

Certification Report

BSI-DSZ-CC-1076-2020

for

**STARCOS 3.7 ID eAT BAC C1, STARCOS 3.7 ID
ePass BAC C1**

from

Giesecke+Devrient Mobile Security GmbH

BSI - Bundesamt für Sicherheit in der Informationstechnik, Postfach 20 03 63, D-53133 Bonn
Phone +49 (0)228 99 9582-0, Fax +49 (0)228 9582-5477, Infoline +49 (0)228 99 9582-111



Bundesamt
für Sicherheit in der
Informationstechnik

Deutsches IT-Sicherheitszertifikat

erteilt vom

Bundesamt für Sicherheit in der Informationstechnik

BSI-DSZ-CC-1076-2020 (*)

Security IC with MRTD Applications (ePass, eID, eSign)

STARCOS 3.7 ID eAT BAC C1, STARCOS 3.7 ID ePass BAC C1

from Giesecke+Devrient Mobile Security GmbH

PP Conformance: Common Criteria Protection Profile Machine Readable Travel Document with "ICAO Application" Basic Access Control, Version 1.10, 25 March 2009, BSI-CC-PP-0055-2009

Functionality: PP conformant
Common Criteria Part 2 extended

Assurance: Common Criteria Part 3 conformant
EAL 4 augmented by ALC_DVS.2



SOGIS
Recognition Agreement



The IT Product identified in this certificate has been evaluated at an approved evaluation facility using the Common Methodology for IT Security Evaluation (CEM), Version 3.1 extended by Scheme Interpretations, by advice of the Certification Body for components beyond EAL 5 and CC Supporting Documents as listed in the Certification Report for conformance to the Common Criteria for IT Security Evaluation (CC), Version 3.1. CC and CEM are also published as ISO/IEC 15408 and ISO/IEC 18045.

(*) This certificate applies only to the specific version and release of the product in its evaluated configuration and in conjunction with the complete Certification Report and Notification. For details on the validity see Certification Report part A chapter 5.

The evaluation has been conducted in accordance with the provisions of the certification scheme of the German Federal Office for Information Security (BSI) and the conclusions of the evaluation facility in the evaluation technical report are consistent with the evidence adduced.

This certificate is not an endorsement of the IT Product by the Federal Office for Information Security or any other organisation that recognises or gives effect to this certificate, and no warranty of the IT Product by the Federal Office for Information Security or any other organisation that recognises or gives effect to this certificate, is either expressed or implied.

Bonn, 18 August 2020

For the Federal Office for Information Security

Sandro Amendola
Head of Division

L.S.



Common Criteria
Recognition Arrangement
recognition for components
up to EAL 2



Bundesamt für Sicherheit in der Informationstechnik

Godesberger Allee 185-189 - D-53175 Bonn - Postfach 20 03 63 - D-53133 Bonn

Phone +49 (0)228 99 9582-0 - Fax +49 (0)228 9582-5477 - Infoline +49 (0)228 99 9582-111

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A. Certification

1. Preliminary Remarks

Under the BSIG¹ Act, the Federal Office for Information Security (BSI) has the task of issuing certificates for information technology products.

Certification of a product is carried out on the instigation of the vendor or a distributor, hereinafter called the sponsor.

A part of the procedure is the technical examination (evaluation) of the product according to the security criteria published by the BSI or generally recognised security criteria.

The evaluation is normally carried out by an evaluation facility recognised by the BSI or by BSI itself.

The result of the certification procedure is the present Certification Report. This report contains among others the certificate (summarised assessment) and the detailed Certification Results.

The Certification Results contain the technical description of the security functionality of the certified product, the details of the evaluation (strength and weaknesses) and instructions for the user.

2. Specifications of the Certification Procedure

The certification body conducts the procedure according to the criteria laid down in the following:

- Act on the Federal Office for Information Security¹
- BSI Certification and Approval Ordinance²
- BSI Schedule of Costs³
- Special decrees issued by the Bundesministerium des Innern (Federal Ministry of the Interior)
- DIN EN ISO/IEC 17065 standard
- BSI certification: Scheme documentation describing the certification process (CC-Produkte) [3]
- BSI certification: Scheme documentation on requirements for the Evaluation Facility, its approval and licencing process (CC-Stellen) [3]

¹ Act on the Federal Office for Information Security (BSI-Gesetz - BSIG) of 14 August 2009, Bundesgesetzblatt I p. 2821

² Ordinance on the Procedure for Issuance of Security Certificates and approval by the Federal Office for Information Security (BSI-Zertifizierungs- und -Anerkennungsverordnung - BSIZertV) of 17 December 2014, Bundesgesetzblatt 2014, part I, no. 61, p. 2231

³ Schedule of Cost for Official Procedures of the Bundesamt für Sicherheit in der Informationstechnik (BSI-Kostenverordnung, BSI-KostV) of 3 March 2005, Bundesgesetzblatt I, p. 519

- Common Criteria for IT Security Evaluation (CC), Version 3.1⁴ [1] also published as ISO/IEC 15408.
- Common Methodology for IT Security Evaluation (CEM), Version 3.1 [2] also published as ISO/IEC 18045
- BSI certification: Application Notes and Interpretation of the Scheme (AIS) [4]

3. Recognition Agreements

In order to avoid multiple certification of the same product in different countries a mutual recognition of IT security certificates - as far as such certificates are based on ITSEC or CC - under certain conditions was agreed.

3.1. European Recognition of CC – Certificates (SOGIS-MRA)

The SOGIS-Mutual Recognition Agreement (SOGIS-MRA) Version 3 became effective in April 2010. It defines the recognition of certificates for IT-Products at a basic recognition level and, in addition, at higher recognition levels for IT-Products related to certain SOGIS Technical Domains only.

The basic recognition level includes Common Criteria (CC) Evaluation Assurance Levels EAL 1 to EAL 4. For "Smartcards and similar devices" a SOGIS Technical Domain is in place. For "HW Devices with Security Boxes" a SOGIS Technical Domains is in place, too. In addition, certificates issued for Protection Profiles based on Common Criteria are part of the recognition agreement.

The current list of signatory nations and approved certification schemes, details on recognition, and the history of the agreement can be seen on the website at <https://www.sogis.eu>.

The SOGIS-MRA logo printed on the certificate indicates that it is recognised under the terms of this agreement by the related bodies of the signatory nations. A disclaimer beneath the logo indicates the specific scope of recognition.

This certificate is recognized under SOGIS-MRA for all assurance components selected.

3.2. International Recognition of CC – Certificates (CCRA)

The international arrangement on the mutual recognition of certificates based on the CC (Common Criteria Recognition Arrangement, CCRA-2014) has been ratified on 08 September 2014. It covers CC certificates based on collaborative Protection Profiles (cPP) (exact use), CC certificates based on assurance components up to and including EAL 2 or the assurance family Flaw Remediation (ALC_FLR) and CC certificates for Protection Profiles and for collaborative Protection Profiles (cPP).

