

# Certification Report

**BSI-DSZ-CC-1162-2021**

for

**CardOS V6.0 ID R1.0**

from

**Atos Information Technology GmbH**

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Bundesamt  
für Sicherheit in der  
Informationstechnik

# Deutsches IT-Sicherheitszertifikat

erteilt vom



Bundesamt für Sicherheit in der Informationstechnik

**BSI-DSZ-CC-1162-2021 (\*)**

**CardOS V6.0 ID R1.0**

from Atos Information Technology GmbH

PP Conformance: BSI-CC-PP-0056-V2-2012-MA-02  
BSI-CC-PP-0068-V2-2011-MA-01  
EN 419211-2:2013 (BSI-CC-PP-0059-2009-MA-02),  
EN 419211-4:2013 (BSI-CC-PP-0071-2012-MA-01),  
EN 419211-5:2013 (BSI-CC-PP-0072-2012-MA-01 (\*\*))

Functionality: PP conformant plus product specific extensions  
Common Criteria Part 2 extended

Assurance: Common Criteria Part 3 conformant  
EAL 4 augmented by ALC\_DVS.2, ATE\_DPT.2 and  
AVA\_VAN.5



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 IT Product identified in this certificate fulfils PP EN 419211-2:2013, PP EN 419211-4:2013 as well as PP EN 419211-5:2013 and is therefore a compliant signature creation device according to Article 30(3.(a)) ("Certification of qualified electronic signature creation devices", 3.(a)) of eIDAS Regulation (Regulation No 910/2014 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 July 2014).

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, 10 November 2021

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



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## A. Certification

### 1. Preliminary Remarks

Under the BSIG<sup>1</sup> 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 Security<sup>1</sup>
- BSI Certification and Approval Ordinance<sup>2</sup>
- BSI Schedule of Costs BMI Regulations on Ex-parte Costs<sup>3</sup>
- 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]

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

<sup>2</sup> 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

<sup>3</sup> BMI Regulations on Ex-parte Costs - Besondere Gebührenverordnung des BMI für individuell zurechenbare öffentliche Leistungen in dessen Zuständigkeitsbereich (BMIBGebV), Abschnitt 7 (BSI-Gesetz) - dated 2 September 2019, Bundesgesetzblatt I p. 1365

- Common Criteria for IT Security Evaluation (CC), Version 3.1<sup>4</sup> [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.

<sup>4</sup> 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 CardOS V6.0 ID R1.0 has undergone the certification procedure at BSI.

The evaluation of the product CardOS V6.0 ID R1.0 was conducted by TÜV Informationstechnik GmbH. The evaluation was completed on 2 November 2021. TÜV Informationstechnik GmbH is an evaluation facility (ITSEF)<sup>5</sup> recognised by the certification body of BSI.

For this certification procedure the sponsor and applicant is: Atos Information Technology GmbH.

The product was developed by: Atos Information Technology 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.

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 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 10 November 2021 is valid until 9 November 2026. Validity can be re-newed by re-certification.

The owner of the certificate is obliged:

<sup>5</sup> Information Technology Security Evaluation Facility

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 CardOS V6.0 ID R1.0 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 developer<sup>6</sup> of the product. The Certification Report may also be obtained in electronic form at the internet address stated above.

<sup>6</sup> Atos Information Technology GmbH  
Otto-Hahn-Ring 6  
81739 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 composite TOE is named CardOS V6.0 ID R1.0 (developed by Atos Information Technology GmbH). The TOE is a smart card operating system on an IC with at least one application. Applications covered by this TOE comprise an electronic passport (ePass) application and/or a signature (eSign) application.

The IC platform comprises the integrated circuit SLC52GDA448\* (IFX\_CCI\_000005 Design Step H13) and the cryptographic libraries RSA v2.08.007, EC v2.08.007, Toolbox v2.08.007, Base v2.08.007, HCL2 v1.12.001 (hash library) and Symmetric Crypto Library (SCL) v2.04.002 certified according CC v3.1 with ID BSI-DSZ-CC-1110-V4-2021.

