International Standard

ISO/IEC 17839-2

Information technology — Biometric System-on-Card —

Part 2:
Physical characteristics

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

Second edition
2024-08

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Foreword

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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 or www.iec.ch/members_experts/refdocs).

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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. In the IEC, see www.iec.ch/understanding-standards.

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

This second edition cancels and replaces the first edition (ISO/IEC 17839-2:2015), which has been technically revised. It also incorporates ISO/IEC 17839-2:2015/Amd 1:2021.

The main changes are as follows:

— change of Biometric System-on-Card (BSoC) classes and requirements;

— replaced references to S1 and S2 with ID-1 and ID-T;

— changes to mechanical requirements and restrictions.

A list of all parts in the ISO/IEC 17839 series can be found on the ISO and IEC websites.

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 and www.iec.ch/national-committees.

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 document. Therefore, this document provides the specifications for both type ID-1 BSoC and type ID-T BSoC.

ID-1 card dimensions are defined in ISO/IEC 7810. The specifications for this type of BSoC are limited to those related to the location of the biometric capture device, the human-machine interaction, as well as to stating certain limitations on the use of certain technologies such as not allowing embossing on this type of card.

ID-T card dimensions and other characteristics are specified in ISO/IEC 18328-2.

The ISO/IEC 17839 series is organized into three parts:

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

— ISO/IEC 17839-2 (this document) *Information technology — Biometric System-on-Card — Physical characteristics*

— ISO/IEC 17839-3 *Information technology — Biometric System-on-Card — Logical information interchange mechanism*

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Information technology — Biometric System-on-Card —

Part 2: Physical characteristics

1 Scope

This document defines:

— dimensions of a type ID-1 Biometric System-on-Card (BSoC) and type ID-T BSoC;

— position and capture area of the biometric capture device according to the needs of the biometric modality;

— minimum requirements to a BSoC with respect to:

— mechanical durability; and

— human-machine interface and ergonomics.

This document is not applicable to other on-card devices such as an electronic display or a keypad.

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

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

ISO/IEC 10373-1, *Cards and security devices for personal identification — 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*

3 Terms, definitions and abbreviated terms

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1 Terms and definitions

3.1.1
minutiae-based comparison algorithm
fingerprint biometric feature comparison algorithm, which relies on evaluating fingerprint minutiae data

Note 1 to entry: The fingerprint minutiae data format used can be the one defined in ISO/IEC 19794-2 or ISO/IEC 39794-2.

3.1.2
hybrid comparison algorithm
fingerprint biometric comparison algorithm, which relies on evaluating fingerprint minutiae data and extended feature data, such as ridge count data, curvature, delta and core singular points or any other proprietary vendor-specific data

Note 1 to entry: The fingerprint minutiae data format used can be the one defined in ISO/IEC 19794-2 or ISO/IEC 39794-2.

3.1.3
pattern comparison algorithm
either fingerprint biometric sample or biometric feature comparison algorithm, or both, which focuses on biometric sample image level correlation

Note 1 to entry: This category of algorithm typically tries to find a small fraction of a probe fingerprint image in a larger reference image or in a plurality of reference images obtained during a *multi-touch enrolment* (3.1.4) process. The data structures used in a pattern comparison algorithm are usually proprietary. A pattern comparison algorithm can evaluate lower level three fingerprint features, i.e. "micro-features" such as sweat pores, incipient ridges or ridge shapes.

3.1.4
multi-touch enrolment
enrolment process of multiple reference biometric samples

Note 1 to entry: Multiple reference biometric samples or biometric templates can be stored, or combined into a larger reference biometric sample or biometric template using *image stitching algorithm* (Note 3) or *template stitching algorithm* (Note 4) respectively

Note 2 to entry: Multi-touch enrolment is common in many smartphones with a small scan area fingerprint sensor.

Note 3 to entry: An image stitching algorithm is an algorithm assembling multiple captured biometric samples of the fingerprint into a larger reference biometric sample image (as if it was captured using large scan area fingerprint sensor) using pattern comparison algorithm (3.1.3).

Note 4 to entry: A template stitching algorithm is an algorithm assembling biometric feature reference templates (e.g. ISO/IEC 19794-2 or ISO/IEC 39794-2 minutiae data) extracted from multiple captured biometric samples of the fingerprint into a larger reference biometric template (as if it was extracted from biometric sample captured using large scan area fingerprint sensor) using minutiae-based comparison algorithm (3.1.1) or hybrid comparison algorithm (3.1.2).

