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**Information technology — Biometric  
System-on-Card —**

**Part 2:  
Physical characteristics**

*Technologies de l'information — Système biométrique sur carte —  
Partie 2: Caractéristiques physiques*

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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. 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](http://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](http://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*.

ISO/IEC 17839 consists of the following parts, under the general title *Information technology — Biometric System-on-Card*:

- *Part 1: Core requirements*
- *Part 2: Physical characteristics*
- *Part 3: Logical information interchange mechanism*

This corrected version of ISO/IEC 17839-2:2015 incorporates the following corrections plus other minor editorial modifications.

### 6.3.1, 2nd paragraph:

“e.g.” was added to the first sentence as well as “<sup>2</sup>” on “in” and “mm”: “The minimum size of an area sensor shall be 169 mm<sup>2</sup> (e.g. 13 × 13 mm<sup>2</sup> or 0.512 × 0.512 in<sup>2</sup>).”

In 6.3.4, 2nd paragraph and 6.3.4, the decimal point replaces the decimal comma for all instances of “in”:

“In the case of a swipe sensor, the effective area of fingerprint capture is bigger than the sensor size. A swipe sensor shall have a minimum width of 13 mm (0.512 in).”

### 6.3.4

The size of the signing pad is limited by ergonomics and cultural differences in the signing process, as different societies have different understanding on how a signature should be done. A minimum area of 35 × 35 mm<sup>2</sup> (1.378 × 1.378 in<sup>2</sup>) shall be allowed for the signing pad.

## Introduction

A Biometric System-on-Card (BSoC) is an integrated circuit card (ICC) with full biometric capabilities as defined in ISO/IEC 17839-1. The implementation of an ICC with such specifications is subject to a number of physical constraints, which are detailed in this part of ISO/IEC 17839. Therefore, this part provides the specifications for both types, S1 and S2 BSoC.

Type S1 is defined in ISO/IEC 17839-1 as the fully compatible ISO/IEC 7810 ID-1 card. The specifications for this type of BSoC are limited to those related to the location of the biometric capture device, the ergonomics, as well as to stating certain limitations on the use of certain technologies such as not allowing embossing on this type of card.

Type S2 is defined as being identical to the ID-T specifications in ISO/IEC 18328-2.

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# Information technology — Biometric System-on-Card —

## Part 2: Physical characteristics

### 1 Scope

This part of ISO/IEC 17839 defines the following:

- dimensions of a Biometric System-on-Card type S1 and type S2;
- position and size of the biometric capture device;
- minimum requirements to a Biometric System-on-Card with respect to
  - mechanical durability, and
  - man-machine interface and ergonomics.

The standardization of other on-card devices such as an electronic display or a keypad is outside the scope of this part of ISO/IEC 17839.

### 2 Conformance

A Biometric System-on-Card claiming conformance with this International Standard shall conform to all mandatory requirements specified herein as applicable.

### 3 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 2382-37, *Information technology — Vocabulary — Part 37: Biometrics*

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

ISO/IEC 7816-1, *Identification cards — Integrated circuit cards — Part 1: Cards with contacts — Physical characteristics*

ISO/IEC 7816-2, *Identification cards — Integrated circuit cards — Part 2: Cards with contacts — Dimensions and location of the contacts*

ISO/IEC 10373-1, *Identification cards — Test methods — Part 1: General characteristics*

ISO/IEC 17839-1, *Information technology — Biometric System-on-Card — Part 1: Core requirements*

ISO/IEC 18328-2, *Identification cards — ICC-managed devices — Part 2: Physical characteristics and test methods for cards with devices*

### 4 Terms and definitions

For the purposes of this document, the terms and definitions given in Annex A of ISO/IEC 18328-2, ISO/IEC 17839-1 and ISO/IEC 7810, ISO/IEC 2382-37 apply.

## 5 Symbols and abbreviated terms

For the purposes of this document, the symbols and abbreviated terms in ISO/IEC 17839-1 and the following apply

IFD interface device

LED light emitting diode

## 6 Dimensions

### 6.1 Overall dimensions

The overall dimensions of a type S1 Biometric System-on-Card shall be identical with the ID-1 card size as specified in ISO/IEC 7810.

The overall dimensions of a type S2 Biometric System-on-Card shall be identical to ID-T card size defined in Annex A of ISO/IEC 18328-2.

The definition of the front of the card is technology dependent. Since the type S2 BSoC does not include the contacts as specified in ISO/IEC 7816-1 and ISO/IEC 7816-2, it does not have a defined orientation.

### 6.2 Location of the biometric capture device

#### 6.2.1 General requirements

The position of the biometric capture device is subject to ergonomic requirements and other reserved areas of the card body for active components. The physical position of the biometric capture device should not be in the centre of the card and shall not cover other defined areas for functional elements in the card.

The biometric capture device cannot be too close to the border of the ICC due to restrictions in the production process and tolerances. A border of 3,5 mm shall not be used for embedding a biometric capture device in a card.

The biometric capture device shall not overlap with the chip or other active card elements in card, e.g. antenna or battery.

[Figure 1](#) illustrates the allowed area for biometric capture devices.

