Federal Office
for Information Security

Certification Report

BSI-DSZ-CC-1107-V2-2021

for

IFX_CCI_00002Dh, IFX_CCI_000039h, IFX_CCI_00003Ah, IFX_CCI_000044h, IFX_CCI_000045h, IFX_CCI_000046h, IFX_CCI_000047h, IFX_CCI_000048h, IFX_CCI_000049h, IFX_CCI_00004Ah, IFX_CCI_00004Bh, IFX_CCI_00004Ch, IFX_CCI_00004Dh, IFX_CCI_00004Eh design step T11 with firmware 80.306.16.0 & 80.306.16.1, optional NRG™ SW 05.03.4097, optional HSL v3.52.9708, UMSLC lib v01.30.0564, optional SCL v2.15.000 and v2.11.003, optional ACL v3.33.003 and v3.02.000, optional RCL v1.10.007, optional HCL v1.13.002 and user guidance

from

Infineon Technologies AG

BSI - Bundesamt für Sicherheit in der Informationstechnik, Postfach 20 03 63, D-53133 Bonn
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Bundesamt
für Sicherheit in der
Informationstechnik

Deutsches IT-Sicherheitszertifikat

erteilt vom Bundesamt für Sicherheit in der Informationstechnik

BSI-DSZ-CC-1107-V2-2021 (*)

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SOGIS
Recognition Agreement

from	Infineon Technologies AG
PP Conformance:	Security IC Platform Protection Profile with Augmentation Packages Version 1.0, 13 January 2014, BSI-CC-PP-0084-2014
Functionality:	PP conformant plus product specific extensions Common Criteria Part 2 extended
Assurance:	Common Criteria Part 3 conformant EAL 6 augmented by ALC_FLR.1

Common Criteria

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.

Common Criteria
Recognition Arrangement
recognition for components
up to EAL 2 and ALC_FLR
only

Bonn, 7 July 2021

For the Federal Office for Information Security

DAkkS
Deutsche
Akkreditierungsstelle
D-ZE-19615-01-00

Sandro Amendola
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L.S.

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Contents

A. Certification

1. Preliminary Remarks

Under the BSIG[1] 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[1]
- BSI Certification and Approval Ordinance[2]
- BSI Schedule of Costs[3]
- 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]
- Common Criteria for IT Security Evaluation (CC), Version 3.1[4] [1] also published as ISO/IEC 15408.

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 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.

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

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 IFX_CCI_00002Dh, IFX_CCI_000039h, IFX_CCI_00003Ah, IFX_CCI_000044h, IFX_CCI_000045h, IFX_CCI_000046h, IFX_CCI_000047h, IFX_CCI_000048h, IFX_CCI_000049h, IFX_CCI_00004Ah, IFX_CCI_00004Bh, IFX_CCI_00004Ch, IFX_CCI_00004Dh, IFX_CCI_00004Eh design step T11 with firmware 80.306.16.0 & 80.306.16.1, optional NRG™ SW 05.03.4097, optional HSL v3.52.9708, UMSLC lib v01.30.0564, optional SCL v2.15.000 and v2.11.003, optional ACL v3.33.003 and v3.02.000, optional RCL v1.10.007, optional HCL v1.13.002 and user guidance has undergone the certification procedure at BSI.

The evaluation of the product IFX_CCI_00002Dh, IFX_CCI_000039h, IFX_CCI_00003Ah, IFX_CCI_000044h, IFX_CCI_000045h, IFX_CCI_000046h, IFX_CCI_000047h, IFX_CCI_000048h, IFX_CCI_000049h, IFX_CCI_00004Ah, IFX_CCI_00004Bh, IFX_CCI_00004Ch, IFX_CCI_00004Dh, IFX_CCI_00004Eh design step T11 with firmware 80.306.16.0 & 80.306.16.1, optional NRG™ SW 05.03.4097, optional HSL v3.52.9708, UMSLC lib v01.30.0564, optional SCL v2.15.000 and v2.11.003, optional ACL v3.33.003 and v3.02.000, optional RCL v1.10.007, optional HCL v1.13.002 and user guidance was conducted by TÜV Informationstechnik GmbH. The evaluation was completed on 29 June 2021. TÜV Informationstechnik GmbH is an evaluation facility (ITSEF)[5] recognised by the certification body of BSI.

For this certification procedure the sponsor and applicant is: Infineon Technologies AG.

The product was developed by: Infineon Technologies AG.

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

[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 7 July 2021 is valid until 6 July 2026. 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 IFX_CCI_00002Dh, IFX_CCI_000039h, IFX_CCI_00003Ah, IFX_CCI_000044h, IFX_CCI_000045h, IFX_CCI_000046h, IFX_CCI_000047h, IFX_CCI_000048h, IFX_CCI_000049h, IFX_CCI_00004Ah, IFX_CCI_00004Bh, IFX_CCI_00004Ch, IFX_CCI_00004Dh, IFX_CCI_00004Eh design step T11 with firmware 80.306.16.0 & 80.306.16.1, optional NRG™ SW 05.03.4097, optional HSL v3.52.9708, UMSLC lib v01.30.0564, optional SCL v2.15.000 and v2.11.003, optional ACL v3.33.003 and v3.02.000, optional RCL v1.10.007, optional HCL v1.13.002 and user guidance 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[6] of the product. The Certification Report may also be obtained in electronic form at the internet address stated above.

[6] Infineon Technologies AG
Am Campeon 1-15
85579 Neubiberg

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 a Smart Card security controller called IFX_CCI_00002Dh, IFX_CCI_000039h, IFX_CCI_00003Ah, IFX_CCI_000044h, IFX_CCI_000045h, IFX_CCI_000046h, IFX_CCI_000047h, IFX_CCI_000048h, IFX_CCI_000049h, IFX_CCI_00004Ah, IFX_CCI_00004Bh, IFX_CCI_00004Ch, IFX_CCI_00004Dh, IFX_CCI_00004Eh design step T11 with firmware 80.306.16.0 & 80.306.16.1, optional NRG™ SW 05.03.4097, optional HSL v3.52.9708, UMSLC lib v01.30.0564, optional SCL v2.15.000 and v2.11.003, optional ACL v3.33.003 and v3.02.000, optional RCL v1.10.007, optional HCL v1.13.002 and user guidance.

