
**Identification cards — Contactless
integrated circuit cards — Proximity
cards —**

**Part 3:
Initialization and anticollision**

AMENDMENT 2: Bit rates of $fc/8$, $fc/4$
and $fc/2$, frame size from 512 bytes to
4 096 bytes and minimum TR0

*Cartes d'identification — Cartes à circuit(s) intégré(s) sans contact —
Cartes de proximité —*

Partie 3: Initialisation et anticollision

*AMENDEMENT 2: Débits binaires de $fc/8$, $fc/4$ et $fc/2$, taille de trame
comprise entre 512 octets et 4 096 octets et TR0 minimal*

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Foreword

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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.

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Amendment 2 to ISO/IEC 14443-3:2011 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 17, *Cards and personal identification*.

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Pages 5–6, 6.1

Replace the subclause with the following:

“

6.1 etu

The value of the etu for each bit rate is defined in Table 1:

Table 1 — etu

Bit rates	etu
$fc/128$ (~ 106 kbit/s)	$128/fc$ (~ 9,4 µs)
$fc/64$ (~ 212 kbit/s)	$128/2fc$ (~ 4,7 µs)
$fc/32$ (~ 424 kbit/s)	$128/4fc$ (~ 2,4 µs)
$fc/16$ (~ 848 kbit/s)	$128/8fc$ (~ 1,2 µs)
$fc/8$ (~ 1,70 Mbit/s)	$128/16fc$ (~ 0,59 µs)
$fc/4$ (~ 3,39 Mbit/s)	$128/32fc$ (~ 0,29 µs)
$fc/2$ (~ 6,78 Mbit/s)	$128/64fc$ (~ 0,15 µs)

”

Page 6, 6.2.1.1

Add the following after the first paragraph:

“For bit rates of $fc/8$, $fc/4$ and $fc/2$ the FDT starts at the end of the last modulation transmitted by the PCD.”

Page 7, 6.2.1.1

Replace the title of Figure 1 with the following:

“Figure 1 — Frame delay time PCD to PICC for bit rates up to $fc/16$ ”

Replace the row before the last row of Table 2 with the following:

“

$fc/128$ or $fc/64$ or $fc/32$ or $fc/16$ or $fc/8$ or $fc/4$ or $fc/2$	$fc/64$ or $fc/32$ or $fc/16$ or $fc/8$ or $fc/4$ or $fc/2$	Not applicable	$\geq 1116/fc$	$\geq 1116/fc$
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”

Add the following after Table 2:

“

NOTE If a bit rate higher than $fc/16$ is selected for PCD to PICC communication, then a bit rate of $fc/128$ is not allowed for PICC to PCD communication, see ISO/IEC 14443-4:2008/Amd.2. This restriction is required because the necessary precise FDT is not defined for PCD NRZ coding which is used for bit rates higher than $fc/16$.

The FDT measurement starts at the beginning of the rising edge as specified and illustrated with small circles in the following figures of ISO/IEC 14443-2:

- Figure 3 for bit rate of $fc/128$,
- Figure 6 for bit rates of $fc/64$, $fc/32$ and $fc/16$,
- Figure 12 for bit rates of $fc/8$, $fc/4$ and $fc/2$.

”

Page 7, 6.2.1.2

Replace the word “pause” by “modulation”.

Page 8, 6.2.3

Add the following after the last dash:

“

- PCD standard frames for bit rates of $fc/8$, $fc/4$ and $fc/2$.

”

Pages 8–9, 6.2.3.2

Add the following new subclause:

“6.2.3.2.1 PCD standard frame for bit rates of $fc/128$, $fc/64$, $fc/32$ and $fc/16$ and PICC standard frame”

Move the text of 6.2.3.2 into this subclause.

Replace:

“The PCD standard frame is illustrated in Figure 3.”

with:

“The PCD standard frame for bit rates of $fc/128$, $fc/64$, $fc/32$ and $fc/16$ is illustrated in Figure 3.”

Replace Figure 3 title with:

“Figure 3 — PCD standard frame for bit rates of $fc/128$, $fc/64$, $fc/32$ and $fc/16$ ”

Replace the third paragraph (below Figure 3) with the following:

“As an exception the last parity bit of a PICC standard frame shall be inverted if this frame is transmitted with bit rate higher than $fc/128$. PICC standard frames are illustrated in Figure 4.”