The current list of signatory nations and approved certification schemes can be seen on the website: <https://www.commoncriteriaportal.org>.

The Common Criteria Recognition Arrangement logo printed on the certificate indicates that this certification is recognised under the terms of this agreement by the related bodies of the signatory nations. A disclaimer beneath the logo indicates the specific scope of recognition.

⁴ Proclamation of the Bundesministerium des Innern of 12 February 2007 in the Bundesanzeiger dated 23 February 2007, p. 3730

This certificate is recognized according to the rules of CCRA-2014, i. e. up to and including CC part 3 EAL 2+ ALC_FLR components.

4. Performance of Evaluation and Certification

The certification body monitors each individual evaluation to ensure a uniform procedure, a uniform interpretation of the criteria and uniform ratings.

The product STARCOS 3.7 ID eAT BAC C1, STARCOS 3.7 ID ePass BAC C1 has undergone the certification procedure at BSI.

The evaluation of the product STARCOS 3.7 ID eAT BAC C1, STARCOS 3.7 ID ePass BAC C1 was conducted by SRC Security Research & Consulting GmbH. The evaluation was completed on 13 August 2020. SRC Security Research & Consulting GmbH is an evaluation facility (ITSEF)⁵ recognised by the certification body of BSI.

For this certification procedure the sponsor and applicant is: Giesecke+Devrient Mobile Security GmbH.

The product was developed by: Giesecke+Devrient Mobile Security GmbH.

The certification is concluded with the comparability check and the production of this Certification Report. This work was completed by the BSI.

5. Validity of the Certification Result

This Certification Report applies only to the version of the product as indicated. The confirmed assurance package is valid on the condition that

- all stipulations regarding generation, configuration and operation, as given in the following report, are observed,
- the product is operated in the environment described, as specified in the following report and in the Security Target.

If the certified product is being used as National ID-Card or National Document the operational instructions and limitations as outlined in 'Technische Richtlinie BSI TR-03116, Kryptographische Vorgaben für Projekte der Bundesregierung, Teil 2: eID-Karten und hoheitliche Dokumente' (TR-03116-2) have to be followed when issuing and using the product. This includes the restrictions related to cryptographic algorithms and related parameters. Cryptographic algorithms and related parameters not covered by the certificate (see Security Target and this Certification Report) must not be used. The latest published version of TR-03116-2 has to be followed (see <https://www.bsi.bund.de/>).

For the meaning of the assurance components and assurance levels please refer to CC itself. Detailed references are listed in part C of this report.

The Certificate issued confirms the assurance of the product claimed in the Security Target at the date of certification. As attack methods evolve over time, the resistance of the certified version of the product against new attack methods needs to be re-assessed. Therefore, the sponsor should apply for the certified product being monitored within the assurance continuity program of the BSI Certification Scheme (e.g. by a re-assessment or re-certification). Specifically, if results of the certification are used in subsequent evaluation and certification procedures, in a system integration process or if a user's risk

⁵ Information Technology Security Evaluation Facility

management needs regularly updated results, it is recommended to perform a re-assessment on a regular e.g. annual basis.

In order to avoid an indefinite usage of the certificate when evolved attack methods would require a re-assessment of the products resistance to state of the art attack methods, the maximum validity of the certificate has been limited. The certificate issued on 18 August 2020 is valid until 17 August 2025. Validity can be re-newed by re-certification.

The owner of the certificate is obliged:

1. when advertising the certificate or the fact of the product's certification, to refer to the Certification Report as well as to provide the Certification Report, the Security Target and user guidance documentation mentioned herein to any customer of the product for the application and usage of the certified product,
2. to inform the Certification Body at BSI immediately about vulnerabilities of the product that have been identified by the developer or any third party after issuance of the certificate,
3. to inform the Certification Body at BSI immediately in the case that security relevant changes in the evaluated life cycle, e.g. related to development and production sites or processes, occur, or the confidentiality of documentation and information related to the Target of Evaluation (TOE) or resulting from the evaluation and certification procedure where the certification of the product has assumed this confidentiality being maintained, is not given any longer. In particular, prior to the dissemination of confidential documentation and information related to the TOE or resulting from the evaluation and certification procedure that do not belong to the deliverables according to the Certification Report part B, or for those where no dissemination rules have been agreed on, to third parties, the Certification Body at BSI has to be informed.

In case of changes to the certified version of the product, the validity can be extended to the new versions and releases, provided the sponsor applies for assurance continuity (i.e. re-certification or maintenance) of the modified product, in accordance with the procedural requirements, and the evaluation does not reveal any security deficiencies.

6. Publication

The product STARCOS 3.7 ID eAT BAC C1, STARCOS 3.7 ID ePass BAC C1 has been included in the BSI list of certified products, which is published regularly (see also Internet: <https://www.bsi.bund.de> and [5]). Further information can be obtained from BSI-Infoline +49 228 9582-111.

Further copies of this Certification Report can be requested from the developer⁶ of the product. The Certification Report may also be obtained in electronic form at the internet address stated above.

⁶ Giesecke+Devrient Mobile Security GmbH
Prinzregentenstr. 159
81677 München
Deutschland

B. Certification Results

The following results represent a summary of

- the Security Target of the sponsor for the Target of Evaluation,
- the relevant evaluation results from the evaluation facility, and
- complementary notes and stipulations of the certification body.

1. Executive Summary

The Target of Evaluation (TOE) is the product STARCOS 3.7 ID eAT BAC C1, STARCOS 3.7 ID ePass BAC C1 provided by Giesecke+Devrient Mobile Security GmbH and based on the hardware platform Infineon Security Controller IFX_CCI_000005h from Infineon Technologies AG (refer to [16], [17]). It is an electronic Identity Card (ID_Card) representing a smart card with contactless interface programmed according to the Technical Guideline BSI TR-03110 [19] and the ICAO specifications [21], [22] and [23]. The smart card contains the MRTD-related Logical Data Structure (LDS) according to [21] and provides (amongst others) the following authentication mechanism:

- Basic Access Control (BAC)

Additionally, the TOE meets the requirements of the Technical Guideline BSI TR-03116-2 [20] as part of the qualification for the use within electronic ID card projects of the Federal Republic of Germany.

Please note that the security mechanism Basic Access Control (BAC) is in focus of this evaluation process. The further security mechanisms Password Authenticated Connection Establishment (PACE) and Extended Access Control (EAC) that are implemented in the corresponding product containing the TOE are subject of a separate evaluation process (refer to BSI-DSZ-CC-1077).

The smart card contains at least the following application that is subject of the TOE's evaluation:

- ePass Application:

With this application the TOE is intended to be used as a machine readable travel document (MRTD). The application contains the related user data (including biometric data) as well as the data needed for authentication (including MRZ).

