DRAFT AMENDMENT
ISO/IEC 14443-2: DAM 1

ISO/IEC JTC **1**/SC **17**

Secretariat: **BSI**

Voting begins on:
2016-04-14

Voting terminates on:
2016-07-13

Identification cards — Contactless integrated circuit cards — Proximity cards —

Part 2:
Radio frequency power and signal interface

AMENDMENT 1: Parameters supporting active and passive PICC transmissions

Cartes d'identification — Cartes à circuit(s) intégré(s) sans contact — Cartes de proximité —

Partie 2: Interface radiofréquence et des signaux de communication

AMENDEMENT 1: Paramètres applicables aux transmissions active et passive de PICC

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ICS: 35.240.15

ISO/IEC 14443-2:2016/DAmd 1
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4b9f98f267fa/iso-iec-14443-2-2016-damd-1

Reference number
ISO/IEC 14443-2:2016/DAM 1:2016(E)

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The main task of the joint technical committee is to prepare International Standards. 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.

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Amendment 1 to ISO/IEC 14443-2:2015 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 17, *Card and personal identification*.

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Identification cards — Contactless integrated circuit cards - Proximity cards — Part 2: Radio frequency power and signal interface - Amendment 1: Parameters supporting active and passive PICC transmissions

Amendment 1: Parameters supporting active and passive PICC transmissions

Page 2, Clause 4

Add to the clause the following symbols:

"

MS1	first modulated state of the load modulation
MS2	second modulated state of the load modulation
US	unmodulated state before the load modulation
$\emptyset_{LM, max, PICC}$	maximum phase drift limit of the load modulation for PICC transmission
$\emptyset_{LM, max, PCD}$	maximum phase drift limit of the load modulation for PCD reception
$\emptyset_{LM, INIT}$	initial phase of the load modulation
$V_{LMA, max, PICC}$	maximum load modulation amplitude for PICC transmission
$V_{LMA, max, PCD}$	maximum load modulation amplitude for PCD reception

"

Page 7, Clause 7

Replace second paragraph with:

"The PICC modifies the PCD alternating magnetic field in order to transmit data to the PCD. This modification is called load modulation and may be achieved by passively loading the PCD alternating magnetic field with a modulated subcarrier signal, and/or by actively contributing with its own modulated alternating field."

Page 20, 8.2.2

Replace first paragraph with:

"The PICC shall be capable of communication to the PCD via inductive coupling. The field generated by the PCD shall be passively and/or actively modified by the PICC with a subcarrier signal of frequency *fs*."

After third paragraph, add the following paragraphs, note and figures and renumber subsequent notes:

"The PICC transmits data by using one or two modulated states. The first modulated state is MS1. The second modulated state is MS2 and may be the same as the unmodulated state US. Amplitude and phase of these modulated states are measured by specific test methods described in ISO/IEC 10373-6:2015/Amd.3.

During the entire PICC response, the PICC shall fulfill the following requirements:

— the magnitude of the complex vector difference between US and any occurrence of PICC modulation state MS1 shall be at least equal to $V_{LMA, PICC}$ as illustrated in Figure Amd.1-1,

— the phase $\varnothing_{LM}$ of the complex vector difference between any occurrence of PICC modulation state MS1 and the subsequent PICC modulation state MS2 shall vary less than $\varnothing_{LM, max, PICC} = 30°$, as illustrated in Figure Amd.1-2.

