

PRE-DRAFT AMENDMENT

Identification cards — Testmethods — Part 6: Proximity cards

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

AMENDMENT 2: Improved RF test methods

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Contents

1	<u>Scope</u>	1
2	<u>Normative references</u>	1
3	<u>Terms and definitions</u>	2
4	<u>Symbols (and abbreviated terms)</u>	2
5	<u>Improved RF test methods</u>	2
5.1	<u>Reproducibility of PICC load modulation test</u>	2
5.2	<u>Additional conditions for the functional test of the PICC</u>	3
5.2.1	<u>Conditions for Type A</u>	3
5.2.2	<u>Conditions for Type B</u>	3
5.3	<u>Tuning of the resonance frequency of the Reference PICC</u>	4
5.4	<u>Measurements of H level in the PCD field</u>	4
5.5	<u>PCD assembly and the matching network</u>	4
5.6	<u>Reference PICC (Annex D)</u>	4
5.6.1	<u>Addition of Zener diode in parallel to C3</u>	4
5.6.2	<u>Modification of R2</u>	4
5.7	<u>Modification of the divider chain (Figure 4)</u>	5

Foreword

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Amendment 2 to International Standard ISO/IEC 10373-6:2002 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information Technology*, Subcommittee SC 17, *Identification cards and related devices*.

Introduction

A paragraph.

The **introduction** is an optional preliminary element used, if required, to give specific information or commentary about the technical content of the standard, and about the reasons prompting its preparation. It shall not contain requirements.

The introduction shall not be numbered unless there is a need to create numbered subdivisions. In this case, it shall be numbered 0 with subclauses being numbered 0.1, 0.2, etc. Any numbered figure, table, displayed formula or footnote shall be numbered normally beginning with 1.

Identification cards — Testmethods — Part 6: Proximity cards

1 Scope

This International Standard defines additional test methods for characteristics of identification cards according to the definition given in ISO/IEC 7810. Each test method is cross-referenced to one or more base standards, which may be ISO/IEC 7810 or one or more of the supplementary standards that define the information storage technologies employed in identification cards applications.

NOTE 1 Criteria for acceptability do not form part of this International Standard but will be found in the International Standards mentioned above.

NOTE 2 Test methods described in this International Standard are intended to be performed separately. A given card is not required to pass through all the tests sequentially.

This amendment to part 6 of ISO/IEC 10373 deals with test methods which are specific to contactless integrated circuit(s) card technology (Proximity cards). Part 1 of the standard, General characteristics, deals with test methods which are common to one or more ICC technologies and other parts deal with other technology-specific tests.

Unless otherwise specified, the tests in this amendment to ISO/IEC 10373-6 shall be applied exclusively to Proximity cards defined in ISO/IEC 14443-1 and ISO/IEC 14443-2.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO/IEC 10373-6:2000, *Identification cards – Test methods - Part 6: Proximity cards*

ISO/IEC 7810:1995, *Identification cards - Physical characteristics*

ISO/IEC 14443-1:2000, *Identification cards - Proximity cards - Part 1: Physical characteristics*

ISO/IEC 14443-2:2001, *Identification cards - Proximity cards - Part 2: Radio frequency power and signal interface*

ISO/IEC 14443-3:2001, *Identification cards - Proximity cards - Part 3: Initialization and anticollision*

ISBN 92-67-10188-9, 1993, *ISO Guide to the Expression of Uncertainty in Measurement*

3 Terms and definitions

For the purposes of this International Standard, the terms and definitions given in ISO/IEC 10373-6:2001 and the following apply.

4 Symbols (and abbreviated terms)

<i>f_{cm}</i>	Frequency of the operating field during the PICC load modulation test
<i>H</i>	Field strength of the PCD antenna field
<i>m</i>	modulation index as defined in clause 3.3 of ISO/IEC 14443-2
PCD	Proximity Coupling Device
PICC	Proximity Card
<i>t</i> ₁ , <i>t</i> ₂	Pulse segments as defined in figure 2 of ISO/IEC 14443-2
<i>t</i> _r , <i>t</i> _f	Rise and fall times as defined in figure 4 of ISO/IEC 14443-2

5 Improved RF test methods

5.1 Reproducibility of PICC load modulation test

Add to clause 7.2 of ISO/IEC 10373-6:

“The frequency *f_{cm}* of the carrier delivered by the signal generator to the test PCD antenna shall be such that two subcarrier cycles correspond exactly to an integer number of samples. The frequency which fulfils this requirement (with common oscilloscope sampling rates) and which is the closest to the nominal carrier frequency defined in ISO/IEC 14443-2 is 13 559 322 Hz.

