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**Identification cards — Contactless  
integrated circuit cards**

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

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ISO/IEC 14443-2:2010/Amd 3:2012  
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**Cartes d'identification — Cartes à circuit(s) intégré(s) sans contact**  
**Partie 2: Interface radiofréquence et des signaux de communication**  
**AMENDEMENT 3: Débits binaires de  $fc/8$ ,  $fc/4$  et  $fc/2$**

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Published in Switzerland

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Amendment 3 to ISO/IEC 14443-2:2010 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 17, *Cards and personal identification*

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# Identification cards — Contactless integrated circuit cards

## Part 2: Radio frequency power and signal interface

### AMENDMENT 3: Bits rates of $fc/8$ , $fc/4$ and $fc/2$

Page 5, Figure 1

Replace Figure 1 with:

“

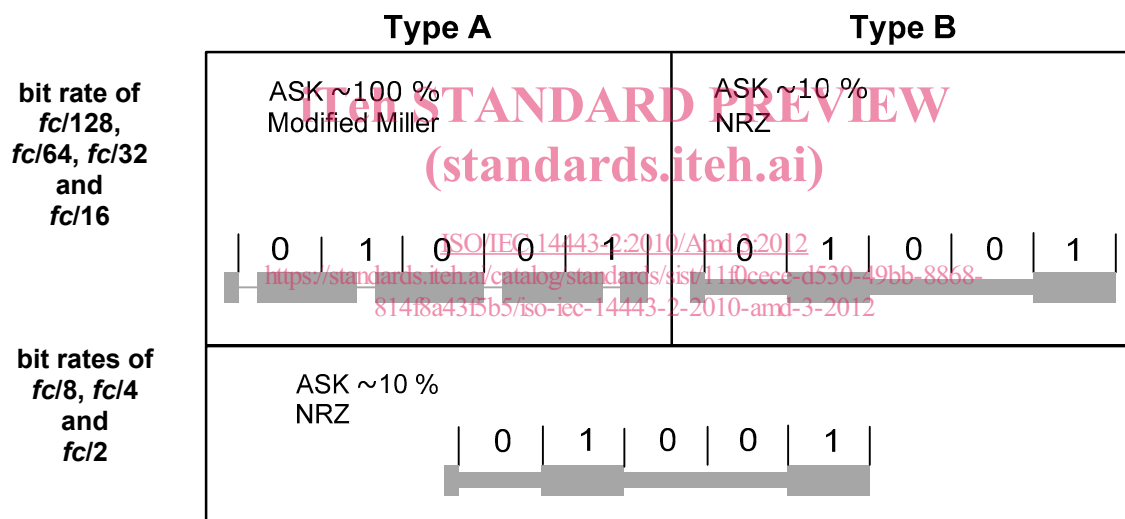


Figure 1 — Example PCD to PICC communication signals for Type A and Type B interfaces

”

Replace Figure 2 with:

“

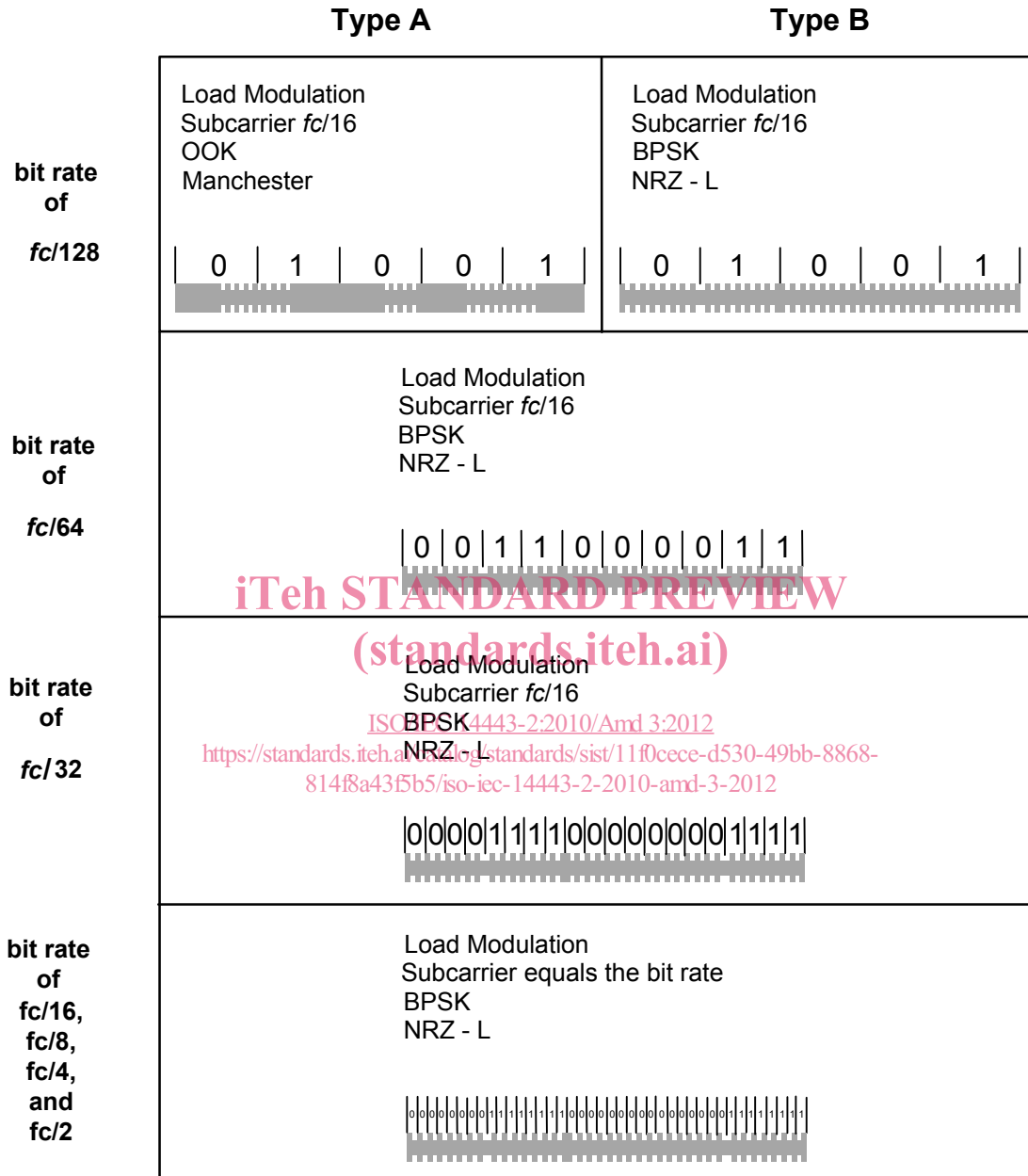


Figure 2 — Example PICC to PCD communication signals for Type A and Type B interfaces

”

Replace 8.1.1 with:

**8.1.1 Bit rate**

The bit rate for the transmission during initialization and anticollision shall be  $fc/128$  (~106 kbit/s).

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),
- $fc/16$  (~848 kbit/s),
- $fc/8$  (~1,70 Mbit/s),
- $fc/4$  (~3,39 Mbit/s),
- $fc/2$  (~6,78 Mbit/s)."

Page 14

Add new subclause after Figure 9:

**"8.1.2.3 Modulation for bit rates of  $fc/8$ ,  $fc/4$  and  $fc/2$**

See 9.1.2."

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Page 14, 8.1.3

Add the following new subclause title below the 8.1.3 title:

[ISO/IEC 14443-2:2010/Amd 3:2012](https://standards.iteh.ai/catalog/standards/sist/11f0cece-d530-49bb-8868-814f8a435b65/iso-iec-14443-2-2010-amd-3-2012)

**"8.1.3.1 Bit representation and coding for bit rates of  $fc/128$ ,  $fc/64$ ,  $fc/32$  and  $fc/16$ "**

Page 15

Add following new subclause before 8.2:

**"8.1.3.2 Bit representation and coding for bit rates of  $fc/8$ ,  $fc/4$  and  $fc/2$**

Bit representation and coding is defined in 9.1.3.

Start of communication is defined in ISO/IEC 14443-3:2011, 7.1.4.

End of communication is defined in ISO/IEC 14443-3:2011, 7.1.5."