Three major configurations of the TOE are defined which differ in the description of the object system:

- ePassport: User data are stored in an ICAO-compliant ePass Application protected by PACE and EAC1. Here, EAC1 is used only for data groups 3 and 4.
- SSCD: User data are stored in an eSign Application conformant to "Protection profiles for secure signature creation device – Part 2: Device with key generation".
- eID: User data are contained in an ICAO-compliant ePass Application, in an eSign Application conformant to "Protection profiles for secure signature creation device – Part 2: Device with key generation", and optional eID applications.

The Security Target [6] is the basis for this certification. It is based on the certified Protection Profiles [8]

- Protection profiles for secure signature creation device – Part 2: Device with key generation, CEN/ISSS, EN 419211-2:2013, 2016-06-30, BSI-CC-PP-0059-2009-MA-02,
- Protection profiles for secure signature creation device – Part 4: Extension for device with key generation and trusted communication with certificate generation application, CEN/ISSS, EN 419211-4:2013, 2016-06-30, BSI-CC-PP-0071-2012-MA-01,
- Protection profiles for secure signature creation device – Part 5: Extension for device with key generation and trusted communication with signature creation application, CEN/ISSS, EN 419211-5:2013, 2016-06-30, BSI-CC-PP-0072-2012-MA-01,
- Machine Readable Travel Document with "ICAO Application" Extended Access Control with PACE, Version 1.3.2, 5 December 2012, BSI-CC-PP-0056-V2-2012-MA-02,
- Common Criteria Protection Profile Machine Readable Travel Document using Standard Inspection Procedure with PACE (PACE\_PP), Version 1.01, 22 July 2014, BSI-CC-PP-0068-V2-2011-MA-01.

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, ATE\_DPT.2 and AVA\_VAN.5.

The TOE Security Functional Requirements (SFR) relevant for the TOE are outlined in the Security Target [6], chapter 7.6. 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:

<b>TOE Security Functionality</b>
User Identification and Authentication (ePass)
User Identification and Authentication (eSign)
Advanced Inspection Procedure with PACE
Protocols (PACE, Chip Authentication v1, Active Authentication, Terminal Authentication Protocol v1, Passive Authentication)
Access Control (General and ePass)
AccessControl (eSign)
Key management
Signature Creation
Test features
Protection

Table 1: TOE Security Functionalities

For more details please refer to the Security Target [6], chapter 8.

The assets to be protected by the TOE are defined in the Security Target [6], chapter 4.1. 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], chapters 4.4, 4.2 and 4.3.

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:

### **CardOS V6.0 ID R1.0**

The following table outlines the TOE deliverables:

No	Type	Identifier	Release	Form of Delivery
1	HW	Infineon SLC52G52GDA448*	IFX_CCI_000005 Design Step H13	Wafer, module or a packaged component.
2	SW	CardOS V6.0 ID R1.0	V6.0 / R1.0	
3	SW (Infineon)	RSA Library	v2.08.007	
4		EC Library	v2.08.007	
5		Toolbox Library	v2.08.007	
6		Base Library	v2.08.007	

No	Type	Identifier	Release	Form of Delivery
7		Hash Library	v1.12.001	
8		Symmetric Crypto Library	v2.04.002	
9	DOC [12]	CardOS V6.0 User's Manual	08/2021	As PDF via signed and encrypted mail.
10		User Guidance 'CardOS V6.0 ID R1.0' and 'CardOS V6.0 ID R1.0 (BAC)'	1.20R	
11		Administrator Guidance 'CardOS V6.0 ID R1.0' and 'CardOS V6.0 ID R1.0 (BAC)'	1.31R	
12		Application Base Guidance 'CardOS V6.0 ID R1.0' and 'CardOS V6.0 ID R1.0 (BAC)'	1.33R	
13		Application ePassport Guidance 'CardOS V6.0 ID R1.0' and 'CardOS V6.0 ID R1.0 (BAC)' ePassport Guidance 'CardOS V6.0 ID'	1.32R	
14		Application eSign Guidance 'CardOS V6.0 ID R1.0' and 'CardOS V6.0 ID R1.0 (BAC)'	1.22R	
15	DATA	Configuration Scripts for initialization and personalization	R1.02	As PDF via signed and encrypted mail.
16		StartKey for initialization	-	

Table 2: Deliverables of the TOE

Components No. 1 to No. 8 are actually delivered as one item, namely the IC platform containing the software mask.