It provides a 32-bit ARMv7-M CPU-architecture. The major components of the core system are the CPU (Central Processing Unit), an MPU (Memory Protection Unit), a Nested Vectored Interrupt Controller (NVIC) and an Instruction Stream Signature Checking (ISS). The dual interface controller is able to communicate using either the contact based or the contactless interface. Also, a variety of software libraries is present or optionally available, i.e. NRG™ library, HSL (hardware support library), UMSLC (user mode security life control) library, SCL (symmetric cryptographic library), ACL (asymmetric cryptographic library), RCL (Random Number Cryptographic Library) and HCL (Hash Cryptographic Library).

This TOE is intended to be used in smart cards for particular security relevant applications and as a developing platform for smart card operating systems. The term smartcard embedded software is used in the following for all operating systems and applications stored and executed on the TOE. The TOE is the platform for the smartcard embedded software.

Depending on the blocking configuration, the TOE can have e.g. different user available memory sizes and can come with or without individual accessible cryptographic coprocessors. All products are identical in regard to module design, layout and footprint.

The Security Target [6] is the basis for this certification. It is based on the certified Protection Profile Security IC Platform Protection Profile with Augmentation Packages Version 1.0, 13 January 2014, BSI-CC-PP-0084-2014 [8].

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 6 augmented by ALC_FLR.1.

The TOE Security Functional Requirements (SFR) relevant for the TOE are outlined in the Security Target [6] and [9], chapter 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:

TOE Security Functionality	Addressed issue
SF_DPM	Device Phase Management
SF_PS	Protection against Snooping
SF_PMA	Protection against Modifying Attacks
SF_PLA	Protection against Logical Attacks
SF_CS	Cryptographic Support

Table 1: TOE Security Functionalities

For more details please refer to the Security Target [6] and [9], chapter 7.

The assets to be protected by the TOE are defined in the Security Target [6] and [9], chapter 3.1.2 . 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 [9], chapter 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:

IFX_CCI_00002Dh, IFX_CCI_000039h, IFX_CCI_00003Ah, IFX_CCI_000044h, IFX_CCI_000045h, IFX_CCI_000046h, IFX_CCI_000047h, IFX_CCI_000048h, IFX_CCI_000049h, IFX_CCI_00004Ah, IFX_CCI_00004Bh, IFX_CCI_00004Ch, IFX_CCI_00004Dh, IFX_CCI_00004Eh design step T11 with firmware 80.306.16.0 & 80.306.16.1, optional NRG™ SW 05.03.4097, optional HSL v3.52.9708, UMSLC lib v01.30.0564, optional SCL v2.15.000 and v2.11.003, optional ACL v3.33.003 and v3.02.000, optional RCL v1.10.007, optional HCL v1.13.002 and user guidance.

The following table outlines the TOE deliverables:

Type	Identifier	Release	Form of Delivery
Hardware			
	IFX_CCI_00002Dh, IFX_CCI_000039h, IFX_CCI_00003Ah, IFX_CCI_000044h, IFX_CCI_000045h, IFX_CCI_000046h, IFX_CCI_000047h, IFX_CCI_000048h, IFX_CCI_000049h, IFX_CCI_00004Ah, IFX_CCI_00004Bh, IFX_CCI_00004Ch, IFX_CCI_00004Dh, IFX_CCI_00004Eh	T11 (design step)	Wafer, IC case, packages
Firmware			
	BOS & POWS	80.306.16.0, 80.306.16.1	stored on the delivered hardware
	Flash Loader	09.12.0005	
Software			
	NRG™ SW (optional)	05.03.4097	L251 Library File (object code), secured download
	HSL (optional)	3.52.9708	
	UMSLC	01.30.0564	

Type	Identifier	Release	Form of Delivery
	SCL (optional)	2.11.003, 2.15.000	
	ACL (optional)	3.02.000, 3.33.003	
	RCL (optional)	1.10.007	
	HCL (optional)	1.13.002	
User Guidance			
	32-bit Security Controller – V11, Hardware Reference Manual [HRM]	V6.2, 2020-12-21	Personalized PDF via secure iShare server
	32-bit Security Controller, SLx1/SLx3 Controller Family, Programmer's Reference Manual [PRM]	V4.6, 2020-10-13	
	32-bit Security Controller – V11, Security Guidelines [SecGuide]	V1.00-2661, 2020-10-05	
	Production and personalization, 32-bit security controller [PPUM]	V09.12, 2020-07-03	
	32-bit Security Controller, Crypto2304T V3, User Manual (optional) [UM_2304T]	V2.0 2019-04-24	
	HSL for SLCx7V11a Hardware Support Library (optional) [HSL]	V03.52.9708, 2021-01-25	
	UMSLC library for SLCx7 in 40nm, User Mode Security Life Control [UMSLC]	V01.30.0564, 2019-06-19	
	SCL37-SCP-v440-C40, Symmetric Crypto Library for SCP-v440 AES/DES/MAC, 32-bit Security Controller, User interface manual (optional) [SCL]	V2.11.003, 2021-06-16 and V2.15.000, 2021-06-01	
	ACL37-Crypto2304T-C40, Asymmetric Crypto Library for Crypto2304T RSA/ECC/Toolbox, 32-bit Security Controller, User interface manual (optional) [ACL]	V3.02.000, 2020-02-07 and V3.33.003, 2021-03-18	
	RCL37-X-C40 Random Crypto Library for SCP-v440 & RNG-v3 DRBG/HWRNG 32-bit Security Controller, User interface manual (optional) [RCL]	V1.10.007, 2020-06-16	

Type	Identifier	Release	Form of Delivery
	HCL37-CPU-C40 Hash Crypto Library for CPU SHA 32-bit Security Controller, User interface manual (optional) [HCL]	V1.13.002, 2020-05-07	

Table 2: Deliverables of the TOE

Please note that NRG functionality and toolbox are out of scope of this evaluation, hence no evaluated TOE guidance documentation applies. However, respective developer provided documentation may be available. User discretion is advised.