Depending on the chosen major configuration (see below) also an eID and eSign Application can be installed in the product containing the TOE. For the present CC evaluation, only the ePass Application of the product is considered because only this application uses the stand-alone BAC protocol.

Two different major configurations of the TOE or corresponding product respectively exist, that only differ in the installed file system or applications:

- Residence Permit:

STARCOS 3.7 ID eAT BAC C1 configuration, corresponding to the 'Residence Permit Configuration' and including the following applications:

ePass Application compliant to ICAO ([21], [22]). In addition, an eID Application and eSign Application is installed in the corresponding product containing the TOE. However, these additional applications are not in scope of the present evaluation, but are considered in a separate evaluation process where the EAC aspects related to these applications are evaluated (refer to BSI-DSZ-CC-1077).

- Passport:

STARCOS 3.7 ID ePass BAC C1 configuration, corresponding to the 'Passport Configuration' and including the following application:

ePass Application compliant to ICAO ([21], [22]).

The Security Target [6] is the basis for this certification. It is based on the certified PP and claims strict conformance to it:

- Common Criteria Protection Profile Machine Readable Travel Document with "ICAO Application", Basic Access Control, Version 1.10, 25 March 2009, BSI-PP-0055-2009 [8]

Please note that in consistency to the claimed Protection Profile the security mechanism Basic Access Control (BAC) is in focus of this evaluation process. The further security mechanisms Password Authenticated Connection Establishment (PACE) and Extended Access Control (EAC) implemented in the corresponding product containing the TOE are subject of a separate evaluation process (refer to BSI-DSZ-CC-1077).

The TOE Security Assurance Requirements (SAR) are based entirely on the assurance components defined in Part 3 of the Common Criteria (see part C or [1], Part 3 for details). The TOE meets the assurance requirements of the Evaluation Assurance Level EAL 4 augmented by ALC_DVS.2.

The TOE Security Functional Requirements (SFR) relevant for the TOE are outlined in the Security Target [6] and [7], chapter 6.1. They are selected from Common Criteria Part 2 and some of them are newly defined. Thus the TOE is CC Part 2 extended.

The TOE Security Functional Requirements are implemented by the following TOE Security Functionality:

TOE Security Functionality	Addressed Issue
SF_AccessControl	The TOE provides access control mechanisms that allow amongst others the maintenance of different users (Manufacturer, Personalisation Agent, Basic Inspection System).
SF_Authentication	The TOE supports user authentication by Basic Access Control Authentication Mechanism and Symmetric Authentication Mechanism based on AES. The TOE prevents reuse of authentication data related to the Basic Access Control Authentication Mechanism and the Symmetric Authentication Mechanism. Protection of user data transmitted from the TOE to the terminal is achieved by means of secure messaging with encryption and message authentication codes. After authentication, user data in transit is protected from unauthorised disclosure, modification, deletion, insertion and replay errors.
SF_AssetProtection	The TOE supports the calculation of block check values for data integrity checking. The TOE hides information about IC power consumption and command execution time ensuring that neither the Personalisation Agent keys nor the logical MRTD data nor any other confidential information can be derived from this information.
SF_TSFPProtection	The TOE detects and resists physical tampering of the TSF with sensors for operating voltage, clock frequency, temperature and electromagnetic

TOE Security Functionality	Addressed Issue
	radiation. The TOE demonstrates the correct operation of the TSF by amongst others verifying the integrity of the TSF and TSF data and verifying the absence of fault injections.
SF_KeyManagement	The TOE generates 2-key Triple DES keys in accordance with the Document Basic Access Key Derivation Algorithm that uses SHA-1 hash function as specified in [21]. The TOE supports overwriting the cryptographic keys with zero values.

Table 1: TOE Security Functionalities

The following TOE security features are the most significant for the TOE's operational use. The TOE ensures

- that the terminals get the authorisation to read the logical MRTD under the Basic Access Control only by optical reading the MRTD or other parts of the passport book providing this information,
- verifying authenticity and integrity as well as securing confidentiality of user data in the communication channel between the TOE and the service provider connected,
- averting of inconspicuous tracing of the MRTD,
- self-protection of the TOE security functionality and the data stored inside.

For more details please refer to the Security Target [6] and [7], chapter 7.

The assets to be protected by the TOE are defined in the Security Target [6] and [7], chapter 3.1. Based on these assets the TOE Security Problem is defined in terms of Assumptions, Threats and Organisational Security Policies. This is outlined in the Security Target [6] and [7], chapter 3.2, 3.3. and 3.4.

This certification covers the configurations of the TOE as outlined in chapter 8.

The vulnerability assessment results as stated within this certificate do not include a rating for those cryptographic algorithms and their implementation suitable for encryption and decryption (see BSIG Section 9, Para. 4, Clause 2).

The certification results only apply to the version of the product indicated in the certificate and on the condition that all the stipulations are kept as detailed in this Certification Report. This certificate is not an endorsement of the IT product by the Federal Office for Information Security (BSI) or any other organisation that recognises or gives effect to this certificate, and no warranty of the IT product by BSI or any other organisation that recognises or gives effect to this certificate, is either expressed or implied.

2. Identification of the TOE

The Target of Evaluation (TOE) is called:

STARCOS 3.7 ID eAT BAC C1, STARCOS 3.7 ID ePass BAC C1

The following table outlines the TOE deliverables:

No	Type	Identifier	Release	Form of Delivery
1	HW/SW	HW Platform Infineon Security Controller IFX_CCI_000005h including its IC Dedicated Software (Firmware) (refer to the Certification Report BSI-DSZ-CC-1110-V3-2020 [17])	SLC52GDA448 with Firmware version 80.100.17.3 (FW-00.100.17.0-SLCx2V3), with Flash Loader FL-8.02.003-SLCx2V3, with Hardware Support Library HSL-2 (HSL-03.11.8339-SLCx2_C65)	The TOE Embedded Software is implemented in the flash storage of the IC. The delivery of the TOE is performed as already initialised and pre-personalised functional cards via secured transport to the Personalisation Centre. In addition, flash images for re-loading of the TOE Embedded Software in the framework of the TOE's personalisation are delivered to the Personalisation Centre (as encrypted and signed electronic item).
2	SW	TOE Embedded Software IC Embedded Software, consisting of <ul style="list-style-type: none"> • STARCOS 3.7 ID operating system • associated file systems for the two major TOE configurations STARCOS 3.7 ID eAT BAC C1, STARCOS 3.7 ID ePass BAC C1 	OS version: 'B7 02' (Release 3.72) Flash Image version: '00 51' TOE configurations: eAT: '0D' ePass: '02' (retrievable via the command GET PROTOCOL DATA, see below)	
3	DATA	Personalisation-related key material	--	Items in electronic form (encrypted and signed)
4	DOC	Guidance Documentation STARCOS 3.7 ID C1 – Main Document [11]	Version 1.01	Document in electronic form (encrypted and signed)
5	DOC	Guidance Documentation for the Usage Phase STARCOS 3.7 ID BAC [12]	Version 0.7	Document in electronic form (encrypted and signed)
6	DOC	Guidance Documentation for the Initialisation Phase STARCOS 3.7 ID C1 [13]	Version 2.0	Document in electronic form (encrypted and signed)
7	DOC	Guidance Documentation for the Personalisation Phase STARCOS 3.7 ID C1 [14]	Version 2.1	Document in electronic form (encrypted and signed)
8	DOC	Starcos 3.7 ID eAT - Perso guide [15]	Version 1.40	Document in electronic form (encrypted and signed)
9	DOC	Starcos 3.7 ID ePass - Perso guide [15]	Version 1.20	Document in electronic form (encrypted and signed)