Items No. 15 represents the configuration files for initialization and personalization. These represent possible configurations and changes on values and parameters to be applied as outlined in the scripts itself and according to the guidance documents.

The OS software pre-loaded on the IC hardware is sent directly from the chip manufacturer to the Trust Center or via logistic centers or distributors. This is possible since the TOE protects itself during delivery and standard procedures for packing, storage and distribution can be applied. Only with knowledge of the StartKey it is possible to continue the process of setting up the TOE. The Trust Center is also provided with the guidance and initialization / personalization scripts from the developer Atos Information Technology GmbH. All data and documents are sent signed and encrypted by mail.

The TOE can be identified in accordance with the described processes in Administrator Guidance chap. 5.1, User Guidance chap. 4.2 and Application Base Guidance chap. 4.1 [12]. After the delivery the TOE can be identified by the command response sequence as

outlined in Application Base Guidance chap. 4.1 and Administrator Guidance chap. 5.1 [12], verifying the OS version, product name, version and year, chip identification and loaded packages (i.e. none in this case).

### 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:

- Security Audit
- Cryptographic Support
- User Data Protection
- Identification and Authentication
- Security Management
- Protection of the TSF
- Trusted Path/Channels

Specific details concerning the above mentioned security policies can be found in Chapter 7.6 of the Security Target (ST).

### 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:

- P.Manufact (Manufacturing of the travel document's chip)
- P.Pre-Operational (Pre-operational handling of the travel document)
- P.Card\_PKI (PKI for Passive Authentication (issuing branch))
- P.Trustworthy\_PKI (Trustworthiness of PKI)
- P.Terminal (Abilities and trustworthiness of terminals)
- P.Sensitive\_Data (Privacy of sensitive biometric reference data)
- P.Personalisation (Personalisation of the travel document by issuing State or Organisation only)
- P.CSP\_QCert (Qualified certificate)
- P.QSign (Qualified electronic signatures)
- P.Sigy\_SSCD (TOE as secure signature creation device)
- P.Sig\_Non-Repud (Non-repudiation of signatures)

Details can be found in the Security Target [6], chapter 5.

### 5. Architectural Information

The composite TOE CardOS V6.0 ID R1.0 is a smart card operating system based on a certified hardware platform together with the cryptographic libraries and object system that

defines its applications. The TOE comprises ten subsystems, listed with a short description in the following itemization:

- **Startup:** Performs actions needed at startup only and not further used after entry into user commands processing loop.
- **Command Manager:** The main loop within the Command Manager is the most central part of CardOS.
- **Protocol Manager:** The Protocol Manager takes care of command reception and transmission of response data.
- **Command Layer:** Implements the APDU command set, enables secure access to data and allows for package download.
- **Security:** Selects appropriate rules and the corresponding evaluation, manages the administration of access rights, provides secure messaging processing, evaluates an entities life cycle when influencing access rules, protects the TOE against attacks using the underlying hardware security features.
- **Entities:** Provides the mediation of access to the application and its objects, provides file system administration, setting of authorization flags, provides PIN/PUK blocking functionality, handles private keys for signature generation with appropriate parameters, handles SCP functionality, provides integrity mechanisms (CRC), checks file status and provides countermeasures against fault induction attacks.
- **Cryptography:** Provides wrapper modules for IFX platform libraries, padding routines and generic management of cryptography.
- **CBIOS:** Provides interface functionality to the hardware peripherals (UART, CRC generator) and provides utility functions (memory management, transaction management, interrupt service routines).
- **IC:** Represents the parts of the underlying hardware platform of the composite TOE, which interacts with the operating system.
- **Retrieval functions:** This subsystem retrieves the results of performed routines.

