

SVENSK STANDARD

SS-ISO/IEC 14443-2:2018

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**Identifieringskort – Kontaktlösa aktiva kort – Kort med kort
läsavstånd –
Del 2: Radiofrekvens, effekt och signalgränssnitt
(ISO/IEC 14443-2:2016, IDT)**

**Identification cards – Contactless integrated circuit cards –
Proximity cards –
Part 2: Radio frequency power and signal interface
(ISO/IEC 14443-2:2016, IDT)**



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The International Standard ISO/IEC 14443-2:2016 has the status of a Swedish Standard. This document contains the official version of ISO/IEC 14443-2:2016.

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Information about the content of the standard is available from the Swedish Standards Institute (SIS), telephone +46 8 555 520 00. Standards may be ordered from SIS, who can also provide general information about Swedish and foreign standards.

Denna standard är framtagen av kommittén för Teknik och stödsystem för personlig identifiering, SIS/TK 448.

Har du synpunkter på innehållet i den här standarden, vill du delta i ett kommande revideringsarbete eller vara med och ta fram andra standarder inom området? Gå in på www.sis.se - där hittar du mer information.

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SS-ISO/IEC 14443-2:2018 (E)**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. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

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).

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

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

The committee responsible for this document is ISO/IEC JTC 1, *Information technology*, Subcommittee SC 17, *Cards and personal identification*.

This third edition cancels and replaces the second edition (ISO/IEC 14443-2:2010), which has been technically revised.

It also incorporates the Amendments ISO/IEC 14443-2:2010/Amd 1:2011, ISO/IEC 14443-2:2010/Amd 2:2012 and ISO/IEC 14443-2:2010/Amd 3:2012.

ISO/IEC 14443 consists of the following parts, under the general title *Identification cards — Contactless integrated circuit cards — Proximity cards*:

- *Part 1: Physical characteristics*
- *Part 2: Radio frequency power and signal interface*
- *Part 3: Initialization and anticollision*
- *Part 4: Transmission protocol*

Introduction

ISO/IEC 14443 is one of a series of International Standards describing the parameters for identification cards as defined in ISO/IEC 7810 and the use of such cards for international interchange.

This part of ISO/IEC 14443 describes the electrical characteristics of two types of contactless interface between a proximity card and a proximity coupling device. The interface includes both power and bi-directional communication. It is intended to be used in conjunction with other parts of ISO/IEC 14443.

Contactless card standards cover a variety of types as embodied in ISO/IEC 10536 (close-coupled cards), ISO/IEC 14443 (proximity cards) and ISO/IEC 15693 (vicinity cards). These are intended for operation when very near, nearby and at a longer distance from associated coupling devices, respectively.

Identification cards — Contactless integrated circuit cards — Proximity cards —

Part 2: Radio frequency power and signal interface

1 Scope

This part of ISO/IEC 14443 specifies the characteristics of the fields to be provided for power and bi-directional communication between proximity coupling devices (PCDs) and proximity cards or objects (PICCs).

This part of ISO/IEC 14443 does not specify the means of generating coupling fields, nor the means of compliance with electromagnetic radiation and human exposure regulations, which can vary according to country.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

ISO/IEC 14443-1:2016, *Identification cards — Contactless integrated circuit cards — Proximity cards — Part 1: Physical characteristics*

ISO/IEC 14443-3:2016, *Identification cards — Contactless integrated circuit cards — Proximity cards — Part 3: Initialization and anticollision*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1 bit duration

time during which a logic level is defined, at the end of which a new bit starts

3.2 binary phase shift keying

phase shift keying where the phase shift is 180 degrees, resulting in two phase state possibilities

3.3 modified Miller

method of bit coding whereby a logic level during a bit duration is represented by the position of a pulse within the bit frame

3.4 modulation index

m

$[1 - b] / [1 + b]$, where b is the ratio between the modulated amplitude and the initial signal amplitude

Note 1 to entry: The value of the index may be expressed as a percentage.

SS-ISO/IEC 14443-2:2018 (E)**3.5****NRZ-L**

method of bit coding whereby a logic level during a bit duration is represented by one of two defined physical states of a communication medium

3.6**operating volume**

for each PICC class, the positions where the corresponding Reference PICC shows PCD compliance with all requirements of this part of ISO/IEC 14443 for this class

3.7**subcarrier**

signal of frequency, f_s , used to modulate a carrier of frequency, f_c

3.8**Manchester**

method of bit coding whereby a logic level during a bit duration is represented by a sequence of two defined physical states of a communication medium, the order of the physical states within the sequence defining the logical state

3.9**TR0**

guard time between the end of a PCD transmission and the start of the PICC subcarrier generation

3.10**TR1**

synchronization time between the start of the PICC subcarrier generation and the start of the PICC subcarrier modulation

4 Symbols and abbreviated terms

a	pulse shape factor, Type A
ACP	actual constellation point
AP	actual phase value
ASK	amplitude shift keying
b	ratio between the modulated and initial signal amplitude, Type B
BPSK	binary phase shift keying
EMD	electromagnetic disturbance, parasitically generated by the PICC
EPI	elementary phase interval
etu	elementary time unit
f_c	frequency of operating field (carrier frequency)
f_s	frequency of subcarrier
H	equivalent homogenous magnetic field strength
H_{INITIAL}	field strength of the unmodulated RF field
h_{OVS}	envelope overshoot for bit rates of $f_c/64$, $f_c/32$ and $f_c/16$, Type A
h_f	envelope undershoot, Type B

h_r	envelope overshoot, Type B
ISI	inter symbol interference
ISI_d	inter symbol interference angle
ISI_m	inter symbol interference magnitude
NP	nominal phase value
NRZ-L	non-return to zero, (L for level)
OOK	on/off keying
PauseA	PCD modulation pulse, Type A
\emptyset_0	initial phase of the subcarrier
P_H	complex constellation point of the maximum NP
P_L	complex constellation point of the minimum NP
PNP	previous nominal phase
PR	phase range
PSK	phase shift keying
PCD	proximity coupling device
PICC	proximity card or object
RF	radio frequency
t_1	PauseA length
t_2	PauseA "Low" time for a bit rate of $fc/128$
t_3	PauseA rise time for a bit rate of $fc/128$
t_4	PauseA rise time section for a bit rate of $fc/128$
t_5	PauseA "Low" time for bit rates of $fc/64$, $fc/32$ and $fc/16$
t_6	PauseA rise time for bit rates of $fc/64$, $fc/32$ and $fc/16$
$t_{6, \max, \text{PCD}}$	maximum value of t_6 for PCD transmission
$t_{6, \max, \text{PICC}}$	maximum value of t_6 for PICC reception
t_b	bit duration, Type A
t_f	envelope fall time, Type B
$t_{f, \max, \text{PCD}}$	maximum fall time for PCD transmission, Type B
$t_{f, \max, \text{PICC}}$	maximum fall time for PICC reception, Type B
t_r	envelope rise time, Type B
$t_{r, \max, \text{PCD}}$	maximum rise time for PCD transmission, Type B