Table 2: Deliverables of the TOE

The TOE Embedded Software consists of the operating system of STARCOS 3.7 ID eAT BAC C1, STARCOS 3.7 ID ePass BAC C1 and the different file systems for its two major configurations (Residence Permit Configuration, Passport Configuration).

The TOE is finalised with its initialisation, that is with loading of the STARCOS 3.7 ID operating system and the respective file system for the different TOE configurations onto the Infineon Security Controller IFX_CCI_000005h and the following pre-personalisation step for insertion of personalisation-related key material. The delivery of the TOE is performed as already initialised and pre-personalised functional cards via secured transport to the Personalisation Centre.

The Personalisation Centre receives information about the personalisation commands and process requirements. To ensure that the Personalisation Centre receives the evaluated version of the TOE, the procedures to start the personalisation process as described in the guidance documentation [11] - [15] have to be followed.

In addition, flash images for re-loading of the TOE Embedded Software in the framework of the TOE's personalisation are delivered to the Personalisation Centre (as encrypted and signed electronic item).

The Initialiser and Personaliser can use the GET PROTOCOL DATA command (CLA = 'A0', INS = 'CA') as described in the user guidance documentation [13], chapter 5.2.5 and [14], chapter 5.2.1 to read out the chip information and identify the chip and the TOE Embedded Software including its configuration.

In particular, with P1 P2 = '9F 6A' the following TOE information can be retrieved by the command GET PROTOCOL DATA:

'47 44 00 B7 02 00 51' whereby 'B7 02' identifies the version of the STARCOS 3.7 ID operating system and '00 51' identifies the version of the flash images that belong to the two major TOE configurations.

With P1 P2 = '9F 65' the following TOE configuration information can be retrieved:

TOE configuration	Response Byte-Number	
	1 (configuration ID)	2 (production state)
STARCOS 3.7 ID eAT BAC C1	'0D'	01 (initialisation phase) 02 (personalisation phase)
STARCOS 3.7 ID ePass BAC C1	'02'	01 (initialisation phase) 02 (personalisation phase)

Table 3: TOE Identification Data (GET PROTOCOL DATA with P1 P2 = '9F 65')

Note that according to [13], chapter 5.2.5 and [14], chapter 5.2.1, the command GET PROTOCOL DATA is available in the usage phase, but does not provide any return values.

3. Security Policy

The Security Policy is expressed by the set of Security Functional Requirements and implemented by the TOE. It covers the following issues:

The Security Policy of the TOE is defined according to the Protection Profile [8] by the Security Objectives and Requirements for the chip of machine readable travel documents (MRTD) based on the requirements and recommendations of the International Civil Aviation Organisation (ICAO). The Security Policy addresses the advanced security methods for authentication and secure communication, which are described in detail in the Security Target [6] and [7].

The TOE implements physical and logical security functionality in order to protect user data stored and operated on the smart card when used in a hostile environment. Hence, the TOE maintains integrity and confidentiality of code and data stored in its memories and the different CPU modes with the related capabilities for configuration and memory access and for integrity, the correct operation and the confidentiality of security functionality provided by the TOE. Therefore, the TOE's overall policy is to protect against malfunction, leakage, physical manipulation and probing. Besides, the TOE's life-cycle is supported as well as the user identification whereas the abuse of functionality is prevented. Furthermore, specific cryptographic services including crypto routines, random number generation and key management functionality are being provided to be securely used by the smart card embedded software.

Specific details concerning the above mentioned security policies can be found in the Security Target [6] and [7], chapter 6 and 7.

4. Assumptions and Clarification of Scope

The Assumptions defined in the Security Target and some aspects of Threats and Organisational Security Policies are not covered by the TOE itself. These aspects lead to specific security objectives to be fulfilled by the TOE-Environment. The following topics are of relevance:

- OE.MRTD_Manufact: Protection of the MRTD Manufacturing
- OE.MRTD_Delivery: Protection of the MRTD Delivery
- OE.Personalization: Personalization of the logical MRTD
- OE.Pass_Auth_Sign: Authentication of the logical MRTD by Signature
- OE.BAC-Keys: Chip Authentication Key
- OE.Exam_MRTD: Authentication of rightful terminals
- OE.Passive_Auth_Verif: Terminal operating
- OE.Prot_Logical_MRTD: Protection of data from the logical MRTD

Details can be found in the Security Target [6] and [7], chapter 4.2 as well as in the Protection Profile [8].

5. Architectural Information

The TOE is a composite product. It is composed from the Integrated Circuit (IC) IFX_CCI_000005h from Infineon Technologies AG and the TOE Embedded Software developed by Giesecke+Devrient Mobile Security GmbH. The TOE Embedded Software contains the operating system STARCOS 3.7 ID and the different file systems for its two major configurations Residence Permit Configuration STARCOS 3.7 ID eAT BAC C1 and Passport Configuration STARCOS 3.7 ID ePass BAC C1. Hereby, the TOE Embedded Software includes at least the ePass Application.

The TOE does not use the cryptographic software libraries of the Infineon hardware platform, but provides its cryptographic services by the cryptographic library developed by Giesecke+Devrient Mobile Security GmbH.

For details concerning the CC evaluation of the underlying IC see the evaluation documentation under the Certification ID BSI-DSZ-CC-1110-V3-2020 ([16], [17]).

According to the TOE design the Security Functions of the TOE as listed in Table 1 in chapter 1 are implemented by the following subsystems:

- System Library: Application framework
- Chip Card Commands: Pre-processing and processing of all implemented commands
- Security Management: Management of the security environment, security states and rule analysis
- Key Management: Search, pre-processing, use and post-processing of keys
- Secure Messaging: SM handling
- Crypto Functions: Library with an API to all cryptographic operations
- Configuration Application: Configuration of the TOE

The subsystem Configuration Application covers the different configurations of the TOE as defined in the Security Target [6] and [7], chapter 1.2 and 1.2.6 and provides the related applications. These configurations and applications comply with the general definition of data structures, including access control and management of authentication with key objects and their usage attributes.

