

INTERNATIONAL  
STANDARD

ISO/IEC  
14443-2

First edition  
2001-06-28

AMENDMENT 1  
2005-06-01

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**Identification cards — Contactless  
integrated circuit(s) cards — Proximity  
cards —**

**Part 2:  
Radio frequency power and signal  
interface**

**AMENDMENT 1: 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 et des signaux de communication*

**AMENDEMENT 1: Débits binaires de  $fc/64$ ,  $fc/32$  et  $fc/16$**

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Reference number  
ISO/IEC 14443-2:2001/Amd.1:2005(E)



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Published in Switzerland

## Foreword

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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 1 to ISO/IEC 14443-2:2001 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 17, *Cards and personal identification*.



## Identification cards — Contactless integrated circuit(s) cards — Proximity cards —

### Part 2: Radio frequency power and signal interface

AMENDMENT 1: Bit rates of  $fc/64$ ,  $fc/32$  and  $fc/16$

*Page 3, clause 7*

Replace last sentence with the following:

"Figures 1 and Amd.1-1 illustrate the concepts described in the following clauses."

*Page 4, clause 7*

Replace figure 1 with the following:

"

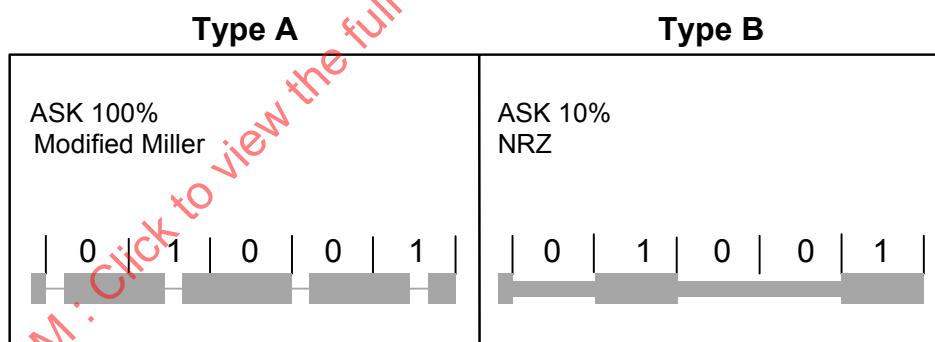


Figure 1 — Example PCD to PICC communication signals for Type A and Type B interfaces

"

Page 4, clause 7

Add the following new figure after figure 1:

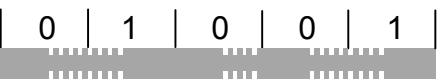
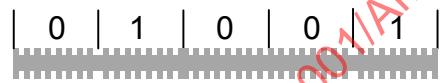
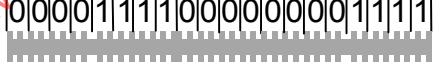
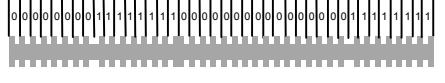
	Type A	Type B
bit rate of <b><math>fc/128</math></b>	Load Modulation Subcarrier $fc/16$ OOK Manchester  	Load Modulation Subcarrier $fc/16$ BPSK NRZ-L  
bit rate of <b><math>fc/64</math></b>		Load Modulation Subcarrier $fc/16$ BPSK NRZ-L  
bit rate of <b><math>fc/32</math></b>		Load Modulation Subcarrier $fc/16$ BPSK NRZ-L  
bit rate of <b><math>fc/16</math></b>		Load Modulation Subcarrier $fc/16$ BPSK NRZ-L  

Figure Amd.1-1 — Example PICC to PCD communication signals for Type A and Type B interfaces

*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 that has been renumbered to 8.1.2.1*

Delete the NOTE in figure 3 and replace the title of figure 3 with the following: "**Definition of "End of Pause" for a bit rate of  $fc/128$** "