## 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.

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

### Developer's Test according to ATE\_FUN

#### Testing Approach:

Originating from the behaviour defined in the SFRs of the ST, the developer specified test cases for all SFRs in order to cover the TSF. ATE\_COV and ATE\_DPT were taken into account and mapped to these test cases. The main test focus was laid upon the access right management and commands and that are used in the operational usage phase to

allow signature creation. Tests using multiple application DFs to verify their separation were performed.

Additional test cases that could not be performed on a real smartcard (e.g. memory faults and manipulation) were performed on an emulator.

Verdict for the activity:

The testing approach covers all TSFI as described in the functional specification and all subsystems of the TOE design adequately. All configuration options as described in the ST are covered and a well-defined approach of possible combinations of options was applied. All test results collected in the test reports are as expected and in accordance with the TOE design and the desired TOE functionality.

**Independent Testing according to ATE\_IND**

Approach for independent testing:

- Examination of developer's testing amount, depth and coverage analysis and of the developer's test goals and plan for identification of gaps.
- Examination whether the TOE in its intended environment, is operating as specified using iterations of developer's tests.
- Independent testing was performed by the evaluator at the ITSEF using developer's and evaluator's test equipment.

TOE test configurations:

- Tests were done in different life-cycle phases (personalisation / operational),
- eSign and ePassport application, combinations of both applications and multiple instances were considered in the configurations,
- Different options on application parameters were tested, for example RSA or EC-based cryptography (Brainpool and NIST curves), different key lengths or PIN/PUK options.

Subset size chosen:

- During sample testing the evaluator chose to sample the developer functional tests at the Evaluation Body for IT Security in Essen. Emulator tests with similar test focus were omitted.
- During independent testing the evaluator focussed on the main security functionality as described in the ST. Access control and user authentication was mainly in focus.
- Penetration tests as outcome of the vulnerability analysis were performed to cover potential vulnerabilities. Fuzzy tests, laser fault injections and side-channel analysis were conducted during testing.

Developer tests performed:

- The developer performed tests of all TSF and interfaces with script based tests and emulator test cases.
- The evaluator selected a set of functional tests of the developer's testing documentation for sampling. Test cases with similar test focus were omitted.

Verdict for the activity:

- During the evaluator's TSF subset testing the TOE operated as specified.

The evaluator verified the developer's test results by executing a sample of the developer's tests and verifying the test results for successful execution.

### **Penetration Testing according to AVA\_VAN**

#### Overview:

The penetration testing was performed at the site of the evaluation body TÜViT in the evaluator's test environment with the evaluator's test equipment. The samples were provided by the sponsor and developer. The test samples were configured and parameterized by the evaluator according to the guidance documentation. Different configurations of the TOE being intended to be covered by the current evaluation were tested using a distribution of configuration parameters to achieve a well-defined and wide coverage. The overall result is that no deviations were found between the expected result and the actual result of the tests. Moreover, no attack scenario with an attack potential of High was actually successful.

#### Penetration testing approach:

Based on the list of potential vulnerabilities applicable to the TOE in its operational environment created within the vulnerability analysis evaluation report, the evaluator created attack scenarios for the penetration tests, where the evaluator is of the opinion that the vulnerabilities could be exploitable. While doing so, the evaluator also considered all aspects of the security architecture of the TOE being not covered by the functional developer tests.

The source code reviews of the provided implementation representation accompanied the development of test cases and were used to find test input. The code inspection supported testing activity by enabling the evaluator to verify implementation aspects that could hardly be covered by test cases.

The primary focus for devising penetration tests was to cover all potential vulnerabilities identified as applicable in the TOE's operational environment for which an appropriate test set was devised.

#### TOE test configurations:

The evaluators used TOE samples for testing that were configured according to the ST and guidance documentation. The samples were identified using the method as described by the developer in its guidance documentation. TOEs were configured with a reasonable coverage for different support of cryptographic algorithms and key sizes. Both, contactless and contactbased interface were covered during testing.

Test configurations were used that allow to reset the TOE in its initial state before initialisation/personalisation. For testing, the different variants of the IC platform were used. Whenever possible, the TOE as a whole (embedded software on IC) was used. For some test scenarios however, an emulator was used that would allow to directly view and manipulate the memory of the TOE.