Page 16, 8.2.3

Replace 8.2.3 with:

**"8.2.3 Subcarrier**

The PICC shall generate a subcarrier only when data is to be transmitted.

**8.2.3.1 Bit rates of  $fc/128$ ,  $fc/64$ ,  $fc/32$  and  $fc/16$**

The frequency  $f_s$  of the subcarrier shall be  $fc/16$  (~848 kHz). Consequently, during initialization and anticollision, one bit duration is equivalent to 8 periods of the subcarrier. After initialization and anticollision, the number of subcarrier periods is determined by the bit rate.

**8.2.3.2 Bit rates of  $fc/8$ ,  $fc/4$  and  $fc/2$**

The frequency  $f_s$  of the subcarrier shall be  $fc/8$  (~1,70 MHz),  $fc/4$  (~3,39 MHz) or  $fc/2$  (~6,78 MHz) depending on the bit rate as specified in Table Amd.3-1.

**Table Amd.3-1 — Subcarrier frequency vs bit rate**

Bit rate	Subcarrier frequency
$fc/8$ (~1,70 Mbit/s)	$fc/8$
$fc/4$ (~3,39 Mbit/s)	$fc/4$
$fc/2$ (~6,78 Mbit/s)	$fc/2$

”

Page 16, 8.2.4

Replace the second paragraph 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  $fc/64$ ,  $fc/32$ ,  $fc/16$ ,  $fc/8$ ,  $fc/4$  and  $fc/2$  the subcarrier is modulated using BPSK with the sequences defined in 8.2.5.2.”

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 ISO/IEC 14443-2:2010/Amd 3:2012

Page 17, 8.2.5.2

Change the 8.2.5.2 title to:

**“8.2.5.2 Bit representation and coding for bit rates of  $fc/64$ ,  $fc/32$ ,  $fc/16$ ,  $fc/8$ ,  $fc/4$  and  $fc/2$ ”**

Pages 17–18, 9.1.1

Replace 9.1.1 with:

**“9.1.1 Bit rate**

The bit rate for the transmission during initialization and anticollision shall be nominally  $fc/128$  (~106 kbit/s).

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),
- $fc/16$  (~848 kbit/s),
- $fc/8$  (~1,70 Mbit/s),



- $fc/4$  (~3,39 Mbit/s),
- $fc/2$  (~6,78 Mbit/s).

Bit boundary tolerances and character separation are defined in ISO/IEC 14443-3:2011, 7.1.1 and 7.1.2, respectively.”

*Page 18, 9.1.2*

Replace the paragraphs between Figure 12 and Figure 13 with:

“The PCD shall generate for any bit combination a modulation waveform with a modulation index  $m$

- greater than 8 % for all supported bit rates,
- and less than
  - 14 % for bit rates of  $fc/128$ ,  $fc/64$ ,  $fc/32$  and  $fc/16$ ,
  - 20 % for bit rates of  $fc/8$ ,  $fc/4$  and  $fc/2$ .

The PICC shall be able to receive for any bit combination a modulation waveform with a modulation index  $m$

- greater than
  - both  $(9,5 - 1,5H/H_{\min})$  % and 7 % for bit rates of  $fc/128$ ,  $fc/64$ ,  $fc/32$  and  $fc/16$ ,
  - 8 % for bit rates of  $fc/8$ ,  $fc/4$  and  $fc/2$ .
- and less than
  - 15 % for bit rates of  $fc/128$ ,  $fc/64$ ,  $fc/32$  and  $fc/16$ ,
  - 21 % for bit rates of  $fc/8$ ,  $fc/4$  and  $fc/2$ .

NOTE 1 Minimum and maximum values of  $H$  are defined in Table 1 and Table 2.

The limits for the modulation index  $m$  for bit rates of  $fc/128$ ,  $fc/64$ ,  $fc/32$  and  $fc/16$  are illustrated in Figure 13.”

*Page 19, 9.1.2*

Replace Table 8 title with:

**“Table 8 — PCD transmission: Overshoot and undershoot for all supported bit rates”**

Renumber NOTE 1 as NOTE 2.

Replace Table 9 title with:

**“Table 9 — PICC reception: Overshoot and undershoot for all supported bit rates”**