
**Cards and security devices for
personal identification — Test
methods —**

**Part 6:
Contactless proximity objects**

*Cartes et dispositifs de sécurité pour l'identification personnelle —
Méthodes d'essai —*

Partie 6: Objets sans contact de proximité

Document Preview

[ISO/IEC 10373-6:2020](https://standards.iteh.ai/catalog/standards/iso/3364f650-fba8-4a6f-bb39-92dce7b27ae1/iso-iec-10373-6-2020)

<https://standards.iteh.ai/catalog/standards/iso/3364f650-fba8-4a6f-bb39-92dce7b27ae1/iso-iec-10373-6-2020>



Reference number
ISO/IEC 10373-6:2020(E)

© ISO/IEC 2020

iTeh Standards
(<https://standards.itih.ai>)
Document Preview

ISO/IEC 10373-6:2020

<https://standards.itih.ai/catalog/standards/iso/3364f650-fba8-4a6f-bb39-92dce7b27ae1/iso-iec-10373-6-2020>



COPYRIGHT PROTECTED DOCUMENT

© ISO/IEC 2020

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier; Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword	v
1 Scope	1
2 Normative references	1
3 Terms, definitions, symbols and abbreviated terms	2
3.1 Terms and definitions	2
3.2 Symbols and abbreviated terms	3
4 Default items applicable to the test methods	5
4.1 Test environment	5
4.2 Pre-conditioning	5
4.3 Setup tolerances	6
4.4 Spurious inductance	6
4.5 Measurement uncertainty	6
4.6 DUT position	6
4.7 Test conditions for PCD	6
4.8 Test conditions for PICC	8
5 Apparatus and circuits for test of ISO/IEC 14443-1 and ISO/IEC 14443-2 parameters	10
5.1 Overview	10
5.2 Minimum requirements for measurement instruments — Oscilloscope	11
5.3 Calibration coils	11
5.3.1 General	11
5.3.2 Size of the calibration coil card	11
5.3.3 Thickness and material of the calibration coil card	12
5.3.4 Coil characteristics	12
5.4 Test PCD assembly	12
5.4.1 General	12
5.4.2 Test PCD antenna	13
5.4.3 Sense coils	13
5.4.4 Assembly of Test PCD	14
5.5 Reference PICC and Active Reference PICC	16
5.5.1 General	16
5.5.2 Reference PICC	16
5.5.3 Active Reference PICC	19
5.6 PICC transmission test setup	21
5.6.1 General description	21
5.6.2 Phase stability precondition test	21
5.7 EMD test setup	22
5.7.1 General description	22
5.7.2 Computation of power versus time	22
5.7.3 Noise floor precondition test	23
6 Test of ISO/IEC 14443-1 parameters	24
6.1 PCD tests	24
6.1.1 Alternating magnetic field	24
6.2 PICC tests	25
6.2.1 Alternating magnetic field	25
6.2.2 Void	25
6.3 PXD tests	25
7 Test of ISO/IEC 14443-2 parameters	26
7.1 PCD tests	26
7.1.1 PCD field strength	26
7.1.2 Void	27
7.1.3 Void	27
7.1.4 Modulation index <i>m</i> and waveform	27