#### Verdict for the sub-activity:

The overall test result is that no deviations were found between the expected and the actual test results. No attack scenario with the attack potential High was actually successful in the TOE's operational environment as defined in [6] provided that all measures required by the developer are applied.

## 8. Evaluated Configuration

The tests were performed with the composite smartcard product CardOS V6.0 ID on the IC SLC52GDA448\* (IFX\_CCI\_000005 Design Step H13). The developer tested a wide spectrum of configurations and configuration parameters, basically categorized as follows

- Configuration variants with ECC ePassport application,
- Configuration variants with RSA ePassport application,
- Configuration variants with ECC eSign application,
- Configuration variants with RSA eSign application,
- Configuration variants with eSign and ePassport applications:
  - Both ECC-based,
  - Both RSA-based,
  - One ECC-based and one RSA-based, and
  - A 4th configuration with ECC and RSA vice versa.

A special test configuration was used for test cases where the TOE shall be in the MANUFACTURING card life cycle before delivery. The tested configurations take into account the configurable options of the TOE as e.g. the use of elliptic curves or RSA, different key lengths, use of Brainpool or NIST elliptic curves, contact and contactless interface, and other options related to PIN secrets or Active Authentication.

All configurations were tested appropriately with a similar amount of tests. The tests were performed in all life-cycle phases that are in scope after TOE delivery within the according operation environment.

## 9. Results of the Evaluation

### 9.1. CC specific results

The Evaluation Technical Report (ETR) [7] 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.

The following guidance specific for the technology was used:

- (i) *AIS 1, Version 14, Durchführung der Ortsbesichtigung in der Entwicklungsumgebung des Herstellers*
- (ii) *AIS 14, Version 7, Anforderungen an Aufbau und Inhalt der ETR-Teile (Evaluation Technical Report) für Evaluationen nach CC (Common Criteria)*
- (iii) *AIS 19, Version 9, Anforderungen an Aufbau und Inhalt der Zusammenfassung des ETR (Evaluation Technical Report) für Evaluationen nach CC (Common Criteria)*
- (iv) *AIS 20, Version 3, Funktionalitätsklassen und Evaluationsmethodologie für deterministische Zufallszahlengeneratoren*
- (v) *AIS 26, Version 10, Evaluationsmethodologie für in Hardware integrierte Schaltungen including JIL Document and CC Supporting Document*

- (vi) *AIS 31, Version 3, Funktionalitätsklassen und Evaluationsmethodologie für physikalische Zufallszahlengeneratoren*
- (vii) *AIS 32, Version 7, CC-Interpretationen im deutschen Zertifizierungsschema*
- (viii) *AIS 34, Version 3, Evaluation Methodology for CC Assurance Classes for EAL 5+ (CCv2.3 & CCv3.1) and EAL 6 (CCv3.1)*
- (ix) *AIS 35, Version 2, Öffentliche Fassung des Security Targets (ST-Lite) including JIL Document and CC Supporting Document and CCRA policies*
- (x) *AIS 36, Version 5, Kompositionsevaluierung including JIL Document and CC Supporting Document*
- (xi) *AIS 37, Version 3, Terminologie und Vorbereitung von Smartcard-Evaluierungen*
- (xii) *AIS 45, Version 2, Erstellung und Pflege von Meilensteinplänen*
- (xiii) *AIS 46, Version 3, Informationen zur Evaluierung von kryptographischen Algorithmen und ergänzende Hinweise für die Evaluierung von Zufallszahlengeneratoren*

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

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 components ALC\_DVS.2, ATE\_DPT.2 and AVA\_VAN.5 augmented for this TOE evaluation.

The evaluation has confirmed:

- PP Conformance: Protection profiles for secure signature creation device – Part 2: Device with key generation, CEN/ISSS, EN 419211-2:2013, 2016-06-30, BSI-CC-PP-0059-2009-MA-02

Protection profiles for secure signature creation device – Part 4: Extension for device with key generation and trusted communication with certificate generation application, CEN/ISSS, EN 419211-4:2013, 2016-06-30, BSI-CC-PP-0071-2012-MA-01

Protection profiles for secure signature creation device – Part 5: Extension for device with key generation and trusted communication with signature creation application, CEN/ISSS, EN 419211-5:2013, 2016-06-30, BSI-CC-PP-0072-2012-MA-01

Machine Readable Travel Document with "ICAO Application" Extended Access Control with PACE, Version 1.3.2, 5 December 2012, BSI-CC-PP-0056-V2-2012-MA-02

Common Criteria Protection Profile Machine Readable Travel Document using Standard Inspection Procedure with PACE

(PACE\_PP), Version 1.01, 22 July 2014, BSI-CC-PP-0068-V2-2011-MA-01 [8]

- for the Functionality: PP conformant plus product specific extensions  
Common Criteria Part 2 extended
- for the Assurance: Common Criteria Part 3 conformant  
EAL 4 augmented by ALC\_DVS.2, ATE\_DPT.2 and AVA\_VAN.5

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.

The evaluation was performed as a composite evaluation according to AIS 36 and therefore relies on the platform certification of the used IC (certification ID BSI-DSZ-CC-1110-V4-2021) [9], [10].

## 9.2. Results of cryptographic assessment

The strength of the cryptographic algorithms was not rated in the course of this certification procedure (see BSIG Section 9, Para. 4, Clause 2). But 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 crypto operations are appropriate for the intended system. Some further hints and guidelines can be derived from the 'Technische Richtlinie BSI TR-02102' (<https://www.bsi.bund.de>).

The table A.1 presented in the Security Target gives an overview of the cryptographic functionalities inside the TOE to enforce the security policy and outlines its rating from cryptographic point of view.

## 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.

Some security measures are partly implemented in this certified TOE, but require additional configuration or control or measures to be implemented by a product layer on top. For this reason the TOE includes guidance documentation (see table 2) which contains obligations and guidelines for the developer of the product layer on top on how to securely use this certified TOE and which measures have to be implemented in order to fulfil the security requirements of the Security Target of the TOE.

## 11. Security Target

For the purpose of publishing, the Security Target [6] of the Target of Evaluation (TOE) is provided within a separate document as Annex A of this report.

## 12. Regulation specific aspects (eIDAS, QES)

The IT Product identified in this certificate fulfils

- PP EN 419211-2:2013 (Protection profiles for secure signature creation device - Part 2: Device with key generation (BSI-CC-PP-0059-2009-MA-02))

This Protection Profile is taken from the list of standards identified in COMMISSION IMPLEMENTING DECISION (EU) 2016/650 of 25 April 2016, Annex, for the security assessment of qualified signature and seal creation devices pursuant to Articles 30(3) and 39(2) of Regulation (EU) No 910/2014 of the European Parliament and of the Council on electronic identification and trust services for electronic transactions in the internal market.

Therefore, the IT-product certified is technically suitable to be a compliant signature creation device according to Article 30(3) and a compliant seal creation device according to Article 39(2) of Regulation (EU) No 910/2014 of the European Parliament and of the Council of 23 July 2014 and to fulfil the requirements laid down in Article 29(1), Article 39(1) and Annex II provided that the following operational conditions are followed:

- The obligations and notes for the usage of the TOE have to be followed as outlined in chapter 10 of this report.
- The trust service provider has to follow the operational requirements from the regulation as relevant for a compliant signature creation device and a compliant seal creation device as well as to follow all related obligations from its supervisory body.
- For the creation of qualified electronic signatures or qualified electronic seals the product has to use the cryptographic algorithms in accordance with the SOG-IS Crypto Evaluation Scheme - Agreed Cryptographic Mechanisms [13] which are depicted in Table 3.
- The trust service provider shall consider the results of the certification and the operational conditions listed above within the system risk management process for the product usage. Specifically, the evolution of limitations of cryptographic algorithms and parameters<sup>7</sup> as well as the evolution of attack methods related to the product or to the type of product has to be considered e.g. by a regular re-assessment of the TOE assurance.

No.	Cryptographic Mechanism	Key Size in Bits	Acceptability Deadline according to [13] as of today	Security level above 100bit
1	RSA PKCS#1 v1.5 [14, 15, 16]	Modulus length = 2048	31. December 2025	yes
2	RSA PKCS#1 v1.5 [14, 15, 16]	Modulus length = 3072, 4096	31. December 2027+ <sup>8</sup>	yes

<sup>7</sup> Future updates of the catalogue [13] may shorten or extend the acceptance time frame. This may need actions for the usage of the product to be taken.

<sup>8</sup>According to [13] the validity period of the algorithm may be extended in future versions of the document.

No.	Cryptographic Mechanism	Key Size in Bits	Acceptability Deadline according to [13] as of today	Security level above 100bit
3	RSA PSS (PKCS#1 v2.1) [14, 15, 16]	Modulus length = 2048	31. December 2025	yes
4	RSA PSS (PKCS#1 v2.1) [14, 15, 16]	Modulus length = 3072, 4096	None	yes
5	ECDSA [17, 18]	ECC Key sizes corresponding to the used elliptic curve  BP P256r1, BP P384r1, BP P512r1 [19]  NIST P-256, NIST P-384, NIST P-521 [22]	None	yes
6	SHA-2, hash length (bits) = 256, 384, 512 [20, 21]	-	None	yes

Table 3: Cryptographic algorithms of the TOE in accordance with [13]

Out of this, the compliance of the QSCD / QSealCD is confirmed under the conditions mentioned above within the following categories:

- Components and procedures for the generation of signature resp. seal creation data
- Components and procedures for the storage of signature resp. seal creation data
- Components and procedures for the processing of signature resp. seal creation data

## 13. Definitions

### 13.1. Acronyms

<b>AES</b>	Advanced Encryption Standard
<b>AIS</b>	Application Notes and Interpretations of the Scheme
<b>APDU</b>	Application Protocol Data Unit
<b>BSI</b>	Bundesamt für Sicherheit in der Informationstechnik / Federal Office for Information Security, Bonn, Germany
<b>BSIG</b>	BSI-Gesetz / Act on the Federal Office for Information Security
<b>CCRA</b>	Common Criteria Recognition Arrangement
<b>CC</b>	Common Criteria for IT Security Evaluation
<b>CEM</b>	Common Methodology for Information Technology Security Evaluation
<b>CEN</b>	European Committee for Standardisation
<b>cPP</b>	Collaborative Protection Profile
<b>CPU</b>	Central Processing Unit
<b>CRC</b>	Cyclic Redundancy Check

<b>EAC</b>	Extended Access Control
<b>EAL</b>	Evaluation Assurance Level
<b>EEPROM</b>	Electrically Erasable Programmable Read Only Memory
<b>eIDAS</b>	electronic IDentification, Authentication and trust Services
<b>ETR</b>	Evaluation Technical Report
<b>IFD</b>	Interface Device
<b>ISSS</b>	Information Society Standardisation System
<b>ICAO</b>	International Civil Aviation Organization
<b>IT</b>	Information Technology
<b>ITSEF</b>	Information Technology Security Evaluation Facility
<b>NIST</b>	National Institute Of Standards And Technology
<b>PACE</b>	Password Authenticated Connection Establishment
<b>PIN</b>	Personal Identification Number
<b>PP</b>	Protection Profile
<b>PUK</b>	Personal Unblocking Key
<b>QES</b>	Qualified Electronic Signature
<b>ROM</b>	Read Only Memory
<b>SAR</b>	Security Assurance Requirement
<b>SCA</b>	Signature Creation Application
<b>SCL</b>	Symmetric Crypto Library
<b>SCP</b>	Smart Card Platform
<b>SFP</b>	Security Function Policy
<b>SFR</b>	Security Functional Requirement
<b>SHA</b>	Secure Hash Algorithm
<b>SSCD</b>	Secure Signature Creation Device
<b>ST</b>	Security Target
<b>SVD</b>	Signature Validation Data
<b>TC</b>	Trusted Channel
<b>TOE</b>	Target of Evaluation
<b>TSF</b>	TOE Security Functionality
<b>TSFI</b>	TSF Interface
<b>UART</b>	Universal Asynchronous Receiver Transmitter
<b>VAD</b>	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

