
**Identification cards — Test methods —
Part 7:
Vicinity cards**

Cartes d'identification — Méthodes d'essai —

Partie 7: Cartes de voisinage

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Contents

	Page
Foreword.....	v
1 Scope	1
2 Normative references	1
3 Terms and definitions, abbreviations and symbols.....	2
3.1 Terms and definitions	2
3.2 Abbreviations and symbols.....	2
4 Default items applicable to the test methods	2
4.1 Test environment.....	2
4.2 Pre-conditioning	2
4.3 Default tolerance.....	3
4.4 Spurious Inductance	3
4.5 Total measurement uncertainty	3
5 Static electricity test.....	3
5.1 Apparatus	3
5.2 Procedure	4
5.3 Test report	4
6 Test apparatus and test circuits.....	5
6.1 Calibration coil.....	5
6.1.1 Size of the Calibration coil card	5
6.1.2 Thickness and material of the Calibration coil card	5
6.1.3 Coil characteristics.....	5
6.2 Test VCD assembly.....	6
6.2.1 Test VCD antenna	6
6.2.2 Sense coils	6
6.2.3 Assembly of test VCD	7
6.3 Reference VICCs	7
6.3.1 Reference VICC for VCD power.....	7
6.3.2 Reference VICC for load modulation test.....	7
6.3.3 Dimensions of the Reference VICCs.....	8
6.3.4 Thickness of the Reference VICC board	8
6.3.5 Coil characteristics.....	8
6.4 Digital sampling oscilloscope	8
7 Functional test - VICC	8
7.1 Purpose.....	8
7.2 Test procedure	8
7.3 Test report	9
8 Functional test - VCD	9
8.1 VCD field strength and Power transfer.....	9
8.1.1 Purpose.....	9
8.1.2 Test procedure.....	9
8.1.3 Test report	10
8.2 Modulation index and waveform.....	10
8.2.1 Purpose.....	10
8.2.2 Test procedure	10
8.2.3 Test report	10
8.3 Load modulation reception (informative only)	10
Annex A (normative) Test VCD Antenna.....	11
A.1 Test VCD Antenna layout including impedance matching network.....	11

A.2	Impedance matching network	13
Annex B	(informative) Test VCD Antenna tuning.....	14
Annex C	(normative) Sense coil	16
C.1	Sense coil layout.....	16
C.2	Sense coil assembly.....	17
Annex D	(normative) Reference VICC for VCD power test	18
Annex E	(informative) Reference VICC for load modulation test	19
Annex F	(informative) Program for evaluation of the spectrum	20

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. 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 part of ISO/IEC 10373 may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

International Standard ISO/IEC 10373-7 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 17, *Identification cards and related devices*.

ISO/IEC 10373 consists of the following parts, under the general title *Identification cards — Test methods*:

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- Part 1: *General characteristics tests*
 - Part 2: *Cards with magnetic stripes* [ISO/IEC 10373-7:2001](https://standards.iteh.ai/catalog/standards/sist/3193c45f-ec6a-4e15-ae8e-0c189319439/iso-iec-10373-7-2001)
 - Part 3: *Integrated circuit(s) cards with contacts and related interface devices*
 - Part 4: *Close-coupled cards*
 - Part 5: *Optical memory cards*
 - Part 6: *Proximity cards*
 - Part 7: *Vicinity cards*

Annexes A, C and D form a normative part of this part of ISO/IEC 10373. Annexes B, E and F are for information only.

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Identification cards — Test methods —

Part 7: Vicinity cards

1 Scope

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

NOTE 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 part of ISO/IEC 10373 deals with test methods, which are specific to contactless integrated circuit(s) cards technology (vicinity cards). ISO/IEC 10373-1, 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 part of ISO/IEC 10373 shall be applied exclusively to Vicinity cards defined in ISO/IEC 15693-1 and ISO/IEC 15693-2.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 10373. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 10373 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 7810, *Identification cards – Physical characteristics*.

ISO/IEC 15693-1:2000, *Identification cards — Contactless integrated circuit(s) cards — Vicinity cards — Part 1: Physical characteristics*.

ISO/IEC 15693-2:2000, *Identification cards — Contactless integrated circuit(s) cards — Vicinity cards — Part 2: Air interface and initialization*.

ISO/IEC 15693-3:2001, *Identification cards — Contactless integrated circuit(s) cards — Vicinity cards — Part 3: Anti-collision and transmission protocol*.