Page 9, 6.2.3.2, Figure 4

Replace the second caption with the following:

“PICC standard frames for bit rates higher than $fc/128$ ”

Replace Figure 4 title with:

“Figure 4 — PICC standard frames for bit rates higher than $fc/128$ ”

Add the following new subclause after Figure 4:

“6.2.3.2.2 PCD standard frame for bit rates of $fc/8$, $fc/4$ and $fc/2$ ”

The character transmission format and character separation as defined in 7.1.1 and 7.1.2, respectively, shall be used.

The frame format is defined in 7.1.3.

”

Page 23, 7.1

Add the following paragraph:

“ t_{etu} is defined in 6.1.”

Page 24, 7.1.1

Add the following paragraph below Table 13:

“For bit rates higher than $fc/16$, bit boundaries shall occur at nominal bit positions.”

Page 24, 7.1.2

Add a new subclause in 7.1.2:

“7.1.2.1 Character separation for bit rates up to $fc/16$ ”

Move the content of 7.1.2 to 7.1.2.1.

Add a note after Table 15:

“NOTE Integer number of etu for EGT should be used for all bit rates. Non integer values may not be accepted in future revisions of this standard.”

Add a second new subclause in 7.1.2:

“7.1.2.2 Character separation for bit rates of $fc/8$, $fc/4$ and $fc/2$ ”

No character separation shall be applied.”

Page 25, 7.1.4

In Table 17 replace “ $fc/16$ ” with “> $fc/32$ ”

Page 26, 7.1.4

In Table 18 replace “ $fc/16$ ” with “> $fc/32$ ”

Page 27, 7.1.5

In Table 20 replace “ $fc/16$ ” with “> $fc/32$ ”

Page 27, 7.1.6

Replace third paragraph including list with:

“The maximum value of TR_0 is:

- $4096/fc$ ($\sim 302 \mu s$) for ATQB;
- $65536/fc$ ($\sim 4,8 ms$) for S(DESELECT) and S(PARAMETERS) blocks (see ISO/IEC 14443-4, 8.1);
- $(4096/fc) \times 2^{FWI} - TR_1$ for all other frames (see 7.9.4.3).”

Remove timing information “($\sim 236 \mu s$)” in fourth paragraph.

Replace second sentence of last paragraph with the following:

“PCDs shall accept minimal and maximal values of TR0 with a margin of $16/f_c$ and of TR1 with a margin of $1/f_s$.”

Page 40, 7.9.4.4

Replace Table 27 with the following:

“

b3	b2	Minimum TR2
0	0	$10 \text{ etu} + 512/f_c$
0	1	$10 \text{ etu} + 2048/f_c$
1	0	$10 \text{ etu} + 4096/f_c$
1	1	$10 \text{ etu} + 8192/f_c$

”

Page 41, 7.9.4.5

Replace the subclause with the following:

“

7.9.4.5 Max_Frame_Size

Table 28 defines the maximum frame size

Table 28 — Maximum frame size

Maximum Frame Size Code in ATQB	'0'	'1'	'2'	'3'	'4'	'5'	'6'	'7'	'8'	'9'	'A'	'B'	'C'	'D' - 'F'
Maximum Frame Size (bytes)	16	24	32	40	48	64	96	128	256	512	1024	2048	4096	RFU

A PICC setting Maximum Frame Size Code = 'D' - 'F' is not compliant with this standard.

Until the RFU values 'D' - 'F' are assigned by ISO/IEC, a PCD receiving Maximum Frame Size Code = 'D' - 'F' should interpret it as Maximum Frame Size Code = 'C' (Maximum frame size = 4096 bytes).

NOTE This PCD recommendation is added for PCD's compatibility with future PICCs when ISO/IEC defines the behavior for the RFU values of 'D' - 'F'.

”

Page 41, 7.9.4.6

Add after last paragraph:

“NOTE S(PARAMETERS) as defined in ISO/IEC 14443-4:2008/Amd.2 is the only way to negotiate bit rates higher than $f_c/16$ and may also be used to negotiate any specified bit rate.”