- [1] Common Criteria for Information Technology Security Evaluation, Version 3.1, Part 1: Introduction and general model, Revision 5, April 2017  
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, Rev. 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 TOE<sup>9</sup>  
<https://www.bsi.bund.de/AIS>

<sup>9</sup>specifically

- 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)

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- [7] Evaluation Technical Report BSI-DSZ-CC-1162, Version 2, 2021-10-27, EVALUATION TECHNICAL REPORT SUMMARY (ETR SUMMARY), TÜV Informationstechnik GmbH, (confidential document)
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- Protection profiles for secure signature creation device – Part 4: Extension for device with key generation and trusted communication with certificate generation application, CEN/ISSS, EN 419211-4:2013, 2016-06-30, BSI-CC-PP-0071-2012-MA-01
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- Common Criteria Protection Profile Machine Readable Travel Document using Standard Inspection Procedure with PACE (PACE\_PP), Version 1.01, 22 July 2014, BSI-CC-PP-0068-V2-2011-MA-01
- [9] Certification Report – BSI-DSZ-CC-1110-V4-2021 for Infineon Security Controller IFX\_CCI\_000003h, 000005h, 000008h, 00000Ch, 000013h, 000014h, 000015h, 00001Ch, 00001Dh, 000021h, 000022h in the design step H13 and including
- AIS 20, Version 3, Funktionalitätsklassen und Evaluationsmethodologie für deterministische Zufallszahlengeneratoren
  - 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
  - AIS 37, Version 3, Terminologie und Vorbereitung von Smartcard-Evaluierungen
  - AIS 45, Version 2, Erstellung und Pflege von Meilensteinplänen
  - AIS 46, Version 3, Informationen zur Evaluierung von kryptographischen Algorithmen und ergänzende Hinweise für die Evaluierung von Zufallszahlengeneratoren

optional software libraries and dedicated firmware in several versions from Infineon Technologies AG, BSI

- [10] ETR FOR COMPOSITE EVALUATION (ETR-COMP), 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, BSI-DSZ-CC-1110-V4, Version 1, 2021-07-01, TÜViT (confidential document)
- [11] Configuration List 'CardOS V6.0 ID R1.0' and 'CardOS V6.0 ID R1.0 (BAC)', Version 1.31, 2021-10-25, Atos Information Technology GmbH (confidential document)
- [12] Guidance documentation for the TOE (confidential documents)  
CardOS V6.0 User's Manual, 08/2021, Atos Information Technology GmbH  
User Guidance 'CardOS V6.0 ID R1.0' and 'CardOS V6.0 ID R1.0 (BAC)', Revision 1.20R, 2021-10-21, Atos Information Technology GmbH  
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- [19] M. Lochter and J. Merkle. Elliptic Curve Cryptography (ECC) Brainpool Standard Curves and Curve Generation. 2010.
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- [21] ISO/IEC. ISO/IEC 10118-3:2004 – Information technology – Security techniques – Hash-functions – Part 3: Dedicated hash-functions. 2004.
- [22] NIST Special Publication 800-186, Recommendations for Discrete Logarithm-Based Cryptography, October 2019

## 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 provided within a separate document.
- Annex B: Evaluation results regarding development and production environment

## Annex B of Certification Report BSI-DSZ-CC-1162-2021

### Evaluation results regarding development and production environment



The IT product CardOS V6.0 ID R1.0 (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 10 November 2021, 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) Atos Information Technology GmbH, Otto-Hahn-Ring 6, 81739 Munich, Germany (SW Development)
- b) Atos Information Technology GmbH, Wuerzburger Str. 121, 90766 Fuerth, Germany (SW Development)
- c) Atos IT Solutions and Services d.o.o, Matice Hrvatske 15, 21000 Split, Croatia (SW Development)
- d) See [9] for the development and production sites of the hardware platform.

For the sites listed above, the requirements have been specifically applied in accordance with the Security Target [6]. 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]) are fulfilled by the procedures of these sites.

Note: End of report