The above-listed subsystems are supported by the subsystems Runtime System, File System, Non-Volatile Memory Management, and Transport Management.

6. Documentation

The evaluated documentation as outlined in Table 2 is being provided with the product to the customer. This documentation contains the required information for secure usage of the TOE in accordance with the Security Target [6] and [7].

Additional obligations and notes for secure usage of the TOE as outlined in chapter 10 of this report have to be followed.

7. IT Product Testing

The developer tested all TOE Security Functions either on real cards or with simulator tests. For all commands and functionality tests, test cases are specified in order to demonstrate the expected behaviour including error cases. Hereby, a representative sample including all boundary values of the parameter set was tested, e.g. all command APDUs with valid and invalid inputs were tested and all functions were tested with valid and invalid inputs. Repetition of developer tests was performed during the independent evaluator tests.

Since many Security Functions can be tested by TR-03110 [19] APDU command sequences, the evaluators performed these tests with real cards. This is considered to be a reasonable approach because the developer tests include a full coverage of all security functionality. Furthermore, penetration tests were chosen by the evaluators for those Security Functions where internal secrets of the card could maybe be modified or observed during testing. During their independent testing, the evaluators covered:

- testing APDU commands related to Key Management and Crypto Functions,
- testing APDU commands related to Security Management,

- testing APDU commands related to Secure Messaging,
- testing APDU commands related to Runtime System and System Library,
- testing the commands which are used to execute the BAC authentication protocol,
- penetration testing related to the verification of the reliability of the TOE,
- source code analysis performed by the evaluators,
- analysis of the conformity of the TOE's implementation of the cryptographic algorithms to the corresponding standards outlined in the Security Target [6] and [7],
- side channel analysis for SHA, DES and AES,
- fault injection attacks (laser attacks and EM glitches),
- testing APDU commands for the initialisation, personalisation and usage phase,
- testing APDU commands for the commands using cryptographic mechanisms, and
- fuzzy testing on APDU processing.

The evaluators have tested the TOE systematically against enhanced basic attack potential during their penetration testing.

The achieved test results correspond to the expected test results.

8. Evaluated Configuration

This certification covers the following TOE as outlined in the Security Target [6] and [7]:

The TOE STARCOS 3.7 ID eAT BAC C1, STARCOS 3.7 ID ePass BAC C1 under certification is composed from:

- Infineon Security Controller IFX_CCI_000005h including its IC Dedicated Support Software from Infineon Technologies AG
- TOE Embedded Software that contains the operating system STARCOS 3.7 ID and the different file systems for its two major configurations (see below)
- Guidance documentation (see Table 2, rows 4 to 9, i.e. [11] to [15])
- Personalisation-related key material (see Table 2, row 3)

Hereby, this certification covers the following two major configurations of the TOE:

- Residence Permit:

STARCOS 3.7 ID eAT BAC C1 configuration, corresponding to the 'Residence Permit Configuration' and including the following applications:

ePass Application compliant to ICAO ([21], [22]). Additional eID Application and eSign Application (refer to BSI-DSZ-CC-1077).

Note: The additional two applications are not in scope of the present evaluation, but are covered by BSI-DSZ-CC-1077.

- Passport:

STARCOS 3.7 ID ePass BAC C1 configuration, corresponding to the 'Passport Configuration' and including the following application:

ePass Application compliant to ICAO ([21], [22]).

The TOE is installed on a contactless chip of type Infineon Security Controller IFX_CCI_000005h from Infineon Technologies AG. This IC is certified under the Certification ID BSI-DSZ-CC-1110-V3-2020 (refer to [17]).

The TOE does not use the cryptographic software libraries of the Infineon hardware platform, but provides its cryptographic services by the cryptographic library developed by Giesecke+Devrient Mobile Security GmbH.

The TOE covering the IC and the TOE Embedded Software is delivered as an initialised and pre-personalised functional card. For details refer to chapter 2 of this Certification Report.

The Initialiser and Personaliser can use the GET PROTOCOL DATA command as described in chapter 2 above to read out the chip information and identify the chip and the TOE Embedded Software including its configuration during the life-cycle phases initialisation and personalisation.

In particular, with P1 P2 = '9F 6A' the following TOE information can be retrieved by the command GET PROTOCOL DATA:

'47 44 00 B7 02 00 51' whereby 'B7 02' identifies the version of the STARCOS 3.7 ID operating system and '00 51' identifies the version of the flash images that belong to the two major TOE configurations.

The following table describes the evaluated TOE configurations with their respective identifiers that can be retrieved with GET PROTOCOL DATA using P1 P2 = '9F 65':

TOE configuration	Response Byte-Number	
	1 (configuration ID)	2 (production state)
STARCOS 3.7 ID eAT BAC C1	'0D'	01 (initialisation phase) 02 (personalisation phase)
STARCOS 3.7 ID ePass BAC C1	'02'	01 (initialisation phase) 02 (personalisation phase)

Table 4: Evaluated TOE configurations and identifier (GET PROTOCOL DATA with P1 P2 = '9F 65')

The GET PROTOCOL DATA command and related parameters are described in the user guidance documentation [13], chapter 5.2.5 and [14], chapter 5.2.1.

The identification data as outlined in Table 4 and retrieved from the product must comply with the data given in the user guidance documentation [13] and [14] in order for the TOE to be verified as a certified version.

9. Results of the Evaluation

9.1. CC specific results

The Evaluation Technical Report (ETR) [9] was provided by the ITSEF according to the Common Criteria [1], the Methodology [2], the requirements of the Scheme [3] and all interpretations and guidelines of the Scheme (AIS) [4] as relevant for the TOE.

The Evaluation Methodology CEM [2] was used for those components up to EAL 5 extended by advice of the Certification Body for components beyond EAL 5 and guidance specific for the technology of the product [4] (AIS 34).

The following guidance specific for the technology was used:

- (i) Composite product evaluation for Smart Cards and similar devices according to AIS 36 (see [4]). On base of this concept the relevant guidance documents of the underlying IC platform (refer to [17]) and the document ETR for composite evaluation from the IC's evaluation ([18]) have been applied in the TOE evaluation.
- (ii) Guidance for Smartcard Evaluation (AIS 37, see [4]).
- (iii) Attack Methods for Smartcards and Similar Devices (AIS 26, see [4]).
- (iv) Application of Attack Potential to Smartcards (AIS 26, see [4]).
- (v) Application of CC to Integrated Circuits (AIS 25, see [4]).
- (vi) Security Architecture requirements (ADV_ARC) for smart cards and similar devices (AIS 25, see [4]).
- (vii) Evaluation Methodology for CC Assurance Classes for EAL5+ and EAL6 (AIS 34, see [4]).
- (viii) Functionality classes and evaluation methodology of physical and deterministic random number generators (AIS 20 and AIS 31, see [4]).
- (ix) Informationen zur Evaluierung von kryptographischen Algorithmen (AIS 46, see [4]).