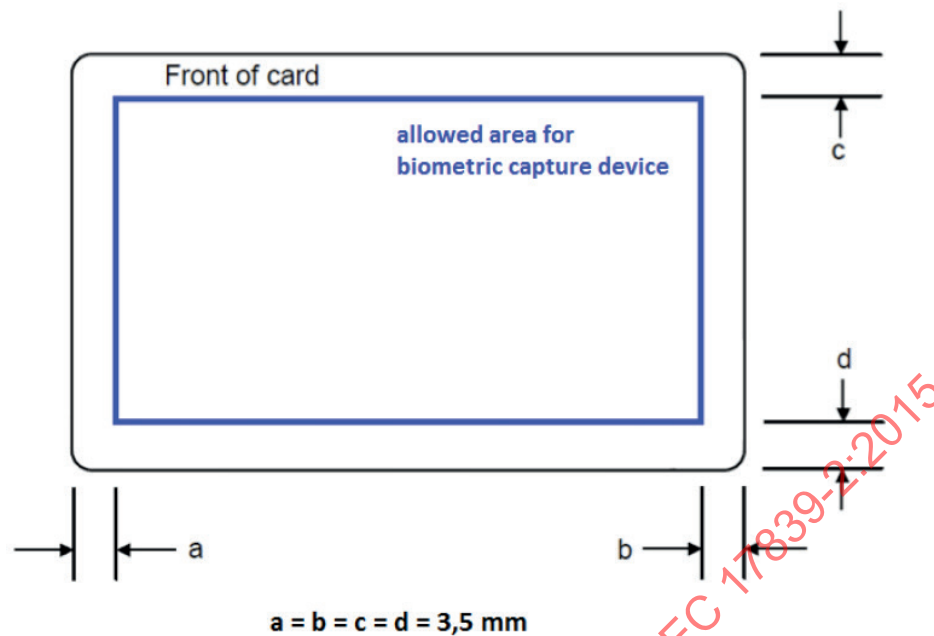


Figure 1 — Allowed area for biometric capture devices on the front of a card

### 6.2.2 Finger biometrics

Orientation of the area or swipe sensor is not standardized. Some application scenarios may use additional card elements such as a display and require alignment for positioning the electrical card components without overlap.

Figures 2 and 3 illustrate examples of card layouts when a BSoC carries other card elements or devices. In these examples the biometric capture device is physically combined with printed information or with an electronic display on the front face.