NOTE 1   There is no requirement on the initial phase $\varnothing_{LM, INIT}$ of the complex vector difference between the first occurrence of PICC modulation state MS1 and the subsequent PICC modulation state MS2.
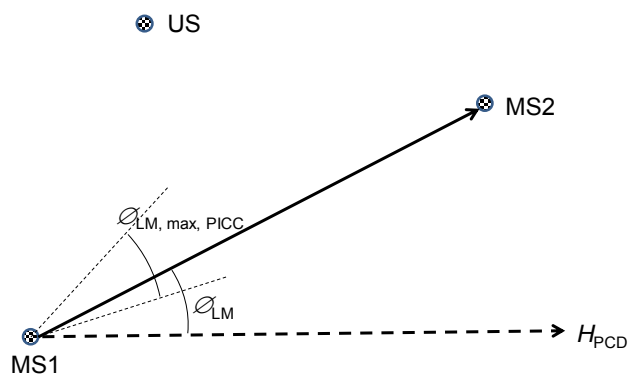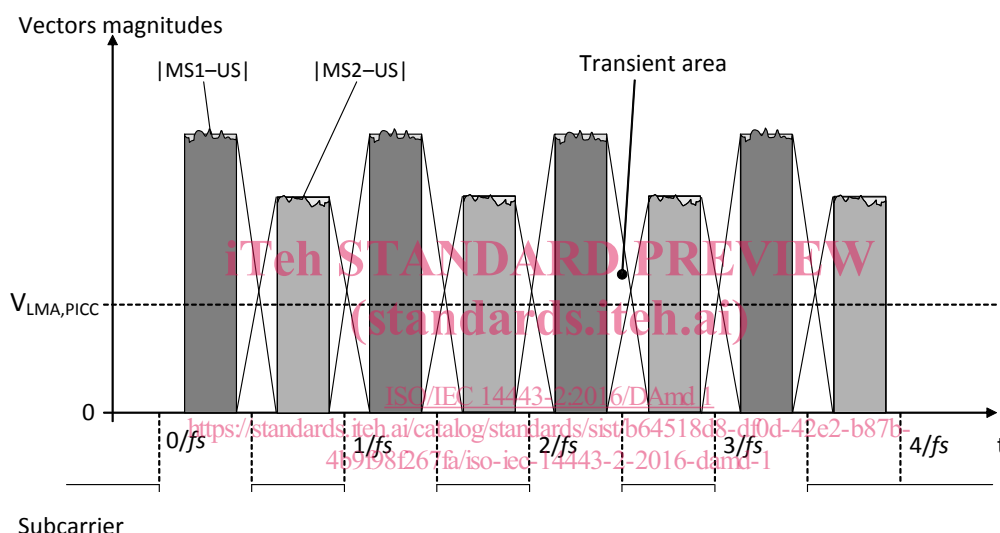

Figure Amd.1-2 — Modulation states and load modulation phase in complex domain

"

After Table 8, add the following paragraph and note and renumber subsequent notes:

"The load modulation amplitude V_{LMA} of the PICC shall not exceed the $V_{LMA, PICC, max}$ of:

— 100 mV (peak) for classes 1, 2 and 3

— 200 mV (peak) for classes 4, 5 and 6.

NOTE 2   For "Class 4", "Class 5" and "Class 6" PICCs, the use of test PCD assembly 2 increases the measured values of load modulation by a factor of approximately 2 compared with test PCD assembly 1.

"

After eighth paragraph, add the following paragraph:

"The PCD shall be able to receive a PICC response with the following characteristics during the entire PICC response:

— magnitude of the complex vector difference between US and any occurrence of PICC modulation state MS1 of at least $V_{LMA, PCD}$,

— phase $\emptyset_{LM}$ of the complex vector difference between any occurrence of modulation state MS1 and the subsequent modulation state MS2 within a $\emptyset_{LM, max, PCD} = 35°$ range,

— any initial phase $\emptyset_{LM, INIT}$."

Replace in Note 1 (renumbered to Note 3) "The PICC load modulation amplitude limits of classes 2 to 6 are less strict than the previous PICC limit" with:

"The minimum load modulation amplitudes of classes 2 to 6 are less strict than the previous limits"

Replace Note 2 (renumbered to Note 4) with the following paragraphs:

"The PCD shall provide fc with a phase drift lower than ± 5° during any supported PICC frame duration.

The PCD shall be able to receive a PICC response with a V_{LMA} up to $V_{LMA, max, PCD}$ of 110 mV (peak) for classes 1, 2 and 3 and optionally shall be able to receive a PICC response with a $V_{LMA, max, PCD}$ up to 220 mV (peak) for classes 4, 5 and 6."

Replace title of tables 8, 9 and figures 11 to 15 with:

"

Table 8 — Minimum load modulation amplitude for PICC transmission

Table 9 — Minimum load modulation amplitude for PCD reception

Figure 11 — Minimum load modulation amplitude for "Class 1"

Figure 12 — Minimum load modulation amplitude for "Class 2" and "Class 3"

Figure 13 — Minimum load modulation amplitude for "Class 4"

Figure 14 — Minimum load modulation amplitude for "Class 5"

Figure 15 — Minimum load modulation amplitude for "Class 6"

"

Replace in fourth paragraph "the load modulation amplitude limit $V_{LMA, PICC}$" with:

"the minimum load modulation amplitude for PICC transmission $V_{LMA, PICC}$"

Replace in ninth paragraph: "the load modulation reception limit $V_{LMA, PCD}$" with:

"the minimum load modulation amplitude for PCD reception $V_{LMA, PCD}$"

Page 24, 8.2.3

Replace "The PICC shall generate a subcarrier only when data is to be transmitted." with:

"The PICC shall generate a load modulation signal only when data is to be transmitted."

Page 25, 8.2.4

Replace the first paragraph with:

"Every bit period has a defined phase relation to the subcarrier. The bit period shall start with the first transition when the PICC passively and/or actively modifies the PCD alternating magnetic field's phase and/or amplitude in any direction."

Page 35, 9.2.5

Replace the expression "generate a subcarrier" with "generate a load modulation signal" twice.