The delivery documentation describes all procedures that are necessary to maintain security when distributing versions of the TOE or parts of it to the user's site including the necessary intermediate delivery procedures.

Furthermore, the delivery documentation describes in a sufficient manner how the various procedures and technical measures provide for the detection of modifications and any discrepancies between the TOE respective parts of it sent by the TOE Manufacturer and the version received by the Composite Product Manufacturer.

Three different delivery procedures have to be taken into consideration:

- Delivery of the IC dedicated software components (IC dedicated SW, guidance) from the TOE Manufacturer to the IC Embedded Software Developer.
- Delivery of the IC Embedded Software (ROM / Flash data, initialisation and pre-personalisation data) from the IC Embedded Software Developer to the TOE Manufacturer.
- Delivery of the final TOE from the TOE Manufacturer to the Composite Product Manufacturer. After phase 3 the TOE is delivered in form of wafers or sawn wafers, after phase 4 in form of modules (with or without inlay antenna) or any other packaging form as offered.

Respective distribution centers are listed in Appendix B (see end of document).

The individual TOE hardware is uniquely identified by its identification data. Each individual TOE can therefore be traced unambiguously and thus assigned to the entire development and production process.

The hardware part of the TOE is identified by IFX_CCI_00002Dh, IFX_CCI_000039h, IFX_CCI_00003Ah, IFX_CCI_000044h, IFX_CCI_000045h, IFX_CCI_000046h, IFX_CCI_000047h, IFX_CCI_000048h, IFX_CCI_000049h, IFX_CCI_00004Ah, IFX_CCI_00004Bh, IFX_CCI_00004Ch, IFX_CCI_00004Dh, IFX_CCI_00004Eh design step T11.

Another characteristic of the TOE are the chip identification data. These chip identification data is accessible via the Generic Chip Identification Mode (GCIM) (see [12], section 4.5).

At TOE start-up the so called GCIM can be chosen by applying special signalling in contactless or contact based communication and the TOE outputs then the generic chip identification data (unless another configuration option is chosen). This data contain the firmware identifier accompanied with the certification identifier, the design step and even more tracking information. In combination with [12] (section 4.5) the user can identify the data, interpret it and retrieve the TOE versioning information. This information includes also the required mapping of firmware identifier and certification identifier.

The optional software libraries can be identified by their unique version numbers and by calculating a hash value (e.g. SHA-256) over the delivered lib-files (.lib) and comparing the calculated values to the values stated in Security Target [6] and [9], sections 9 - 13.

3. Security Policy

The security policy enforced is defined by the selected set of security functional requirements and implemented by the TOE. It covers the following issues:

The security policy of the TOE is to provide basic security functionalities to be used by the smart card operating system and the smart card application, thus providing an overall smart card system security. Therefore, the TOE will implement a symmetric cryptographic block cipher algorithm (Triple-DES and AES) to ensure the confidentiality of plain text data by encryption and to support secure authentication protocols and it will provide different random number generators.

The RSA library is used to provide a high-level interface to RSA (Rivest, Shamir, Adleman) cryptography implemented on the hardware component Crypto@2304T and includes countermeasures against SPA, DPA and DFA attacks. The EC library is used to provide a high-level interface to Elliptic Curve cryptography implemented on the hardware component Crypto@2304T and includes countermeasures against SPA, DPA and DFA attacks. The optional Hash Crypto Library provides a high-level interface for performing cryptographic hash functions and includes countermeasures against SPA, DPA and DFA attacks. The RCL provides a high-level interface for obtaining random data. This can be deterministic data from a AES CTR_DRBG or non-deterministic data that is provided by the underlying hardware. The RCL includes countermeasures against SPA, DPA and DFA attacks.

Besides that, the TOE can come with the optional Hardware Support Library (HSL) providing a simplified interface for NVM management and provides the possibility to write tearing safe into the NVM.

As the TOE is a hardware security platform, the security policy of the TOE is also to provide protection against leakage of information (e.g. to ensure the confidentiality of cryptographic keys during AES, Triple-DES, RSA and EC cryptographic functions performed by the TOE), against physical probing, against malfunctions, against physical manipulations and against abuse of functionality. Hence the TOE shall:

- maintain the integrity and the confidentiality of data stored in the memory of the TOE, and
- maintain the integrity, the correct operation and the confidentiality of security functionalities (security mechanisms and associated functions) provided by the TOE.

Specific details concerning the above mentioned security policies can be found in sections 6 and 7 of the Security Target [6] and [9].

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 and measures to be taken by the IT environment, the user or the risk manager. The following topics are of relevance:

The objective OE.Resp-Appl states that the IC embedded software developer shall treat user data (especially keys) of the composite product appropriately. The IC embedded software developer gets sufficient information on how to protect user data adequately in the security guidelines [14].

The ST includes the following security objectives for the operational environment, which are relevant for the Composite Product Manufacturer: OE.Process-Sec-IC, OE.Lim_Block_Loader, OE.Loader_Usage, OE.TOE_Auth, and OE.Prevent_Masquerade.

The objective OE.Process-Sec-IC requires the protection of the TOE, as well as of its manufacturing and test data up to the delivery to the end-consumer. As defined in [6] and [9] section 1.4.5 the TOE can be delivered to the composite product manufacturer after phase 3 or after phase 4. However, the single chips are identical in all cases. This means that the test mode is deactivated and the TOE is locked in the user mode. Therefore, it is not necessary to distinguish between these forms of delivery. Since Infineon has no information about the security requirements of the implemented IC embedded software it is not possible to define any concrete security requirements for the environment of the composite product manufacturer.

The objective OE.TOE_Auth requires that the environment has to support the authentication and verification mechanism and has to know the corresponding authentication reference data. The composite product manufacturer receives sufficient information with regard to the authentication mechanism in [15], section 2.1.5. Please note that this objective is only valid in case the Flash Loader is ordered with mutual authentication (i.e., option “External Authentication” is unavailable).

The objective OE.Prevent_Masquerade is valid in case the Flash Loader is ordered with External Authentication (EA) instead of mutual authentication. In this case, customers need to take care that not masquerading attacks can be performed. The objective replaces OE.Loader-Usage. A description of the External Authentication is given in [15], section 2.1.5 and further highlights the risks of masquerading attacks when using this order option of the flash loader:

> The objective OE.Prevent_Masquerade is valid in case the Flash Loader is ordered with External Authentication (EA) instead of a mutual authentication. In this case, customers need to take care that not masquerading attacks can be performed.

The objective OE.Loader_Usage requires that the authorised user has to support the trusted communication with the TOE by protecting the confidentiality and integrity of the loaded data and he has to meet the access conditions defined by the flash loader. [15], section 4 provides sufficient information regarding this topic.

The objective OE.Lim_Block_Loader requires the composite product manufacturer to protect the loader against misuse, to limit the capability of the loader and to terminate the loader irreversibly after the intended usage. The permanent deactivation of the flash loader is described in [15], section 2.1.2.2. This objective for the environment originates from the “Package 1: Loader dedicated for usage in secured environment only”. However, this TOE also implements “Package 2: Loader dedicated for usage by authorized users only” and thus the flash loader can also be used in an unsecure environment and is able to protect itself against misuse if the authentication and download keys are handled appropriately.

5. Architectural Information

For further information on the TOE architecture, see Security Target [6] and [9], section 1 (especially sections 1.3 and 1.4).

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

Regarding functional testing:

Different classes of functional tests were performed by the developer to test the TOE:

- Simulation tests (design verification),
- Qualification tests,
- Verification Tests,
- Security Evaluation Tests,
- Production Tests.

The developer's testing results demonstrate that the TSFs behave as specified. The developer's testing results also demonstrate that the TOE behaves as expected.

In the course of the evaluation of the TOE, the following classes of functional tests were carried out by the ITSEF:

- Module tests,
- Simulation tests,
- Emulation tests,
- Tests in user mode,
- Tests in test mode,
- Hardware tests,
- Optional library tests,
- repetition of developer tests (see above).

With these kinds of tests the entire security functionality of the TOE was tested.

The results of the (functional) developer tests, which have been repeated by the evaluator, matched the results the developer stated.

Overall the TSF has been functionally tested against the functional specification, the TOE design and the security architecture description. The tests demonstrate that the TSF performs as specified.

Regarding AVA related tests:

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] and [9], provided that all measures required by the developer are applied.

The embedded software has to implement the security advices given in [12] - [22].

8. Evaluated Configuration

In the broadest sense, the production of the mask sets for the chip production may be looked upon as the procedure for the system generation. The TOE can be delivered with the following so called certification identifiers:

IFX_CCI_00002Dh, IFX_CCI_000039h, IFX_CCI_00003Ah, IFX_CCI_000044h, IFX_CCI_000045h, IFX_CCI_000046h, IFX_CCI_000047h, IFX_CCI_000048h, IFX_CCI_000049h, IFX_CCI_00004Ah, IFX_CCI_00004Bh, IFX_CCI_00004Ch, IFX_CCI_00004Dh and IFX_CCI_00004Eh design step T11.

This TOE is represented by various configurations called products. The module design, layout and footprint, of all products are identical. The degree of freedom for configuring the TOE is predefined by the developer.

Furthermore comprising of firmware and optional software libraries with revisions stated in section 2. The flash loader (part of FW) was enabled on evaluated derivative.

An extensive overview over all possible configuration options is given in the Security Target [6] and [9] in sections 1.4.5 and 1.4.7.

The evaluation results, also including results of tests performed by the developer, are valid for all hardware derivates mentioned above. All identifiers represent the equal hardware platform but name differences in configurations or market segments. Configuration differences are achieved by blocking only. The firmware and optional software libraries were examined in those revisions, which are stated in table 2 (above).

The evaluation results are valid for all configurations and blocking options of the hardware stated in section 1.4.7 of the Security Target [6] and [9]. Depending on configuration, blocking option and on selection of optional software libraries, some of the services might be unavailable to the user. The unavailable services have no security impact on the TOE. The user must ensure a working configuration. The evaluation results apply to all configurations of Flash Loader, BPU and PIN-Letter as stated in the Security Target [6] and [9].

The evaluation results cannot be extended to further versions/derivates of the TOE and/or other production sites without any extra investigations.

Developer and evaluator tested the TOE in these configurations in which the TOE is delivered and which is described above and in Section 2.

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 and guidance specific for the technology of the product [4] (AIS 34).

The following guidance specific for the technology was used:

- Anwendungshinweise und Interpretationen zum Schema (AIS) – AIS 1, Durchführung der Ortsbesichtigung in der Entwicklungsumgebung des Herstellers, Version 14, 2017-10-11, Bundesamt für Sicherheit in der Informationstechnik.
- Anwendungshinweise und Interpretationen zum Schema (AIS) – AIS 14, Anforderungen an Aufbau und Inhalt der ETR-Teile (Evaluation Technical Report) für Evaluationen nach CC (Common Criteria), Version 7, 2010-08-03, Bundesamt für Sicherheit in der Informationstechnik.
- Anwendungshinweise und Interpretationen zum Schema (AIS) – AIS 19, Anforderungen an Aufbau und Inhalt der Zusammenfassung des ETR (Evaluation Technical Report) für Evaluationen nach CC (Common Criteria), Version 9, 2014-11-03, Bundesamt für Sicherheit in der Informationstechnik.
- Anwendungshinweise und Interpretationen zum Schema (AIS) – AIS 20, Funktionalitätsklassen und Evaluationsmethodologie für deterministische Zufallszahlengeneratoren, Version 3, 2013-05-15, Herausgeber: Zertifizierungsstelle des BSI im Rahmen des Zertifizierungsschemas, Bundesamt für Sicherheit in der Informationstechnik.
- A proposal for: Functionality classes for random number generators, W. Killmann, W. Schindler, Version 2.0, 2011-09-18, T-Systems GEI GmbH and Bundesamt für Sicherheit in der Informationstechnik. (same as [AIS31_KS2011])
- Developer evidence for the evaluation of a deterministic random number generator, Version 0.9, 2013-02-28, Bundesamt für Sicherheit in der Informationstechnik.
- Evaluation Report as part of the Evaluation Technical Report, Part B – ETR-Part Deterministic Random Number Generator, Template-Version 0.10, 2013-02-28, Bundesamt für Sicherheit in der Informationstechnik.
- Anwendungshinweise und Interpretationen zum Schema (AIS) – AIS 23, Zusammentragen von Nachweisen der Entwickler, Version 4, 2017-03-15, Bundesamt für Sicherheit in der Informationstechnik.
- CC Supporting Document Guidance – Collection of Developer Evidence, Version 1.5, April 2012, CCDB-2012-04-005.
- Joint Interpretation Library – Collection of Developer Evidence, Version 1.5, January 2012.
- Application Notes and Interpretation of the Scheme (AIS) – AIS 25, Anwendungen der CC auf integrierte Schaltungen, Version 9, 2017-03-15, Bundesamt für Sicherheit in der Informationstechnik.
- CC Supporting Document Mandatory Technical Document – Security Architecture requirements (ADV_ARC) for smart cards and similar devices, Version 2.1, April 2014, CCDB-2012-04-004.
- CC Supporting Document Guidance – Security Architecture requirements (ADV_ARC) for smart cards and similar devices – Appendix 1, Version 2.0, April 2012.

- CC Supporting Document Mandatory Technical Document – The Application of CC to Integrated Circuits, Version 3.0, Revision 1, March 2009, CCDB-2009-03-002.
- Joint Interpretation Library – Security Architecture requirements (ADV_ARC) for smart cards and similar devices – Appendix 1, Version 2.0, January 2012.
- Joint Interpretation Library – The Application of CC to Integrated Circuits, Version 3.0, February 2009.
- Joint Interpretation Library – Security requirements for post-delivery code loading, Version 1.0, February 2016.
- Validity of conducted tests on Security Smart Card ICs in dependence of test date, Version 1, 2017-03-15, Bundesamt für Sicherheit in der Informationstechnik.
- Anwendungshinweise und Interpretationen zum Schema (AIS) – AIS 26, Evaluationsmethodologie für in Hardware Integrierte Schaltungen, Version 10, 2017-07-03, Bundesamt für Sicherheit in der Informationstechnik.
- Auswahl geeigneter Chips für DPA-Messungen, Version 1.1, 2008-12-07, Bundesamt für Sicherheit in der Informationstechnik.
- Special Attack Methods for Smartcards and Similar Devices, Version 1.4, 2011-06-08, Bundesamt für Sicherheit in der Informationstechnik.
- CC Supporting Document Mandatory Technical Document – Requirements to perform Integrated Circuit Evaluations, Version 1.1, May 2013, CCDB-2013-05-001.
- Joint Interpretation Library – Application of Attack Potential to Smartcards, Version 2.9, 2013-01.
- Joint Interpretation Library – Attack Methods for Smartcards and Similar Devices, Version 2.4, 2020-01, confidential.
- Joint Interpretation Library – Requirements to perform Integrated Circuit Evaluations, Version 1.1, February 2013.
- Application Notes and Interpretation of the Scheme (AIS) – AIS 27, Transition from ITSEC to CC, Version 5, 2010-08-17, Bundesamt für Sicherheit in der Informationstechnik.
- Anwendungshinweise und Interpretationen zum Schema (AIS) – AIS 31, Funktionalitätsklassen und Evaluationsmethodologie für physikalische Zufallszahlengeneratoren, Version 3, 2013-05-15, Bundesamt für Sicherheit in der Informationstechnik.
- Developer evidence for the evaluation of a physical true random generator, Version 0.8, 2013-02-28, Bundesamt für Sicherheit in der Informationstechnik.
- Evaluation Report as part of the Evaluation Technical Report, Part B – ETR-Part True Physical and Hybrid Random Number Generator, Template-Version 0.7, 2013-02-28, Bundesamt für Sicherheit in der Informationstechnik.
- Anwendungshinweise und Interpretationen zum Schema (AIS) – AIS 32, CC-Interpretationen im deutschen Zertifizierungsschema, Version 7, 2011-06-08, Bundesamt für Sicherheit in der Informationstechnik.
- Application Notes and Interpretation of the Scheme (AIS) – AIS 34, Evaluation Methodology for CC Assurance Classes for EAL5+ (CC v2.3 & v3.1) and EAL6 (CC v3.1), Version 3, 2009-09-03, Bundesamt für Sicherheit in der Informationstechnik.

- Anwendungshinweise und Interpretationen zum Schema (AIS) – AIS 35, Öffentliche Fassung eines Security Target (ST-lite), Version 2, 2007-11-12, Bundesamt für Sicherheit in der Informationstechnik.
- Anwendungshinweise und Interpretationen zum Schema (AIS) – AIS 36, Kompositionsevaluierung, Version 5, 2017-03-15, Bundesamt für Sicherheit in der Informationstechnik.
- CC Supporting Document Mandatory Technical Document – Composite product evaluation for Smart Cards and similar devices, Version 1.4, December 2015, CCDB-2015-12-001.
- Joint Interpretation Library – Composite product evaluation for Smart Cards and similar devices, Version 1.5.1, May 2018.
- CC Supporting Document Guidance – ETR template for composite evaluation of Smart Cards and similar devices, Version 1.1, December 2015, CCDB-2015-12-002.
- Joint Interpretation Library – ETR template for composite evaluation of Smart Cards and similar devices, Version 1.1, August 2015.
- Joint Interpretation Library – Certification of “open” smart card products, Version 1.1 (for trial use), 2013-02-04.
- Anwendungshinweise und Interpretationen zum Schema (AIS) – AIS 37, Terminologie und Vorbereitung von Smartcard-Evaluierungen, Version 3, 2010-05-17, Bundesamt für Sicherheit in der Informationstechnik.
- CC Supporting Document Guidance – Smartcard Evaluation, Version 2.0, February 2010, CCDB-2010-03-001.
- Application Notes and Interpretation of the Scheme (AIS) – AIS 38, Reuse of evaluation results, Version 2, 2007-09-28, Bundesamt für Sicherheit in der Informationstechnik.
- Application Notes and Interpretation of the Scheme (AIS) – AIS 41, Guidelines for PPs and STs, Version 2, 2011-01-31, Bundesamt für Sicherheit in der Informationstechnik.
- Guidance Document – The PP/ST Guide, Version 2, Revision 0, 2010-08, Bundesamt für Sicherheit in der Informationstechnik.
- Anwendungshinweise und Interpretationen zum Schema (AIS) – AIS 46, Informationen zur Evaluierung von kryptographischen Algorithmen und ergänzende Hinweise für die Evaluierung von Zufallszahlengeneratoren, Version 3, 2013-12-04, Bundesamt für Sicherheit in der Informationstechnik.
- Review-Protokoll zum (Krypto-)AVA-KickOff, Template-Version/Date: 2019-08-23, Bundesamt für Sicherheit in der Informationstechnik.
- Minimal Requirements for Evaluating Side-Channel Attack Resistance of Elliptic Curve Implementations, Version 1.0.4, 2011-07-01, BSI.
- Methodology for cryptographic rating of memory encryption schemes used in smartcards and similar devices, Version 1.0, 2013-10-31, BSI.
- Minimum Requirements for Evaluating Side-Channel Attack Resistance of RSA, DSA and Diffie-Hellman Key Exchange Implementations, Version 1.0, 2013-01-14, BSI.
- Anwendungshinweise und Interpretationen zum Schema (AIS) – AIS 47, Regelungen zu Site Certification, Version 1.1, 2013-12-04, Bundesamt für Sicherheit in der Informationstechnik.

- Guidance for Site Certification, Version 1.1, 2013-12-04, Bundesamt für Sicherheit in der Informationstechnik.
- Joint Interpretation Library – Minimum Site Security Requirements, 04/2019.

(see [4] for respective AIS references).

For RNG assessment the scheme interpretations AIS 20/31 was 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 6 package including the class ASE as defined in the CC (see also part C of this report),
- The components ALC_FLR.1 augmented for this TOE evaluation.

The evaluation has confirmed:

- PP Conformance: Security IC Platform Protection Profile with Augmentation Packages Version 1.0, 13 January 2014, BSI-CC-PP-0084-2014 [8],
- for the Functionality: PP conformant plus product specific extensions Common Criteria Part 2 extended,
- for the Assurance: Common Criteria Part 3 conformant EAL 6 augmented by ALC_FLR.1.

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 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 following table (which originates from the ITSEF-evaluated table in [7] and in this certification report is enhanced by the 100 bit column) provides an overview of the cryptographic functionalities inside the TOE to enforce the security policy and outlines its rating from cryptographic point of view. Any Cryptographic Functionality that is marked in column '*Security Level above 100 Bits*' of the following table with '*no*' achieves a security level of lower than 100 Bits (in general context) only.

#	Purpose / Service	Cryptographic Mechanism	Standard of Implementation	Key Size in Bits	Security Level above 100 Bits
SCP (Symmetric Cryptographic Processor)					
1	Cryptographic primitive	TDES	[NIST SP800-67], [ISO18033-3]	112, 168	Yes (for |k|=168 bit)
2	Cryptographic primitive	AES	[FIPS197], [ISO18033-3]	128, 192, 256	Yes
3	Confidentiality	TDES (see #1) in ECB mode for encryption and decryption	[NIST SP800-38A]	112, 168	No
4	Confidentiality	TDES (see #1) in CBC mode for encryption and decryption	[NIST SP800-38A]	112, 168	Yes (for |k|=168 bit)
5	Confidentiality	AES (see #2) in ECB mode for encryption and decryption	[NIST SP800-38A]	128, 192, 256	No
6	Confidentiality	AES (see #2) in CBC mode for encryption and decryption	[NIST SP800-38A]	128, 192, 256	Yes
SCL (Symmetric Cryptographic Library)					
7	Cryptographic primitive	TDES	[NIST SP800-67]	112, 168	Yes (for |k|=168 bit)
8	Cryptographic primitive	AES	[FIPS197]	128, 192, 256	Yes
9	Confidentility	#7 in ECB mode for encryption and decryption	[NIST SP800-38A]	112, 168	No
10	Confidentility	#7 in CBC mode for encryption and decryption	[NIST SP800-38A]	112, 168	Yes (for |k|=168 bit)
11	Confidentility	#7 in CTR mode for encryption and decryption	[NIST SP800-38A]	112, 168	Yes (for |k|=168 bit)
12	Confidentility	#7 in CFB mode for encryption and decryption	[NIST SP800-38A]	112, 168	Yes (for |k|=168 bit)
13	Integrity	#7 in CMAC mode for MAC generation and verification	[NIST SP800-38B]	112, 168	Yes (for |k|=168 bit)
14	Integrity	#7 in Retail MAC (Algorithm 3) for MAC generation and verification	[ISO9797-1]	112	No

#	Purpose / Service	Cryptographic Mechanism	Standard of Implementation	Key Size in Bits	Security Level above 100 Bits
15	Confidentiality	#8 in ECB mode for encryption and decryption	[NIST SP800-38A]	128, 192, 256	No
16	Confidentiality	#8 in CBC mode for encryption and decryption	[NIST SP800-38A]	128, 192, 256	Yes
17	Confidentiality	#8 in CTR mode for encryption and decryption	[NIST SP800-38A]	128, 192, 256	Yes
18	Confidentiality	#8 in CFB mode for encryption and decryption	[NIST SP800-38A]	128, 192, 256	Yes
19	Integrity	#8 in CMAC mode for MAC generation and verification	[NIST SP800-38B]	128, 192, 256	Yes
ACL (Asymmetric Cryptographic Library, v3.02.000)					
20	Confidentiality	encryption	[PKCS #1, 5.1.1], [IEEE_P1363, 8.2.2]	512 – 2112	Yes (for |k|≥1976 bit)
21	Confidentiality	decryption	[PKCS #1, 5.1.2], [IEEE_P1363, 8.2.1 (I) / 8.2.3]	512 – 2112	Yes (for |k|≥1976 bit)
22	Confidentiality	decryption with CRT	[PKCS #1, 5.1.2], [IEEE_P1363, 8.2.1 (I) / 8.2.3]	512 – 4224	Yes (for |k|≥1976 bit)
23	Authenticity	signature generation	[PKCS #1, 5.2.1], [IEEE_P1363, 8.2.1 (I) / 8.2.4]	512 – 2112	Yes (for |k|≥1976 bit)
24	Authenticity	signature generation with CRT	[PKCS #1, 5.2.1], [IEEE_P1363, 8.2.1 (II) / 8.2.4]	512 – 4224	Yes (for |k|≥1976 bit)
25	Authenticity	signature verification	[PKCS #1, 5.2.2], [IEEE_P1363, 8.2.5]	512 – 4224	Yes (for |k|≥1976 bit)
26	Key generation	RSA key generation returning CRT key components dp, dq and qinv (prime generation not included)	[PKCS #1, 3.1 / 3.2] [IEEE_P1363, 8.1.3.1]	512 – 4224	N/A
27	Key generation	RSA key generation returning key representation n and d (prime generation not included)	[PKCS #1, 3.1 / 3.2] [IEEE_P1363, 8.1.3.1]	512 – 2112	N/A

#	Purpose / Service	Cryptographic Mechanism	Standard of Implementation	Key Size in Bits	Security Level above 100 Bits
28	Key generation	RSA key generation returning key representation p, q and d (prime generation included)	[IEEE_P1363, 8.1.3.1], proprietary w.r.t. prime gen	512 – 2047	N/A
29	Key generation	RSA key generation returning key representation p, q and d (prime generation included)	[IEEE_P1363, 8.1.3.1], FIPS186-4, B.3.3]	2048 – 2112	Yes (due to FIPS)
30	(supplementary information)	Certified ECC curve parameters	[FIPS186-4] [RFC5639]	Key sizes corresponding to the used elliptic curves NIST: P-{192, 224, 256, 384, 521}, K-{163, 233, 283, 409}, B-{233, 283, 409} [FIPS186-4]; brainpool: P{160, 192, 224, 256, 320, 384, 512}t1, P{160, 192, 224, 256, 320, 384, 512}r1 [RFC5639]	N/A
31	Functionality / Cryptographic primitive /	EC point addition on curves listed in #30	N/A	160 - 521	N/A
32	Authenticity	ECDSA signature generation on curves listed in #30	[ANS X9.62, 7.3], [IEEE_P1363, 7.2.7]	160 – 521	Yes (for | k|≥224 bit)
33	Authenticity	ECDSA signature verification on curves listed in #30	[ANS X9.62, 7.4.1] [IEEE_P1363, 7.2.8]	160 – 521	Yes (for | k|≥250 bit)
34	Key agreement	Elliptic Curve Diffie-Hellman (ECDH) key agreement on curves listed in #30	[ANS X9.63, 5.4.1], [ISO_11770-3, D.6] [IEEE_P1363, 7.2.1]	160 – 521	Yes (for | k|≥250 bit)
35	Key generation	Elliptic Curve key generation on curves listed in #30	[ANS X9.62, A.4.3] [IEEE_P1363, A.16.9]	160 – 521	Yes (for | k|≥224 bit)
ACL (Asymmetric Cryptographic Library, v3.33.003)					
36	Confidentiality	encryption	[PKCS #1, 5.1.1], [IEEE_P1363, 8.2.2]	512 – 2112	Yes (for | k|≥1976 bit)
37	Confidentiality	decryption	[PKCS #1, 5.1.2], [IEEE_P1363, 8.2.1 (I) / 8.2.3]	512 – 2112	Yes (for | k|≥1976 bit)
38	Confidentiality	decryption with CRT	[PKCS #1, 5.1.2], [IEEE_P1363, 8.2.1 (I) / 8.2.3]	512 – 4224	Yes (for | k|≥1976 bit)

#	Purpose / Service	Cryptographic Mechanism	Standard of Implementation	Key Size in Bits	Security Level above 100 Bits
39	Authenticity	signature generation	[PKCS #1, 5.2.1], [IEEE_P1363, 8.2.1 (I) / 8.2.4]	512 – 2112	Yes (for |k|≥1976 bit)
40	Authenticity	signature generation with CRT	[PKCS #1, 5.2.1], [IEEE_P1363, 8.2.1 (II) / 8.2.4]	512 – 4224	Yes (for |k|≥1976 bit)
41	Authenticity	signature verification	[PKCS #1, 5.2.2], [IEEE_P1363, 8.2.5]	512 – 4224	Yes (for |k|≥1976 bit)
42	Key generation	RSA key generation returning CRT key components dp, dq and qinv (prime generation not included)	[PKCS #1, 3.1 / 3.2] [IEEE_P1363, 8.1.3.1]	512 – 4224	N/A
43	Key generation	RSA key generation returning key representation n and d (prime generation not included)	[PKCS #1, 3.1 / 3.2] [IEEE_P1363, 8.1.3.1]	512 – 2112	N/A
44	Key generation	RSA key generation returning key representation p, q and d (prime generation included)	[IEEE_P1363, 8.1.3.1]	512 – 2047	N/A
45	Key generation	RSA key generation returning key representation p, q and d (prime generation included)	[IEEE_P1363, 8.1.3.1], FIPS186-4, B.3.3]	2048 – 2112	Yes (due to FIPS)
46	Functionality / Cryptographic primitive	Prime number generation (for use with RSA key generation, see above) (PRIME_GEN())	proprietary	length of prime: 512 – 2112 Bits	N/A
47	Functionality / Cryptographic primitive	Generation of probable primes, Miller Rabin test (2PRIME_GEN())	[FIPS186-4, B.3.3 / C.3.1]	length of prime: 512 – 2064 Bits	N/A
48	Functionality / Cryptographic primitive	Primality test (PRIME_CHECK())	Proprietary	length of prime: 512 – 2112 Bits	N/A
49	Functionality / Cryptographic primitive	Primality test (PRIME_CHECK_MASK())	[FIPS186-4, C.3.1 / C.3.2]	length of prime: 512 – 2064 Bits	N/A