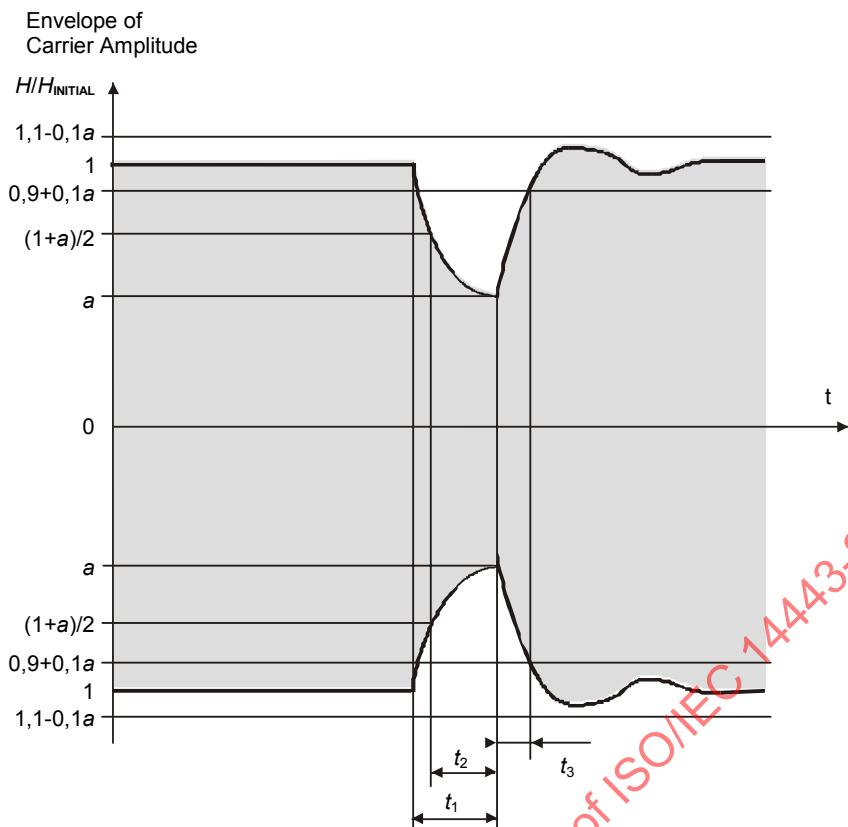
*Page 6, subclause 8.1.2*

Insert the following new subclause 8.1.2.2 after subclause 8.1.2.1:

**"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 Amd.1-2.

The envelope of the PCD field shall decrease monotonically to less than 60% of its initial value. This envelope shall comply with figure Amd.1-2.



**Figure Amd.1-2 — 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 Amd.1-2 shall be between 0 and 0,6 for bit rates of  $fc/64$ ,  $fc/32$  and  $fc/16$ .

The parameters  $t_1$ ,  $t_2$  and  $t_3$  are specified in table 1.

**Table 1 — Modulation timing**

Timing parameter	Bit rate					
	$fc/64$		$fc/32$		$fc/16$	
	Min	Max	Min	Max	Min	Max
$t_1$	15/fc	20/fc	8/fc	10/fc	4/fc	5/fc
$t_2$	8/fc	$t_1$	4/fc	$t_1$	2/fc	$t_1$
$t_3$	0	12/fc	0	10/fc	0	8/fc

"

Page 6, subclause 8.1.3

Add the following text, figure and table after definition of sequence Z (after fourth line):

"Figure Amd.1-3, together with the timing parameters in table 2, illustrates sequences X, Y and Z.

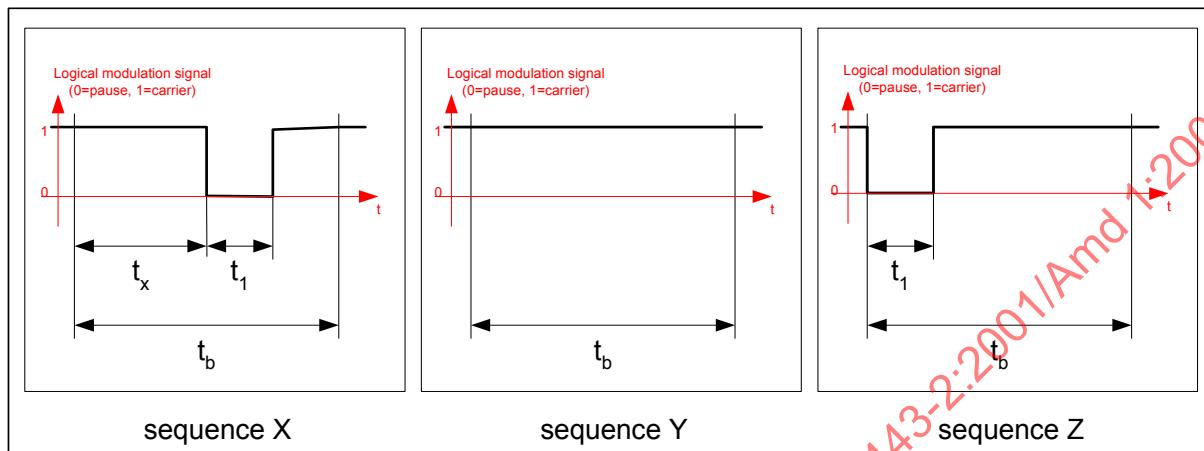


Figure Amd.1-3 — Signal shapes for sequences

Table 2 — Parameters for sequences

Parameter	Bit rate			
	$fc/128$	$fc/64$	$fc/32$	$fc/16$
$t_b$	$128/fc$	$64/fc$	$32/fc$	$16/fc$
$t_x$	$64/fc$	$32/fc$	$16/fc$	$8/fc$
$t_1$	see $t_1$ of figure 2	see $t_1$ of figure Amd.1-2		

"

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."