IEC 61000-4-2:1995, *Electromagnetic compatibility (EMC) — Part 4: Testing and measurement techniques — Section 2: Electrostatic discharge immunity test*.

BIPM, IEC, IFCC, ISO, IUPAC, IUPAP, OIML, 1993, *Guide to the Expression of Uncertainty in Measurement (Gum)*.

3 Terms and definitions, abbreviations and symbols

For the purposes of this part of ISO 10373, the following terms and definitions and abbreviations apply.

3.1 Terms and definitions

3.1.1

base standard

standard which the test method is used to verify conformance to

3.1.2

testably functional

surviving the action of some potentially destructive influence to the extent that any integrated circuit(s) present in the card continues to show a response¹⁾ as defined in ISO/IEC 15693-3 which conforms to the base standard

NOTE If other technologies exist on the same card they shall be testably functional in accordance with their respective standard.

3.1.3

test method

method for testing characteristics of identification cards for the purpose of confirming their compliance with International Standards

3.2 Abbreviations and symbols

DUT Device under test

ESD Electrostatic Discharge

*f*_c Frequency of the operating field

*f*_{s1}, *f*_{s2} Frequencies of the subcarriers

*H*_{max} Maximum fieldstrength of the VCD antenna field

*H*_{min} Minimum fieldstrength of the VCD antenna field

VCD Vicinity Coupling Device

VICC Vicinity Card

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4 Default items applicable to the test methods

4.1 Test environment

Unless otherwise specified, testing shall take place in an environment of temperature 23 °C ± 3 °C (73 °F ± 5 °F) and of relative humidity 40 % to 60 %.

4.2 Pre-conditioning

Where pre-conditioning is required by the test method, the identification cards to be tested shall be conditioned to the test environment for a period of 24 h before testing.

1) This International Standard does not define any test to establish the complete functioning of integrated circuit(s) cards. The test methods require only that the minimum functionality (testably functional) be verified. This may, in appropriate circumstances, be supplemented by further, application specific functionality criteria which are not available in the general case.

4.3 Default tolerance

Unless otherwise specified, a default tolerance of $\pm 5\%$ shall be applied to the quantity values given to specify the characteristics of the test equipment (e.g. linear dimensions) and the test method procedures (e.g. test equipment adjustments).

4.4 Spurious Inductance

Resistors and capacitors should have negligible inductance.

4.5 Total measurement uncertainty

The total measurement uncertainty for each quantity determined by these test methods shall be stated in the test report.

Basic information is given in Gum, 1993.

5 Static electricity test

The purpose of this test is to check the behavior of the card IC in relation to electrostatic discharge (ESD) exposure of the test sample. The card under test is exposed to a simulated electrostatic discharge (ESD, human body model) and its basic operation checked following the exposure.

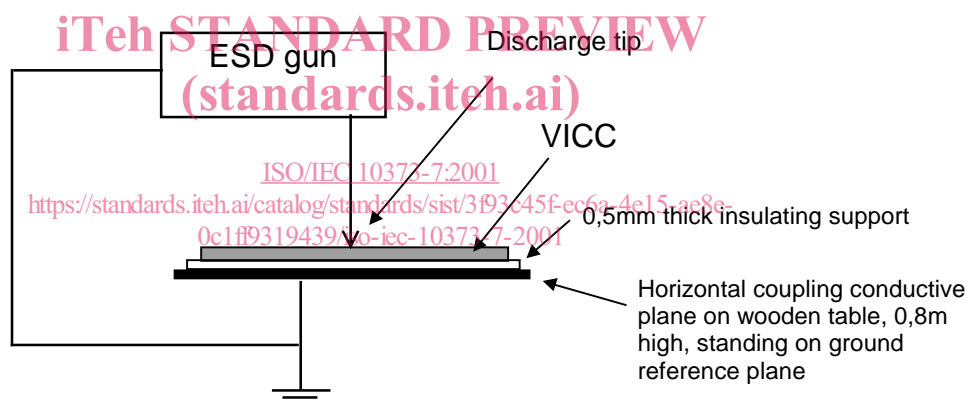


Figure 1 — ESD test circuit

5.1 Apparatus

Refer to IEC 61000-4-2:1995.

- a) Main specifications of the ESD generator
 - energy storage capacitance: $150\text{ pF} \pm 10\%$
 - discharge resistance: $330\text{ Ohm} \pm 10\%$
 - charging resistance: between 50 MOhm and 100 MOhm
 - rise time: $0,7$ to 1 ns
- b) Selected specifications from the optional items
 - type of equipment: table top equipment

- discharge method: direct and contact discharge to the equipment under test
- discharge electrodes of the ESD generator: Round tip probe of 8 mm diameter (to avoid damaging surface of card).