The discrete Fourier transformation shall be done at the exact sidebands frequencies generated by the PICC under test, i.e. $f_{cm} \times 15 / 16$ and $f_{cm} \times 17 / 16$. If the programme given in informative annex F of ISO/IEC 10373-6 is used it shall be modified to replace 13,56 MHz by the exact value of *f_{cm}* during the test.

NOTE To limit to approximately 5% in the worst case the measurement error due to inexact frequencies the following tolerances apply:

- *f_{cm}* = 13 559 322 Hz +/- 50 ppm

- *f_{cm}* measurement error + oscilloscope sampling rate error: +/- 10 ppm

(The oscilloscope sampling rate error may be compensated if the *f_{cm}* measurement is done by the digital sampling oscilloscope. A better than +/- 10 ppm precision may be achieved by sampling more than 500 periods of unmodulated carrier and using interpolation to know precisely the time of the first and of the last rising edge of the carrier.)

NOTE To limit the measurement error due to noise (quantification noise, PICC noise...) the following techniques may be used:

- increase of the oscilloscope sampling rate

- increase of the number of subcarrier cycles used in the Fourier transformation

(To minimize transient effects, avoid a subcarrier cycle immediately following a non-modulating period or a phase shift.)

NOTE For type B PICC load modulation test, the oscilloscope FFT option may also be used on a large number of subcarrier cycles with neither transient effect nor phase shift (i.e. on a stable part of synchronization time TR1 as defined in clause 9.2.5 of ISO/IEC 14443-2).”

5.2 Additional conditions for the functional test of the PICC

In addition to the functional test given in clause 7 of ISO/IEC 10373-6 this clause defines additional test conditions to verify the ability of the PICC to receive the PCD message under the specified conditions given in tables 1 and 2.

5.2.1 Conditions for Type A

Table 1 defines the additional test conditions to be applied for type A.

Table 1 — Additional test conditions for type A

Pause width (t1)	3 μ s	2 μ s
Carrier below 5% time (t2)	0,5 μ s	0,7 μ s
H = 1,5 A/m	X	X
H = 4,5 A/m	X	X
H = 7,5 A/m	X	X

5.2.1.1 Test procedure

Under all these conditions the PICC shall answer to a REQA with ATQA.

5.2.1.2 Test report

The test report shall confirm the intended operation under the conditions marked with X in table 1.

5.2.2 Conditions for Type B

Table 2 defines the additional test conditions to be applied for type B.

Table 2 — Additional test conditions for type B

Modulation index (m)	8%		14%	
	1 μ s	2 μ s	1 μ s	2 μ s
Rise, fall times (tr, tf)				
H = 1,5 A/m	X	X	X	X
H = 4,5 A/m	X	X	X	X
H = 7,5 A/m	X	X	X	X

5.2.2.1 Test procedure

Under all these conditions the PICC shall answer to a REQB with ATQB.

5.2.2.2 Test report

The test report shall confirm the intended operation under the conditions marked with X in table 2.

5.3 Tuning of the resonance frequency of the Reference PICC

Replace the Note in clause 8.1.2 of ISO/IEC 10373-6 by:

"NOTE Tuning of the resonance frequency of the PICC is performed as follows:

- a) Set jumper J1 to position a.
- b) Drive the Calibration Coil directly from a signal generator with the desired frequency setting.
- c) Locate the Calibration Coil and the Reference PICC as close as possible with the axes of the two coils being congruent and adjust the Reference PICC capacitor C2 to maximum voltage, assuring final reading of about 3 Volts (dc) at R1 of the Reference PICC by adjusting the generator drive level."

5.4 Measurements of H level in the PCD field

Replace clause 8.4.2 of ISO/IEC 10373-6 by:

"Annex E describes a Reference PICC and calibration procedure which allows the sensitivity of a PCD to load modulation to be assessed. This Reference PICC does not emulate the shunt action of all types of PICC, therefore it shall be calibrated at a given field strength H in the Test PCD assembly. It shall be used in the PCD field at a position where the field has the same value of H . The measurement of C3 (dc) voltage shall be exactly the same for both Reference PICC calibration and PCD load modulation test."

5.5 PCD assembly and the matching network

The test PCD assembly as defined in clause 6.2 and in the Annex A of ISO/IEC 10373-6 is intended to be used for time limited measurements, to avoid any overheating of the individual components. If the test is run continuously the following points should be considered:

1. Add a Note to figure A1 of ISO/IEC 10373-6:

"NOTE The layout of the impedance matching network is informative."

2. Replace the Note 1 in clause A.2 of ISO/IEC 10373-6 by:

"NOTE 1 Care has to be taken to keep maximum voltages and maximum power dissipation within the specified limits of the individual components:

- C1, C2, C3 and C4 have to have a voltage rating of at least 200 V;
- Rext has to be able to dissipate approximately 10 Watts at 7,5 A/m;
- Rext has to be able to dissipate approximately 25 Watts at 12 A/m (if the test PCD assembly is used for testing the maximum alternating magnetic field as required in the clause 4.3.5 of ISO/IEC 14443-1).