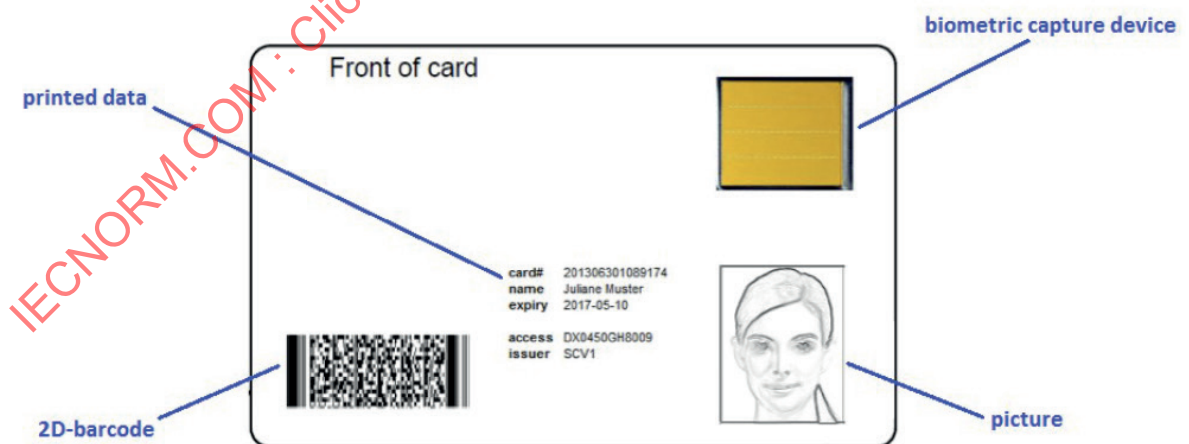


Figure 2 — Example of BSoC with printed information

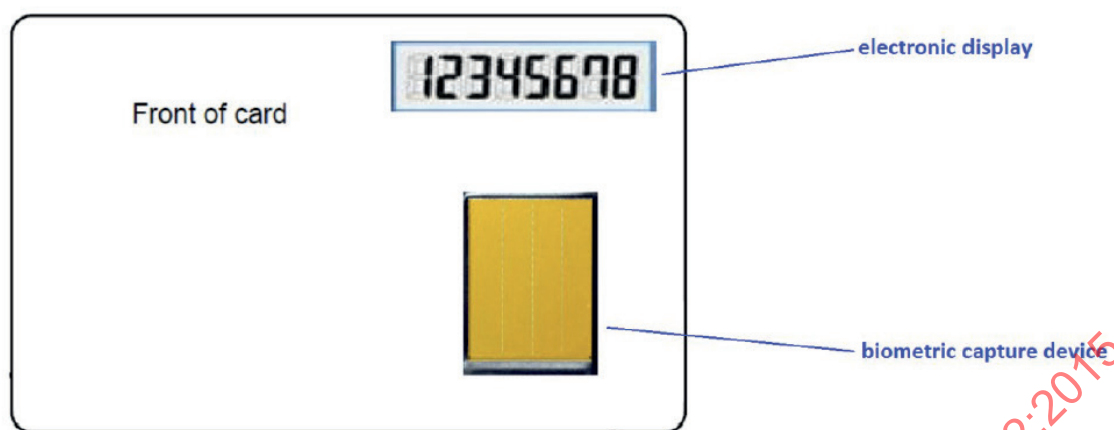


Figure 3 — Example of BSoC with electronic display

### 6.2.3 Voice biometrics

For voice biometrics the biometric capture device is an embedded microphone. The microphone shall be placed where the sound waves are not obstructed from reaching the sensing area. Therefore, in the case of a contact S1 card, the sensor shall be located in the right most edge of the allowed sensor region, and the IFD shall allow that the sensor is not obstructed when the card is inserted and in operation.

In contactless cards, the sensor may be located in any of the positions within the allowed region for sensor defined in [6.2.1](#).

In any case, the location of the sensor shall be visually or tactile noted so as the cardholder knows in which direction the voice utterance should be emitted.

### 6.2.4 Face biometrics

Due to ergonomic reasons in operational environments, the embedded camera required to capture the face of the cardholder is not usable while the card is inserted in the IFD. Therefore, face biometrics is only allowed in BSoC when contactless cards are used, either a S1 or S2 card.

In any case, the camera location shall be indicated visually or tactile.

### 6.2.5 Signature biometrics

In the case of a card with contacts, signature biometrics shall only be considered if the IFD allows the card to lay on a rigid surface, so that it does not bend during the process of signing. This is due to the fact that having a bending surface while signing, changes considerably the signing characteristics, and therefore raises the biometric error rates. Therefore, in case of a card with contacts inserted in an IFD with such a surface, the signing pad shall be located within the right half of the allowed region for the sensor defined in [6.2.1](#).

In the case of a contactless card, the signing pad may be placed in any of the two sides of the card, and within the allowed region for the sensor.

### 6.3 Size of the biometric capture device

#### 6.3.1 Finger biometrics

The biometric capture device shall have a minimum size to ensure stable operation of the Biometric System-on-Card. The industry provides two different categories of biometric capture devices with respect to shape. Area fingerprint sensors are operated by touching the sensor with a finger. Swipe fingerprint sensors require the user to move his or her finger over the biometric capture device.

The minimum size of an area sensor shall be  $169 \text{ mm}^2$  (e.g.  $13 \times 13 \text{ mm}^2$  or  $0.512 \times 0.512 \text{ in}^2$ ). In the case of a swipe sensor, the effective area of fingerprint capture is bigger than the sensor size. A swipe sensor shall have a minimum width of 13 mm (0.512 in).

Note: Cards using smaller biometric capture devices may not be able to capture a sufficient area of the fingerprint to allow reliable biometric comparison.

#### 6.3.2 Voice biometrics

The minimum size of the microphone shall not limit the acquisition without distortion in the 50 Hz – 8 kHz band.

#### 6.3.3 Face biometrics

The minimum size of the camera shall not limit the possibility of acquiring a facial image that conforms to the minimum requirements in size, resolution, colour depth and contrast given in ISO/IEC 19794-5.

#### 6.3.4 Signature biometrics

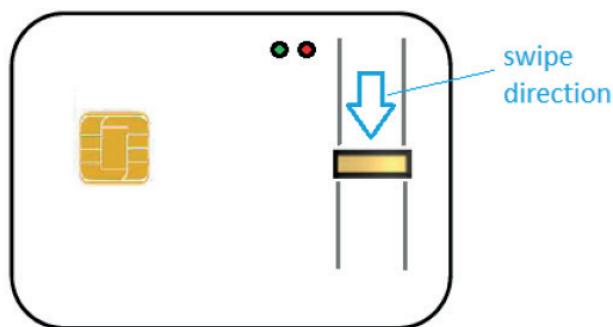
The size of the signing pad is limited by ergonomics and cultural differences in the signing process, as different societies have different understanding on how a signature should be done. A minimum area of  $35 \times 35 \text{ mm}^2$  ( $1.378 \times 1.378 \text{ in}^2$ ) shall be allowed for the signing pad.

### 6.4 Orientation

#### 6.4.1 Finger biometrics

The biometric capture device shall be placed within the allowed biometric capture device area in [Figure 1](#). The biometric capture device orientation is not standardized in a Biometric System-on-Card. If the ICC contacts are used in a type S1 Biometric System-on-Card using a swipe sensor, it is recommended to align the swipe direction parallel to the short edge of the card. Otherwise it is almost impossible to swipe the finger over the biometric capture device when it is inserted into an interface device.

[Figures 4](#) and [5](#) illustrate the recommended and other swipe direction in a BSoC with fingerprint sensor.



**Figure 4 — recommended swipe direction and biometric capture device orientation**