7.1.5	Phase stability test.....	28
7.1.6	Load modulation reception for PICC to PCD bit rates of $f_c/128$, $f_c/64$, $f_c/32$ and $f_c/16$	29
7.1.7	Load modulation reception for PICC to PCD bit rates of $f_c/8$, $f_c/4$ and $f_c/2$	36
7.1.8	PCD EMD immunity test.....	37
7.2	PICC tests.....	38
7.2.1	PICC transmission.....	38
7.2.2	PICC EMD level and low EMD time test.....	40
7.2.3	PICC reception.....	41
7.2.4	PICC resonance frequency.....	44
7.2.5	PICC maximum loading effect.....	45
7.2.6	PICC operating field strength test.....	46
7.3	Test methods for bit rates of $3f_c/4$, f_c , $3f_c/2$ and $2f_c$ from PCD to PICC.....	47
7.4	PXD tests.....	47
8	Test of ISO/IEC 14443-3 and ISO/IEC 14443-4 parameters.....	48
8.1	PCD tests.....	48
8.1.1	PCD EMD recovery test.....	48
8.1.2	Additional PCD tests.....	49
8.2	PICC tests.....	49
8.3	PXD tests.....	49
8.3.1	PCD and PICC Modes.....	49
8.3.2	Automatic mode alternation.....	49
Annex A	(normative) Test PCD antennas.....	54
Annex B	(informative) Test PCD Antenna tuning.....	64
Annex C	(normative) Sense coil.....	67
Annex D	(normative) Reference PICCs and Active Reference PICCs.....	70
Annex E	(normative) PCD modulation index m and waveform analysis tool.....	82
Annex F	(informative) Program for the evaluation of the load modulation amplitude.....	127
Annex G	(normative) Additional PICC test methods.....	132
Annex H	(normative) Additional PCD test methods.....	198
Annex I	(normative) High bit rate selection test methods for PCD.....	245
Annex J	(informative) Program for EMD level measurements.....	257
Annex K	(normative) Test methods for bit rates of $3f_c/4$, f_c, $3f_c/2$ and $2f_c$ from PCD to PICC.....	264
Annex L	(normative) Frame with error correction test methods.....	327
Annex M	(normative) PCD phase stability analysis tool.....	337
Annex N	(normative) PICC amplitude and phase drift analysis tool.....	343
Annex O	(normative) Conformance test plan.....	442
Annex P	(normative) PICC Type A Frame Delay Time (FDT) determination method.....	450
Bibliography		459

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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents) or the IEC list of patent declarations received (see <http://patents.iec.ch>).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, SC 17, *Cards and security devices for personal identification*.

This fourth edition cancels and replaces the third edition (ISO/IEC 10373-6:2016), which has been technically revised. It also incorporates the Amendment ISO/IEC 10373-6:2016/Amd.3:2018.

The main changes compared to the previous edition are as follows:

- enhancement of test methods for PCD load modulation reception and PICC transmission including introduction of Active Reference PICC and PICC amplitude and phase drift analysis tool;
- introduction of PICC Type A Frame Delay Time (FDT) determination method;
- extension of frame with error correction test methods.

A list of all the parts in the ISO/IEC 10373 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Cards and security devices for personal identification — Test methods —

Part 6: Contactless proximity objects

1 Scope

The ISO/IEC 10373 series 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 can be ISO/IEC 7810 or one or more of the supplementary standards that define the information storage technologies employed in identification card applications.

NOTE 1 Criteria for acceptability do not form part of the ISO/IEC 10373 series, but can be found in the International Standards mentioned above.

This document defines test methods which are specific to proximity cards and objects, proximity coupling devices and proximity extended devices, defined in ISO/IEC 14443-1, ISO/IEC 14443-2, ISO/IEC 14443-3 and ISO/IEC 14443-4.

NOTE 2 Test methods defined in this document are intended to be performed separately. A given proximity card or object, proximity coupling device or proximity extended device, is not required to pass through all the tests sequentially.

ISO/IEC 10373-1 defines test methods which are common to one or more integrated circuit card technologies and other parts in the ISO/IEC 10373 series deal with other technology-specific tests.

The conformance test plan defined in [Annex 0](#) specifies the list of tests applicable for each part of the ISO/IEC 14443 series.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 7810, *Identification cards — Physical characteristics*

ISO/IEC 14443-1:2018, *Cards and security devices for personal identification — Contactless proximity objects — Part 1: Physical characteristics*

ISO/IEC 14443-2:2020, *Cards and security devices for personal identification — Contactless proximity objects — Part 2: Radio frequency power and signal interface*

ISO/IEC 14443-3:2018, *Cards and security devices for personal identification — Contactless proximity objects — Part 3: Initialization and anticollision*

ISO/IEC 14443-4:2018, *Cards and security devices for personal identification — Contactless proximity objects — Part 4: Transmission protocol*