For smart card specific methodology the scheme interpretations AIS 25, AIS 26, AIS 34, AIS 36, AIS 37 and AIS 46 (see [4]) were used. For RNG assessment the scheme interpretations AIS 20 and AIS 31 were used (see [4]).

The assurance refinements outlined in the Security Target were followed in the course of the evaluation of the TOE.

As a result of the evaluation the verdict PASS is confirmed for the following assurance components:

- All components of the EAL 4 package including the class ASE as defined in the CC (see also part C of this report).
- The component ALC_DVS.2 augmented for this TOE evaluation.

The evaluation has confirmed:

- PP Conformance: Common Criteria Protection Profile Machine Readable Travel Document with "ICAO Application", Basic Access Control, Version 1.10, 25 March 2009, BSI-PP-0055-2009 [8]
- for the Functionality: PP conformant
Common Criteria Part 2 extended

- for the Assurance: Common Criteria Part 3 conformant
EAL 4 augmented by ALC_DVS.2

Additionally, the requirements of the Technical Guideline BSI TR-03116-2 [20] are met by the TOE. This is part of the qualification of STARCOS 3.7 ID eAT BAC C1, STARCOS 3.7 ID ePass BAC C1 for the use within electronic passport card projects of the Federal Republic of Germany.

For specific evaluation results regarding the development and production environment see annex B in part D of this report.

The results of the evaluation are only applicable to the TOE as defined in chapter 2 and the configuration as outlined in chapter 8 above.

9.2. Results of cryptographic assessment

The table in annex C of part D of this report gives an overview of the cryptographic functionalities inside the TOE to enforce the security policy.

For the TOE's cryptographic functionalities, this table outlines the standard of application where their specific appropriateness is stated.

According to [19], [20], [21], [22], [23] and [24] the algorithms are suitable for authentication, key agreement, authenticity, integrity, confidentiality and trusted channel. An explicit validity period is not given.

Please take into account that cryptographic functionalities with a security level of lower than 100 bits can no longer be regarded as secure without considering the application context. Therefore, for these functionalities it shall be checked whether the related cryptographic operations are appropriate for the intended system. Some further hints and guidelines can be derived from the document 'Technische Richtlinie BSI TR-02102-1 Kryptographische Verfahren: Empfehlungen und Schlüssellängen' (refer to the reference <https://www.bsi.bund.de>).

The strength of the these cryptographic algorithms was not rated in the course of this certification procedure (see BSIG Section 9, Para. 4, Clause 2).

10. Obligations and Notes for the Usage of the TOE

The documents as outlined in Table 2 contain necessary information about the usage of the TOE and all security hints therein have to be considered. In addition, all aspects of Assumptions, Threats and OSPs as outlined in the Security Target not covered by the TOE itself need to be fulfilled by the operational environment of the TOE.

The customer or user of the product shall consider the results of the certification within his system risk management process. In order for the evolution of attack methods and techniques to be covered, he should define the period of time until a re-assessment of the TOE is required and thus requested from the sponsor of the certificate.

The limited validity for the usage of cryptographic algorithms as outlined in chapter 9 has to be considered by the user and his system risk management process, too.

In addition, the following aspects need to be fulfilled when using the TOE:

If the product certified is being used as National ID-Card or National Document the operational instructions and limitations as outlined in 'Technische Richtlinie BSI TR-03116, Kryptographische Vorgaben für Projekte der Bundesregierung, Teil 2: eID-Karten und

hoheitliche Dokumente' [20] (TR-03116-2) have to be followed when issuing and using the product. This includes the restrictions related to cryptographic algorithms and related parameters. Cryptographic algorithms and related parameters not covered by the certificate (see ST [6] and this Certification Report) must not be used. The latest published version of TR-03116-2 has to be followed (see <https://www.bsi.bund.de/>).

11. Security Target

For the purpose of publishing, the Security Target Lite [7] of the Target of Evaluation (TOE) is provided within a separate document as Annex A of this report. It is a sanitised version of the complete Security Target [6] used for the evaluation performed. Sanitisation was performed according to the rules as outlined in the relevant CCRA policy (see AIS 35 [4]).

12. Regulation specific aspects (eIDAS, QES)

Not applicable.

13. Definitions

13.1. Acronyms

AES	Advanced Encryption Standard
AIS	Application Notes and Interpretations of the Scheme
APDU	Application Protocol Data Unit
BAC	Basic Access Control
BSI	Bundesamt für Sicherheit in der Informationstechnik / Federal Office for Information Security, Bonn, Germany
BSIG	BSI-Gesetz / Act on the Federal Office for Information Security
CA	Chip Authentication
CAM	Chip Authentication Mapping
CCRA	Common Criteria Recognition Arrangement
CC	Common Criteria for IT Security Evaluation
CEM	Common Methodology for Information Technology Security Evaluation
CMAC	Cipher-Based Message Authentication Code,
cPP	Collaborative Protection Profile
DECIES	Domain Parameter ECIES
DES	Data Encryption Standard
EAC	Extended Access Control
EAL	Evaluation Assurance Level
ECC	Elliptic Curve Cryptography
ECDH	Elliptic Curve Diffie-Hellman
ECIES	Elliptic Curve Integrated Encryption Scheme

eID	electronic Identity Card
eIDAS	electronic IDentification, Authentication and trust Services
EM	Electromagnetic
ETR	Evaluation Technical Report
IC	Integrated Circuit
ICAO	International Civil Aviation Organisation
ID_Card	electronic Identity Card
IT	Information Technology
ITSEF	Information Technology Security Evaluation Facility
LDS	Logical Data Structure
MAC	Message Authentication Code
MRTD	Machine Readable Travel Document
MRZ	Machine Readable Zone
PACE	Password Authenticated Connection Establishment
PP	Protection Profile
QES	Qualified Electronic Signature
QSCD	Qualified Signature Creation Device
SAR	Security Assurance Requirement
SCA	Signature Creation Application
SFP	Security Function Policy
SFR	Security Functional Requirement
SHA	Secure Hash Algorithm
SSCD	Secure Signature Creation Device
ST	Security Target
SVD	Signature Verification Data
TA	Terminal Authentication
TOE	Target of Evaluation
TSF	TOE Security Functionality
VAD	Verification Authentication Data

13.2. Glossary

Augmentation - The addition of one or more requirement(s) to a package.

Collaborative Protection Profile - A Protection Profile collaboratively developed by an International Technical Community endorsed by the Management Committee.

Extension - The addition to an ST or PP of functional requirements not contained in CC part 2 and/or assurance requirements not contained in CC part 3.