5.2 Procedure

Connect the ground pin of the apparatus to the conductive plate upon which the card is placed.

Apply the discharge successively in normal polarity to each of the 20 test zones shown in figure 2. Then repeat the same procedure with reversed polarity. Allow a cool-down period between successive pulses of at least 10 s.

WARNING — If the card includes contacts, the contacts shall be face up and the zone which includes contacts shall not be exposed to this discharge.

Check that the card remains testably functional (see clause 3) at the end of the test.

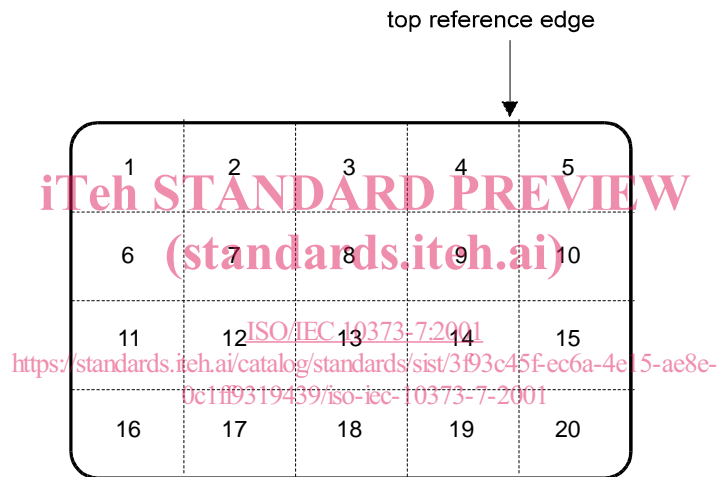


Figure 2 — Test zones on card for ESD test

5.3 Test report

The test report shall state whether or not the card remains testably functional.

6 Test apparatus and test circuits

This clause defines the test apparatus and test circuits for verifying the operation of a VICC or a VCD according to ISO/IEC 15693-2. The test apparatus includes:

- Calibration coil (see 6.1)
- Test VCD assembly (see 6.2)
- Reference VICC (see 6.3)
- Digital sampling oscilloscope (see 6.4).

These are described in the following clauses.

6.1 Calibration coil

This clause defines the size, thickness and characteristics of the calibration coil.

6.1.1 Size of the Calibration coil card

The Calibration coil card consists of an area, which has the height and width defined in ISO/IEC 7810 for ID-1 type containing a single turn coil concentric with the card outline.

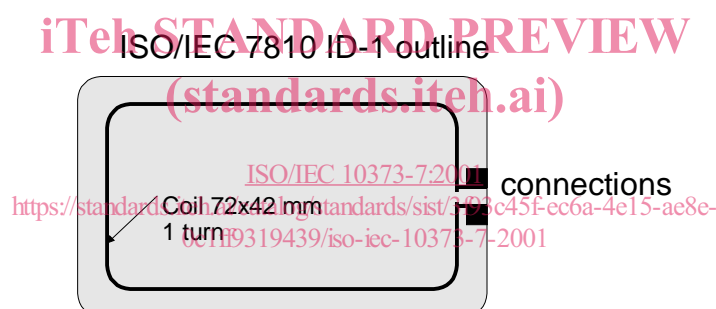


Figure 3 — Calibration coil

6.1.2 Thickness and material of the Calibration coil card

The thickness of the calibration coil card shall be $0,76 \text{ mm} \pm 10 \%$. It shall be constructed of a suitable insulating material.

6.1.3 Coil characteristics

The coil on the Calibration coil card shall have one turn. The outer size of the coil shall be $72 \text{ mm} (\pm 2 \%) \times 42 \text{ mm} (\pm 2 \%)$ with corner radius 5 mm.

NOTE The area over which the field is integrated is approximately 3000 mm^2 .

The coil is made as a printed coil on PCB plated with $35 \mu\text{m}$ copper. Track width shall be $500 \mu\text{m} \pm 20 \%$. The size of the connection pads shall be $1,5 \text{ mm} \times 1,5 \text{ mm}$.

NOTE At 13,56 MHz the approximate inductance is 200 nH and the approximate resistance is 0,25 Ohm.