If a heat sink is used Rext should be placed on the ground side of the antenna coil."

5.6 Reference PICC (Annex D)

5.6.1 Addition of Zener diode in parallel to C3

Add a Note to Annex D of ISO/IEC 10373-6:

"NOTE In order to limit the reverse voltage across bridge rectifier at high field when the jumper is removed or if the value of R1 or of R2 is not low enough to load the voltage at C3 sufficiently, a Zener diode (Value 15 Volts) should be added in parallel to C3."

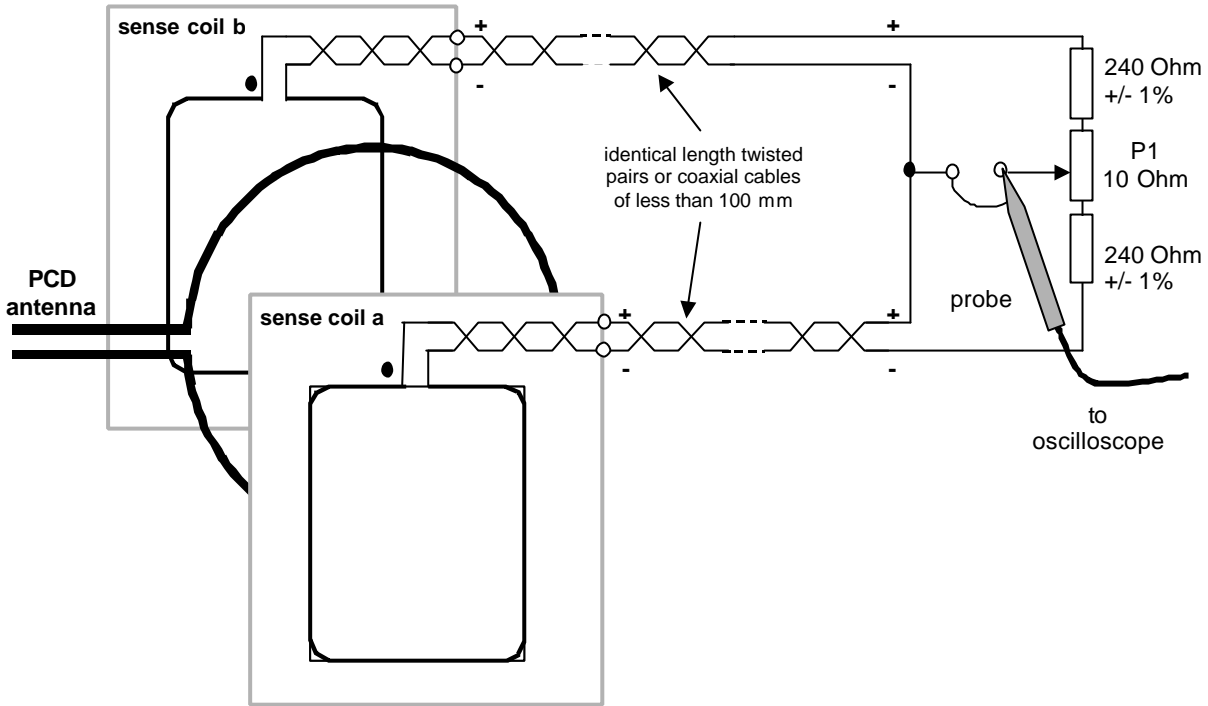
5.6.2 Modification of R2

To ease adjustment the tuning range of the potentiometer R2 has been decreased to 1 kOhm.

5.7 Modification of the divider chain (Figure 4)

To avoid any unintended misalignment in case of an unsymmetrical set-up the tuning range of the potentiometer P1 has been decreased to 10 Ohms. If the set-up cannot be compensated by the 10 Ohm potentiometer P1 the overall symmetry of the set-up has to be checked.

In addition the two twisted pairs may be replaced by coaxial cables.



Bibliography

Preliminary

- [1] ISO/IEC TR 10000-1, *Information technology — Framework and taxonomy of International Standardized Profiles — Part 1: General principles and documentation framework*.
- [2] ISO/IEC Directives, Part 3, *Rules for the structure and drafting of International Standards*, 1997.
- [3] ISO 10241, *International terminology standards — Preparation and layout*.
- [4] ISO 31 (all parts), *Quantities and units*.
- [5] IEC 60027 (all parts), *Letter symbols to be used in electrical technology*.
- [6] ISO 1000, *SI units and recommendations for the use of their multiples and of certain other units*.
- [7] ISO 690, *Documentation — Bibliographic references — Content, form and structure*.