3.1.5
enrolment update
process of merging the current biometric probe's biometric sample data or biometric feature data into a biometric reference, e.g. enrolled using multi-touch enrolment

Note 1 to entry: In a Biometric System-on-Card (BSoC) context, an enrolment update can happen after card issuance to update biometric reference data that can be stored in a secure element. An enrolment update helps when using features that are not consistent over a longer time period or capture environment dependent.

3.1.6
capture area
area of a biometric capture device that captures biometric data, e.g. a fingerprint or dynamic signature

3.2   Abbreviated terms

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

FAR false acceptance rate

FM false match

FMR false match rate

FNM false non-match

FNMR false non-match rate

FRR false rejection rate

FTA failure to acquire

IFD interface device

LED light emitting diode

PCB printed circuit board

ppi pixels per inch

4   Conformance

A BSoC claiming conformance with this document shall conform to all mandatory requirements specified herein as applicable. A BSoC using an area fingerprint biometric capture device claiming conformance to this document, shall express the class defined in Table 1 in the conformance statement, e.g. ISO/IEC 17839-2 Class C.

5   Dimensions

5.1   Overall dimensions

The overall dimensions of a type ID-1 BSoC shall be as specified in ISO/IEC 7810.

The overall dimensions of a type ID-T BSoC shall be as defined in ISO/IEC 18328-2.

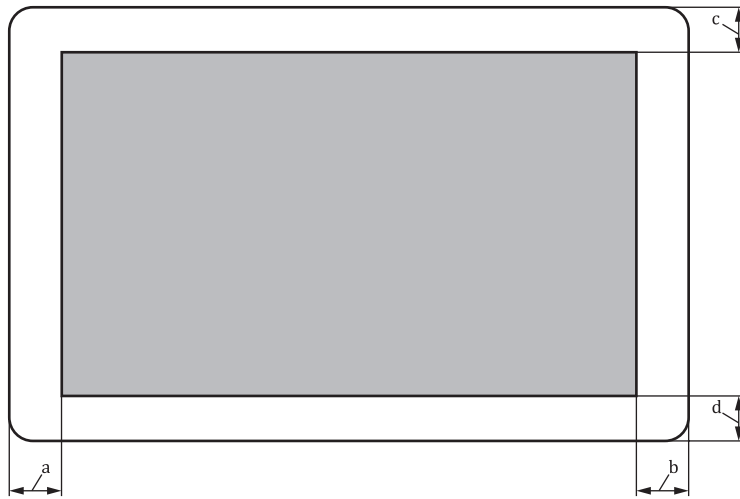## 5.2   Location of the biometric capture device

5.2.1   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 should not cover defined areas for other functional elements in the card.

The biometric capture device should not be too close to the border of the ICC due to ergonomic reasons. A minimum distance of 3,5 mm (approx. 0,138 in) between the capture area and the edge of the card is recommended for embedding a biometric capture device in a card.

When combining the biometric sensor with other functional elements in a card, care shall be taken that one element does not severely affect the functionality of the other one.

Figure 1 illustrates the recommended position for the biometric capture area. The position and modality-specific type of biometric capture device can be indicated on the BSoC.

Key

| | recommended position for biometric capture area |

a, b, c, d   3,5 mm.

Figure 1 — Recommended position for biometric capture area on the card

5.2.2 Fingerprint 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.
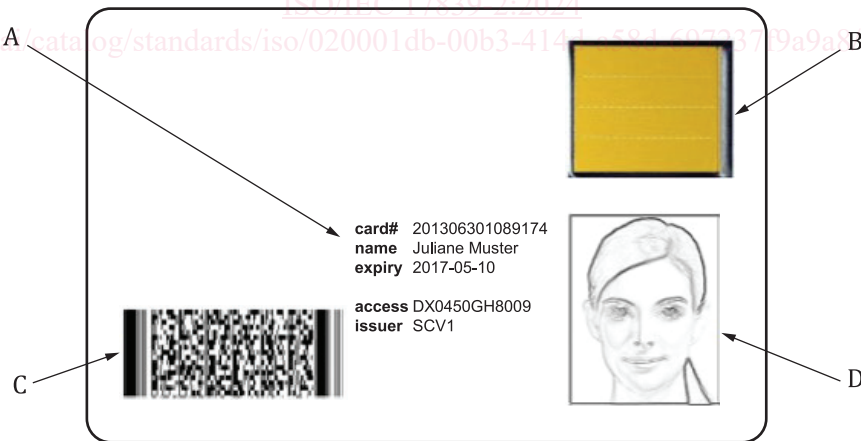
Key

A   printed data

B   biometric capture device

C   2D-barcode

D   picture

Figure 2 — Example of BSoC with printed information