Formal - Expressed in a restricted syntax language with defined semantics based on well-established mathematical concepts.

Informal - Expressed in natural language.

Object - A passive entity in the TOE, that contains or receives information, and upon which subjects perform operations.

Package - Named set of either security functional or security assurance requirements.

Protection Profile - A formal document defined in CC, expressing an implementation independent set of security requirements for a category of IT Products that meet specific consumer needs.

Security Target - An implementation-dependent statement of security needs for a specific identified TOE.

Semiformal - Expressed in a restricted syntax language with defined semantics.

Subject - An active entity in the TOE that performs operations on objects.

Target of Evaluation - An IT Product and its associated administrator and user guidance documentation that is the subject of an Evaluation.

TOE Security Functionality - Combined functionality of all hardware, software, and firmware of a TOE that must be relied upon for the correct enforcement of the SFRs.

14. Bibliography

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Part 2: Security functional components, Revision 5, April 2017
Part 3: Security assurance components, Revision 5, April 2017,
<https://www.commoncriteriaportal.org>
- [2] Common Methodology for Information Technology Security Evaluation (CEM), Evaluation methodology, Version 3.1, Revision 5, April 2017,
<https://www.commoncriteriaportal.org>
- [3] BSI certification: Scheme documentation describing the certification process (CC-Produkte) and Scheme documentation on requirements for the Evaluation Facility, approval and licencing (CC-Stellen),
<https://www.bsi.bund.de/zertifizierung>
- [4] Application Notes and Interpretations of the Scheme (AIS) as relevant for the TOE⁷,
<https://www.bsi.bund.de/AIS>

⁷specifically

- AIS 1, Version 14, Durchführung der Ortsbesichtigung in der Entwicklungsumgebung des Herstellers
- AIS 14, Version 7, Anforderungen an Aufbau und Inhalt der ETR-Teile (Evaluation Technical Report) für Evaluationen nach CC (Common Criteria)
- AIS 19, Version 9, Anforderungen an Aufbau und Inhalt der Zusammenfassung des ETR (Evaluation Technical Report) für Evaluationen nach CC (Common Criteria) und ITSEC
- AIS 20, Version 3, Funktionalitätsklassen und Evaluationsmethodologie für deterministische Zufallszahlengeneratoren
- AIS 23, Version 4, Zusammentragen von Nachweisen der Entwickler

- [5] German IT Security Certificates (BSI 7148), periodically updated list published also on the BSI Website,
<https://www.bsi.bund.de/zertifizierungsreporte>
- [6] Security Target BSI-DSZ-CC-1076-2020, Security Target STARCOS 3.7 ID eAT BAC C1, STARCOS 3.7 ID ePass BAC C1, Version 1.5, 12 August 2020, Giesecke+Devrient Mobile Security GmbH (confidential document)
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- [8] Common Criteria Protection Profile Machine Readable Travel Document with “ICAO Application”, Basic Access Control, Version 1.10, 25 March 2009, BSI-PP-0055-2009
- [9] ETR BSI-DSZ-CC-1076-2020, Evaluation Technical Report (ETR) – Summary for STARCOS 3.7 ID eAT BAC C1, STARCOS 3.7 ID ePass BAC C1, Version 1.2, 13 August 2020, SRC Security Research & Consulting GmbH (confidential document)
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- [14] Guidance Documentation for the Personalisation Phase STARCOS 3.7 ID C1, Version 2.1, 27 July 2020, Giesecke+Devrient Mobile Security GmbH
- [15] Application-specific personalisation guidance:
Starcos 3.7 ID eAT - Perso guide, Version 1.40, 17 March 2020, Giesecke+Devrient Mobile Security GmbH
- AIS 25, Version 9, Anwendung der CC auf Integrierte Schaltungen including JIL Document and CC Supporting Document
 - AIS 26, Version 10, Evaluationsmethodologie für in Hardware integrierte Schaltungen including JIL Document and CC Supporting Document
 - AIS 31, Version 3, Funktionalitätsklassen und Evaluationsmethodologie für physikalische Zufallszahlengeneratoren
 - AIS 32, Version 7, CC-Interpretationen im deutschen Zertifizierungsschema
 - AIS 34, Version 3, Evaluation Methodology for CC Assurance Classes for EAL 5+ (CCv2.3 & CCv3.1) and EAL 6 (CCv3.1)
 - AIS 35, Version 2, Öffentliche Fassung des Security Targets (ST-Lite) including JIL Document and CC Supporting Document and CCRA policies
 - AIS 36, Version 5, Kompositionsevaluierung including JIL Document and CC Supporting Document (but with usage of updated JIL document ‘Composite product evaluation for Smart Cards and similar devices’, version 1.5.1, May 2018)
 - AIS 38, Version 2, Reuse of evaluation results

Starcos 3.7 ID ePass - Perso guide, Version 1.20, 17 March 2020,
Giesecke+Devrient Mobile Security GmbH

- [16] Security Target of the underlying hardware platform, Common Criteria Confidential Security Target IFX_CCI_000003h, IFX_CCI_000005h, IFX_CCI_000008h, IFX_CCI_00000Ch, IFX_CCI_000013h, IFX_CCI_000014h, IFX_CCI_000015h, IFX_CCI_00001Ch, IFX_CCI_00001Dh, IFX_CCI_000021h, IFX_CCI_000022h, H13, Revision 3.3, 22 April 2020, Infineon Technologies AG, BSI-DSZ-CC-1110-V3-2020 (confidential document)
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- [18] ETR for Composite Evaluation of the underlying hardware platform Infineon Security Controller IFX_CCI_000003h, 000005h, 000008h, 00000Ch, 000013h, 000014h, 000015h, 00001Ch, 00001Dh, 000021h, 000022h, H13 from certification procedure BSI-DSZ-CC-1110-V3-2020, Version 1, 23 April 2020, TÜV Informationstechnik GmbH (confidential document)
- [19] Technical Guideline BSI TR-03110: Advanced Security Mechanisms for Machine Readable Travel Documents, Bundesamt für Sicherheit in der Informationstechnik (BSI)
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- [27] Site Certification Report BSI-DSZ-CC-S-0152-2020 for Giesecke+Devrient Secure Data Management GmbH, 13 March 2020, Bundesamt für Sicherheit in der Informationstechnik (BSI)
- [28] Site Certification Report BSI-DSZ-CC-S-0150-2020 for Bundesdruckerei GmbH, 20 April 2020, Bundesamt für Sicherheit in der Informationstechnik (BSI)
- [29] Site Certification Report BSI-DSZ-CC-S-0143-2019 for Linxens (Thailand) Co Ltd., 4 December 2019, Bundesamt für Sicherheit in der Informationstechnik (BSI)

C. Excerpts from the Criteria

For the meaning of the assurance components and levels the following references to the Common Criteria can be followed:

- On conformance claim definitions and descriptions refer to CC part 1 chapter 10.5.
- On the concept of assurance classes, families and components refer to CC Part 3 chapter 7.1.
- On the concept and definition of pre-defined assurance packages (EAL) refer to CC Part 3 chapters 7.2 and 8.
- On the assurance class ASE for Security Target evaluation refer to CC Part 3 chapter 12.
- On the detailed definitions of the assurance components for the TOE evaluation refer to CC Part 3 chapters 13 to 17.
- The table in CC part 3, Annex E summarizes the relationship between the evaluation assurance levels (EAL) and the assurance classes, families and components.

