the following text at the end of the subclause:

"The bit rate for the transmission after initialization and anticollision shall be one of the following:

- $fc/128$ (~106 kbit/s),
- $fc/64$ (~212 kbit/s),
- $fc/32$ (~424 kbit/s),
- $fc/16$ (~847 kbit/s)."

Page 9, subclause 9.2.3

Replace the first and the second sentence of the subclause with the following:

"The frequency f_s of the subcarrier shall be $fc/16$ (~847 kHz). Consequently, during initialization and anticollision, one bit period is equivalent to 8 periods of the subcarrier. After initialisation and anticollision, the number of subcarrier periods is determined by the bit rate."

Page 9, subclause 9.2.4

Replace figure 6 (original figure 5 becomes figure 6 after renumbering) with the following:

