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## **Identification cards — Test methods — Part 6: Proximity cards**

### **AMENDMENT 5**

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

*Cartes d'identification — Méthodes d'essai — Partie 6: Cartes de proximité*

### **AMENDEMENT 5**

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

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Amendment 5 to ISO/IEC 10373-6:2005 was prepared by Joint Technical Committee ISO/IEC JTC 1, , Subcommittee SC 17, .



## Identification cards — Test methods — Part 6: Proximity cards

### AMENDMENT 5

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

Page 8, subclause 7.1

Add the following note at the end of the subclause:

"NOTE: No load modulation test is required for bit rates of  $fd/64$ ,  $fd/32$  and  $fd/16$ ."

Page 14, subclause A.2

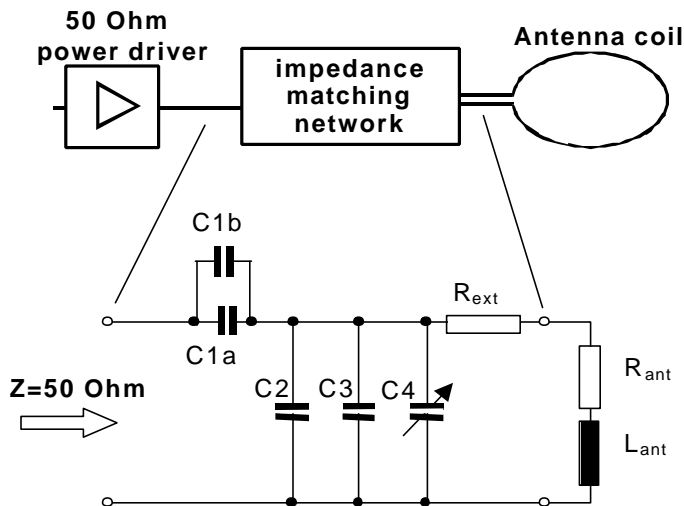
Insert a new subclause A.2.1 after the note and before figure A.3 with the following title and move the existing figure A.3 into the new subclause A.2.1:

#### "A.2.1 Impedance matching network for a bit rate of $fd/128$ "

Change the title of figure A.3 to "Figure A.3– Impedance matching network for a bit rate of  $fc/128$ "

Page 14, subclause A.2

Insert a new subclause A.2.2 after new subclause A.2.1 with the following title and insert the following figure into the new subclause A.2.2:"



Component Table:

	Value	Unit	Remarks
C1a	56	pF	Voltage range 200V
C1b	5,6	pF	Voltage range 200V
C2	180	pF	Voltage range 200V
C3	15	pF	Voltage range 200V
C4	2-27	pF	Voltage range 200V
Rext	2	Ohm	8 Watts at 7,5A/m

Figure A.4 — Impedance matching network for bit rates of  $fd/64$ ,  $fd/32$  and  $fd/16$ "

Page 4, subclause 7.2.2 of ISO/IEC 10373-6:2001/AMD:2003

Replace the existing text with the following:

"Tables 1 to 4 define additional test conditions to be applied for type A PICCs for different bit rates.

NOTE the definitions for timing parameters related to the amplitude are different between  $fd/128$  and higher bit rates, see ISO/IEC 14443-2:2001/AMD2, 8.1.2.2."

Page 4, subclause 7.2.2 of ISO/IEC 10373-6:2001/AMD:2003

Replace the title of table 1 with the following "**Table 1 – Additional test conditions for a bit rate of  $fd/128$** "

Page 4, subclause 7.2.2 of ISO/IEC 10373-6:2001/AMD:2003

Insert the following table after table 1:

**Table 2 — Additional test conditions for a bit rate of  $fd/64$**

Condition	$H$ (A/m)	$t1$ ( $\mu$ s)	$t2$ ( $\mu$ s)
1	1,5	1,5	0,8
2	1,5	1,1	0,9
3	4,5	1,5	0,8
4	4,5	1,1	0,9
5	7,5	1,5	0,8
6	7,5	1,1	0,9

Page 4, subclause 7.2.2 of ISO/IEC 10373-6:2001/AMD:2003

Insert the following table after table 2:

**Table 3 — Additional test conditions for a bit rate of  $fd/32$**

Condition	$H$ (A/m)	$t1$ ( $\mu$ s)	$t2$ ( $\mu$ s)
1	1,5	0,8	0,4
2	1,5	0,6	0,5
3	4,5	0,8	0,4
4	4,5	0,6	0,5
5	7,5	0,8	0,4
6	7,5	0,6	0,5

Page 4, subclause 7.2.2 of ISO/IEC 10373-6:2001/AMD:2003

Insert the following table after table 3:

**Table 4 — Additional test conditions for a bit rate of  $fd/16$** 

Condition	$H$ (A/m)	$t_1$ ( $\mu$ s)	$t_2$ ( $\mu$ s)
1	1,5	0,4	0,2
2	1,5	0,3	0,2
3	4,5	0,4	0,2
4	4,5	0,3	0,2
5	7,5	0,4	0,2
6	7,5	0,3	0,2

Page 4, subclause 7.2.3 of ISO/IEC 10373-6:2001/AMD:2003

Replace the title of table 2 (renumbered to table 5I with the following: "**Table 5 – Additional test condition for bit rates of  $fd128$  and  $fd64$** "

Page 4, subclause 7.2.3 of ISO/IEC 10373-6:2001/AMD:2003

Insert the following table after table 5:

**Table 6 — Additional test conditions for a bit rate of  $fd/32$** 

Condition	$H$ (A/m)	$M$	$T_r, t_f$ ( $\mu$ s)
1	1,5	8	1
2	1,5	14	1
3	4,5	8	1
4	4,5	14	1
5	7,5	8	1
6	7,5	14	1

Page 4, subclause 7.2.3 of ISO/IEC 10373-6:2001/AMD:2003

Insert the following table after table 6:

**Table 7 — Additional test conditions for a bit rate of  $fd/16$** 

Condition	$H$ (A/m)	$m$ (%)	$t_r, t_f$ ( $\mu$ s)
1	1,5	8	0,8
2	1,5	14	0,8
3	4,5	8	0,8
4	4,5	14	0,8
5	7,5	8	0,8
6	7,5	14	0,8

Last page

Add the following new Annex K:

**"Annex K  
(informative)**

**Optional protocol test methods for bit rates of *fc/64*, *fc/32* and *fc/16***

**K.1 High bit rate selection mechanism type A**

The purpose of this test is to analyse the high bit rate selection mechanism. This test is suitable only for the PCD, which supports high bit rates (*fd/64*, *fd/32* or *fd/16*).

The following test should be repeated for the supported bit rates.

**K.1.1 Apparatus**

For the purpose of this test the PCD-test-apparatus shall be configurable to change the bit rate during the test procedure. Tester shall be able to measure the bit rate used by the PCD on each stage of this test procedure.

**K.1.2 Procedure**

Place the PCD-test-apparatus into the field of the PCD.

Run through activation sequence as defined in ISO/IEC 14443-3.

Procedure 1 and 2 shall be repeated for all supported values of DRI and DSI ((00)b, (01)b, (10)b, (11)b).

**K.1.2.1 Procedure 1**

Use the following sequence immediately after the activation sequence:

- a) The PCD sends a RATS command.
- b) The PCD-test-apparatus answers with a valid ATS. For the purpose of this test assume, that the PCD-test-apparatus returns interface byte TA(1) equal '91' (see ISO/IEC 14443-4:2001 clause 5.2.4). Value '91' = (10010001)b means:
  - ?? bit rate supported is *fd/64* in both directions.
  - ?? PCD-test-apparatus supports only the same bit rate in both directions.
- c) The PCD may send the following PPS request to change parameters: 'D0 11 05 CRC\_A'. Value '05' = (00000101)b means:
  - ?? selected divisor integer from PICC to PCD is (01)b, it means a bit rate of *fd/64* from PICC to PCD.
  - ?? selected divisor integer from PCD to PICC is (01)b, it means a bit rate of *fc/64s* from PCD to PICC.
- d) The PCD-test-apparatus acknowledges the received PPS request as following: 'D0 CRC\_A'.
- e) The PCD shall send I(0)<sub>b</sub> block using a bit rate of *fd/64*.

- f) The PCD-test-apparatus sends  $I(0)_0$  using a bit rate  $fc/64$ . Check, that the answer from the PCD-test apparatus (using a bit rate  $fc/64$ ) is accepted by the PCD.

**Scenario K1 —High bit rate selection, type A, Procedure 1**

PCD		PCD-test-apparatus
RATS command frame (‘E0 01 CRC_A’)	? ? ? ?	
	? ? ? ?	ATS, TA(1) = ‘91’
OPTIONAL PPS request (‘D0 11 05 CRC_A’)	? ? ? ?	
	? ? ? ?	PPS response
$I(0)_0$ (using bit rate $fc/64$ )	? ? ? ?	
	? ? ? ?	$I(0)_0$ (using bit rate $fc/64$ )

**K.1.2.2 Expected result**

The PCD shall answer as described in Scenario K 1.

**K.1.2.3 Test report**

Fill the appropriate row in table K.1 according to the test results and report which bit rate has been tested.

**K.1.2.4 Procedure 2**

Use the following sequence after the activation sequence:

- a) The PCD sends a RATS command frame.
- b) The PCD-test-apparatus answers with a valid ATS. For the purpose of this test assume, that the PCD-test-apparatus returns interface byte TA(1) equal ‘21’ (see ISO/IEC 14443-4:2001 clause 5.2.4)). Value ‘21’= (00100001)b means:
  - ?? DS = 4 and DR = 2 are supported by the PCD-test-apparatus.
  - ?? PCD-test-apparatus supports different bit rates for each direction.
- c) The PCD may send the following PPS request to change parameters: ‘D0 11 09 CRC\_A’. Value ‘09’ = (00001001)b means:
  - ?? selected divisor integer from PICC to PCD is (10)b, it means a bit rate of  $fc/32$  from PICC to PCD.
  - ?? selected divisor integer from PCD to PICC is (01)b, it means a bit rate of  $fc/64$  from PCD to PICC.
- d) The PCD-test-apparatus acknowledges the received PPS request as following: ‘D0 CRC\_A’.

- e) The PCD shall send  $I(0)_0$  block using a bit rate  $fc/64$ .
- f) The PCD-test-apparatus sends  $I(0)_0$  using a bit rate  $fc/32$ . Check, that the answer from the PCD-test apparatus (using a bit rate  $fd/32$ ) is accepted by the PCD.

**Scenario K.2 —High bit rate selection, type A, Procedure 2**

PCD		PCD-test-apparatus
RATS command frame (‘E0 01 CRC_A’)	? ? ? ?	
	? ? ? ?	ATS, TA(1) = ‘21’
PPS request (e.g. ‘D0 11 09 CRC_A’)	? ? ? ?	
The PPS may also confirm $fc/64$ and $fd/128$		
	? ? ? ?	PPS response
$I(0)_0$ (using bit rate $fd/64$ )	? ? ? ?	
	? ? ? ?	$I(0)_0$ (using bit rate of $fc/32$ )

**K.1.2.5 Expected result**

The PCD shall answer as described in Scenario K.2.

**K.1.2.6 Test report**

Fill the appropriate row in table K.1 according to the test results and report which bit rate has been tested.

**K.2 High bit rate selection mechanism type B**

The purpose of this test is to analyse the high bit rate selection mechanism. This test is suitable only for the PCD, which supports high bit rates ( $fd/64$ ,  $fc/32$  or  $fd/16$ ).

The following test should be repeated for the supported bit rates.

**K.2.1 Apparatus**

For the purpose of this test the PCD-test-apparatus shall be configurable to change the bit rate during the test procedure. Tester shall be able to measure the bit rate used by the PCD on each stage of this test procedure.

**K.2.1.1 Procedure**

Place the PCD-test-apparatus into the field of the PCD.

**K.2.1.2 Procedure 1**

Use the following sequence:

- g) The PCD sends a valid REQB Command frame ('05 00 00 71 FF').
- h) The PCD-test-apparatus answers with ATQB. Assume, that PUPI of the PCD-test-apparatus is '12 23 34 45' and the PCD-test-apparatus supports CID. For the purpose of this test assume, that the PCD-test-apparatus returns Bit\_Rate\_capability byte equal '91' (see ISO/IEC 14443-3:2001 clause 7.9.4.6), which means that bit rate supported by the PCD-test-apparatus is  $fc/64$  and the PCD-test-apparatus supports only the same bit rate in both directions.
- i) The PCD shall send a valid ATTRIB Command frame. If bits b8 to b5 of Param2 byte equal to (0000)<sub>b</sub>, stop test at this point.
- j) For the purpose of this test assume, that ATTRIB Command frame received from the PCD is '1D 12 23 34 45 00 50 01 04 CRC\_B' and Param2 byte equal to '50'. Value '50' means:
  - ?? PCD Maximum Frame size is 16 bytes (b4 to b1 of Param2 equal 0).
  - ?? Bit rate selected is  $fc/64$  in both directions (b8 to b5 of Param2 equal 5).
- k) The PCD-test-apparatus sends Answer to ATTRIB command using the bit rate  $fc/128$ . Switch the PCD-test-apparatus to the bit rate  $fc/64$ .
- l) The PCD shall send  $I(0)_0$  or  $I(1)_0$  block using a bit rate  $fc/64$ .
- m) The PCD-test-apparatus sends  $I(0)_0$  using a bit rate  $fc/64$ . Check, that the answer from the PCD-test-apparatus (using a bit rate  $fc/64$ ) is accepted by the PCD.

**Scenario K.3—High bit rate selection, type B, Procedure 1**

PCD	PCD-test-apparatus
REQB	? ? ? ?
	? ? ? ?
ATTRIB command frame with, e.g. PARAM2 = '50': (e.g. '1D 12 23 34 45 00 50 01 04 CRC_B')	? ? ? ?
	? ? ? ?
$I(0)_0$ or $I(1)_0$ (using bit rate $fc/64$ )	? ? ? ?
	? ? ? ?
	ATQB
	Answer to ATTRIB command ( '04 CRC_B' ) (using bit rate $fc/128$ )
	$I(0)_0$ (using bit rate $fc/64$ )

**K.2.1.3 Expected result**

The PCD command is expected according to the scenario K.3

**K.2.1.4 Test report**

Fill the appropriate row in table K.1 according to the test results and report which bit rate has been tested.

**K.2.1.5 Procedure 2**

Use the following sequence:

- n) The PCD sends a valid REQB Command frame ('05 00 00 71 FF').
- o) The PCD-test-apparatus answers with ATQB. Assume, that PUPI of the PCD-test-apparatus is '12 23 34 45' and the PCD-test-apparatus supports CID. For the purpose of this test assume, that the PCD-test-apparatus returns Bit\_Rate\_capability byte equal '91' (see ISO/IEC 14443-3:2001 clause 7.9.4.6), which means that bit rate supported by the PCD-test-apparatus is  $f_c/64$  and the PCD-test-apparatus supports only the same bit rate in both directions.
- p) The PCD shall send a valid ATTRIB Command frame. If bits b8 to b5 of Param2 byte equal to (0000)<sub>b</sub>, stop test at this point.
- q) For the purpose of this test assume, that ATTRIB Command frame received from the PCD is '1D 12 23 34 45 00 50 01 04 CRC\_B' and Param2 byte equal to '50'. Value '50' means:
  - ?? PCD Maximum Frame size is 16 bytes (b4 to b1 of Param2 equal 0).
  - ?? Bit rate selected is  $f_c/64$  in both directions (b8 to b5 of Param2 equal 5).
- r) The PCD-test-apparatus sends Answer to ATTRIB command using the bit rate  $f_d/64$ .
- s) If I(0)<sub>b</sub> block is received from the PCD with a bit rate of  $f_c/64$ , stop test at this points and report about e rror.
- t) The PCD shall repeat ATTRIB Command frame or send REQB.

**Scenario K.4 — High bit rate selection, type B, Procedure 2**

PCD	PCD-test-apparatus
REQB	? ? ? ?
	ATQB
ATTRIB command frame with, e.g., PARAM2 = '50': (e.g. '1D 12 23 34 45 00 50 01 04 CRC_B')	? ? ? ?
	Answer to ATTRIB command ( '04 CRC_B' ) (using bit rate $f_c/64$ )
REQB or ATTRIB commands (bit rate $f_d/128$ )	? ? ? ?
	ATQB or Answer to ATTRIB

**K.2.1.6 Expected result**

The PCD command is expected according to the scenario K.4

**K.2.1.7 Test report**

Fill the appropriate row in table K.1 according to the test results and report which bit rate has been tested.

**K.3 Test coverage report**

The test coverage report will report the test reports.

If the PCD's behaviour matches the expected test scenario then report "pass".

If the PCD fails on at least one step of the test scenario then report "fail".

**Table K.5 — Test coverage report**

No	Name	Description	Information
1	Bit rate selection	Tested only the PCD supports high bit rates	<i>fc/64</i>
			<i>fc/32</i>
			<i>fc/16</i>