The CC are published at <https://www.commoncriteriaportal.org/cc/>

D. Annexes

List of annexes of this Certification Report

- Annex A: Security Target Lite [7] provided within a separate document
- Annex B: Evaluation results regarding development and production environment
- Annex C: Overview and rating of cryptographic functionalities implemented in the TOE

Annex B of Certification Report BSI-DSZ-CC-1076-2020

Evaluation results regarding development and production environment



The IT product STARCOS 3.7 ID eAT BAC C1, STARCOS 3.7 ID ePass BAC C1 (Target of Evaluation, TOE) has been evaluated at an approved evaluation facility using the Common Methodology for IT Security Evaluation (CEM), Version 3.1 extended by Scheme Interpretations, by advice of the Certification Body for components beyond EAL 5 and CC Supporting Documents for conformance to the Common Criteria for IT Security Evaluation (CC), Version 3.1.

As a result of the TOE certification, dated 18 August 2020, the following results regarding the development and production environment apply. The Common Criteria assurance requirements ALC – Life cycle support (i.e. ALC_CMC.4, ALC_CMS.4, ALC_DEL.1, ALC_DVS.2, ALC_LCD.1, ALC_TAT.1) are fulfilled for the development and production sites of the TOE listed below:

- a) Giesecke+Devrient Mobile Security GmbH - Development Centre Germany (DCG) for Development and Testing. Refer to the Certification Report BSI-DSZ-CC-S-0132-2019 ([25]).
- b) Giesecke+Devrient Mobile Security Iberica S.A.U. - Development Centre Spain (DCS) for Development. Refer to the Certification Report CCN-CC-023/2018 ([26]).
- c) Giesecke+Devrient Secure Data Management GmbH (GDSDM) for Initialisation and Storage. Refer to the Certification Report BSI-DSZ-CC-S-0152-2020 ([27]).
- d) Bundesdruckerei GmbH for Initialisation and Inlay Production. Refer to the Certification Report BSI-DSZ-CC-S-0150-2020 ([28]).
- e) Linxens Co Ltd. for Initialisation and Inlay Production. Refer to the Certification Report BSI-DSZ-CC-S-0143-2019 ([29]).
- f) For development and production sites regarding the underlying IC platform please refer to the Certification Report BSI-DSZ-CC-1110-V3-2020 ([17]).

For the sites listed above, the requirements have been specifically applied in accordance with the Security Target [6] and [7]. The evaluators verified, that the threats, security objectives and requirements for the TOE life cycle phases up to delivery (as stated in the Security Target [6] and [7]) are fulfilled by the procedures of these sites.

Annex C of Certification Report BSI-DSZ-CC-1076-2020

Overview and rating of cryptographic functionalities implemented in the TOE

No	Purpose	Cryptographic Mechanism	Standard of Implementation	Key Size in Bits	Standard of Application	Comments
1	Authenticated Key Agreement / Authentication	BAC, symmetric authentication, based on 3DES in CBC mode	[EACTR], Part 1 [ICAO9303] [FIPS46-3] (3DES) [SP800-38A], chapter 6.2 (CBC) also cf. lines 3, 4	k =112	[EACTR], Part 1 [ICAO9303]	FIA_UAU.4 FIA_UAU.6 FIA_AFL.1
2		Symmetric authentication of the Personalisation Agent	[prEN 14890], Part 1, chapter 8.8 [FIPS197] (AES) [SP800-38A], chapter 6.2 (CBC) also cf. lines 3, 4	k =128	[prEN 14890], Part 1, chapter 8.8	FCS_COP.1/AUTH
3	Key Derivation	BAC Key Derivation with SHA-1	[EACTR], Part 1 [EACTR], Part 3 [ICAO9303] [FIPS180], chapter 6	n.a.	[EACTR], Part 1 [EACTR], Part 3 [ICAO9303]	FCS_COP.1/SHA
4		Document Basic Access Key Derivation Algorithm	[EACTR], Part 1 [ICAO9303], Part 1, Appendix 5	n.a.	[EACTR]	FCS_CKM.1
5	Confidentiality	TDES in CBC mode for Secure Messaging	[EACTR], Part 1 [EACTR], Part 3 [ICAO9303] [FIPS46-3] (3DES) [SP800-38A], chapter 6.2 (CBC)	k =112	[EACTR], Part 1 [EACTR], Part 3 [ICAO9303] [ICAOSAC]	FCS_COP.1/ENC
6	Integrity	TDES in Retail-MAC mode for Secure Messaging	[EACTR], Part 1 [EACTR], Part 3 [ICAO9303] [FIPS46-3] (3DES) [ISO9797], chapter 7.4, MAC algorithm 3 (Retail-MAC)	k =112	[EACTR], Part 1 [EACTR], Part 3 [ICAO9303] [ICAOSAC]	FCS_COP.1/MAC
7	Trusted Channel	ICAO BAC Secure Messaging in ENC_MAC mode	[EACTR], Part 1 [EACTR], Part 3 [ICAO9303], chapter 4 refer cf. lines 3, 5, 6	n.a.	[EACTR], Part 1 [EACTR], Part 3 [ICAO9303]	FCS_COP.1/SHA FCS_COP.1/ENC FCS_COP.1/MAC FDP_UIT.1 FDP_UCT.1
8	Cryptographic Primitive	Deterministic RNG DRG.4	[AIS20] [AIS31] [ISO18031], Appendix C.3.2	n.a.	[ECARDTR], chapter 1.3.3, 8.3, 8.4	FCS_RND.1
9		SHA-1 (hash for key derivation)	[FIPS180], chapter 6	n.a.	[EACTR], Part 1 [EACTR], Part 3 [ICAO9303]	FCS_COP.1/SHA

Table 5: TOE cryptographic functionality

Bibliography for Table 5:

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- [AIS31] Funktionalitätsklassen und Evaluationsmethodologie für physikalische Zufallszahlengeneratoren, Version 3, Bundesamt für Sicherheit in der Informationstechnik (BSI)
- [EACTR] Technical Guideline BSI TR-03110: Advanced Security Mechanisms for Machine Readable Travel Documents, Bundesamt für Sicherheit in der Informationstechnik (BSI)
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Note: End of report