A high impedance oscilloscope probe (e.g. > 1MΩ, < 14pF) shall be used to measure the (open circuit) voltage in the coil. The resonance frequency of the whole set (calibration coil, connecting leads and probe) shall be above 60 MHz.

NOTE A parasitic capacitance of the probe assembly of less than 35 pF normally ensures a resonant frequency for the whole set of greater than 60 MHz.

The open circuit calibration factor for this coil is 0,32 Volts (rms) per A/m (rms) [Equivalent to 900 mV (peak-to-peak) per A/m (rms)].

6.2 Test VCD assembly

The test VCD assembly for load modulation consists of a 150 mm diameter VCD antenna and two parallel sense coils: sense coil a and sense coil b. The test set-up is shown in figure 4. The sense coils are connected such that the signal from one coil is in opposite phase to the other. The 50 Ohm potentiometer P1 serves to fine adjust the balance point when the sense coils are not loaded by a VICC or any magnetically coupled circuit. The capacitive load of the probe including its parasitic capacitance shall be less than 14pF.

NOTE The capacitance of the connections and oscilloscope probe should be kept to a minimum for reproducibility.

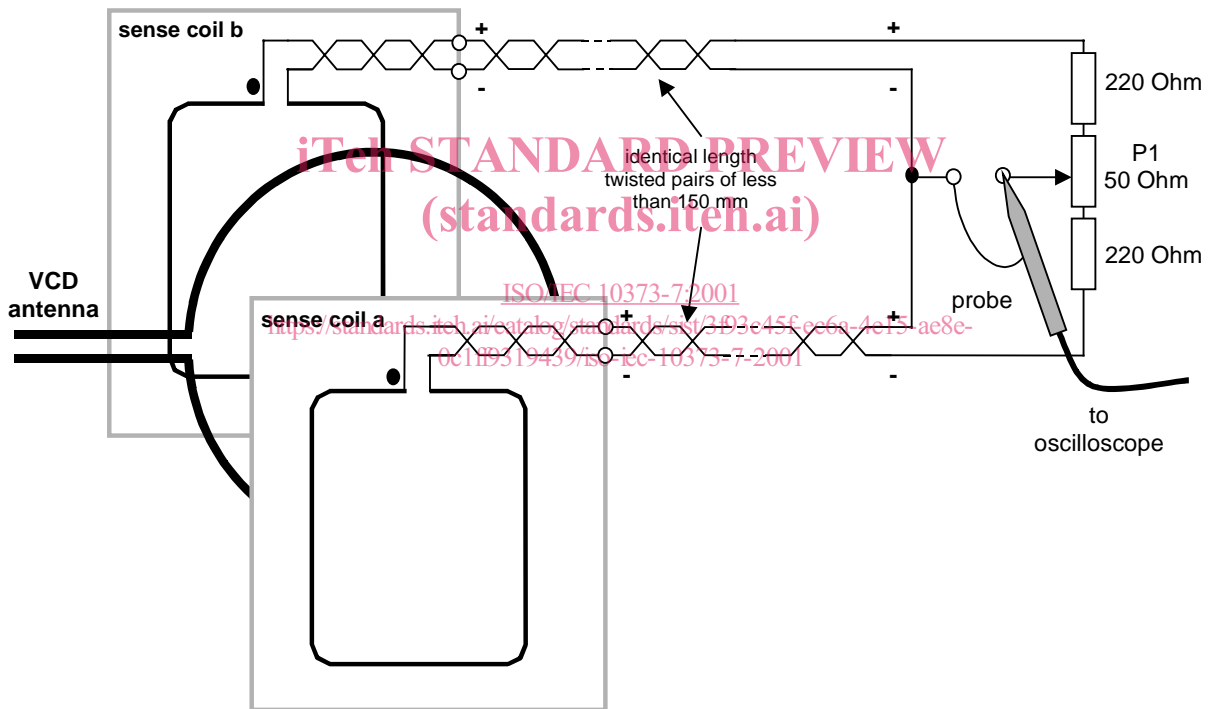


Figure 4 — Test set-up (principle)

NOTE The length of 150 mm of the twisted pairs takes the wider spacing of the sense coils in comparison to the set-up in ISO/IEC 10373-6 into account.

6.2.1 Test VCD antenna

The Test VCD antenna shall have a diameter of 150 mm and its construction shall conform to the drawings in Annex A. The tuning of the antenna may be accomplished with the procedure given in Annex B.

6.2.2 Sense coils

The size of the sense coils is 100 × 70 mm. The sense coil construction shall conform to the drawings in Annex C.