#	Purpose / Service	Cryptographic Mechanism	Standard of Implementation	Key Size in Bits	Security Level above 100 Bits
50	Key Agreement	RSA Diffie-Hellman (DH) key agreement (RSA_DH())	[N186-4, B.5.5] [RSA-PKCSB, 5.2.1 / 5.1.2] [IEEE1336, 8.2.4 / 8.2.3]	512 – 4224	N/A
51	(supplementary information)	Certified ECC curve parameters	[FIPS186-4] [RFC5639]	Key sizes corresponding to the used elliptic curves NIST: P-{192, 224, 256, 384, 521}, K-{163, 233, 283, 409}, B-{233, 283, 409} [FIPS186-4]; brainpool: P{160, 192, 224, 256, 320, 384, 512}t1, P{160, 192, 224, 256, 320, 384, 512}r1 [RFC5639]	N/A
52	Cryptographic primitive / functionality	EC point addition on curves listed in #50	N/A	160 - 521	N/A
53	Authenticity	ECDSA signature generation on curves listed in #50	[ANS X9.62, 7.3], [IEEE_P1363, 7.2.7]	160 – 521	Yes (for |k|≥224 bit)
54	Authenticity	ECDSA signature verification on curves listed in #50	[ANS X9.62, 7.4.1] [IEEE_P1363, 7.2.8]	160 – 521	Yes (for |k|≥250 bit)
55	Key agreement	Elliptic Curve Diffie-Hellman (ECDH) key agreement on curves listed in #50	[ANS X9.63, 5.4.1], [ISO_11770-3, D.6] [IEEE_P1363, 7.2.1]	160 – 521	Yes (for |k|≥250 bit)
56	Key generation	Elliptic Curve key generation on curves listed in #50	[ANS X9.62, A.4.3] [IEEE_P1363, A.16.9]	160 – 521	Yes (for |k|≥224 bit)
57	Functionality / PACE integrated mapping	Point encoding for the ECDH-integrated mapping on curves listed in #50	[ICAO_11, B.2]	160 – 521	N/A
Flash Loader					
58	Confidentiality	#2 in CCM mode for encryption and decryption	[NIST SP800-38C]	128	Yes
59	Authenticity	#2 in CCM mode for MAC verification	[NIST SP800-38C]	128	Yes
60	Authentication	Mutual authentication protocol based on #58	[AGD_PPUM, 2.1.5]	128	Yes
Random Number Generation					

#	Purpose / Service	Cryptographic Mechanism	Standard of Implementation	Key Size in Bits	Security Level above 100 Bits
61	RNG	Physical RNG	Corresponds to PTG.2 in [AIS31]	N/A	N/A
62	RNG	Hybrid RNG	Corresponds to PTG.3 in [AIS31]	N/A	N/A
63	RNG	Deterministic RNG	Corresponds to DRG.3 in [AIS20]	N/A	N/A
64	RNG	Deterministic RNG	Corresponds to DRG.4 in [AIS20]	N/A	N/A
Random Crypto Library (RCL) v1.10.007					
65	RNG	Physical RNG (the RCL acts as interface to the PTG.2 hardware RNG)	Corresponds to PTG.2 in [AIS31]	N/A	N/A
66	RNG	Deterministic RNG (CTR_DRBG())	corresponds to DRG.3 in [AIS20] [NIST SP800-90A]	128, 256	N/A
67	RNG	Deterministic RNG (CTR_DRBG())	corresponds to DRG.4 in [AIS20] [NIST SP800-90A]	128, 256	N/A
Hash Crypto Library (HCL) v1.13.002					
68	Hash calculation	SHA-1	[FIPS180-4]	N/A	N/A
69	Hash calculation	SHA-224	[FIPS180-4]	N/A	N/A
70	Hash calculation	SHA-256	[FIPS180-4]	N/A	N/A
71	Hash calculation	SHA-384	[FIPS180-4]	N/A	N/A
72	Hash calculation	SHA-512	[FIPS180-4]	N/A	N/A
73	Hash calculation	SHA-512/224	[FIPS180-4]	N/A	N/A
74	Hash calculation	SHA-512/256	[FIPS180-4]	N/A	N/A

Table 3: TOE cryptographic functionality and related functionality

The TOE's memory enryption, named ICS ("ICS-C8") and not separately listed above, was successfully evaluated according to BSI's "Methodology for cryptographic rating of memory encryption schemes used in smartcards and similar devices" (Version 1.0, 2013-10-31).

Where no cryptographic 100-Bit-Level assessment was given at all (i.e where "N/A" was stated), nevertheless the targeted CC Evaluation Assurance Level has been achieved for those functionalities as well.

Further conformance evaluation and assessment to claimed cryptographic functionality standards is documented in the confidential report "Cryptographic Standards Compliance Verification" [23].

Reference of Legislatives and Standards quoted above:

[AIS20] Anwendungshinweise und Interpretationen zum Schema (AIS) – AIS 20, Funktionalitätsklassen und Evaluationsmethodologie für deterministische Zufallszahlengeneratoren, Version 3, 2013-05-15, Bundesamt für Sicherheit in der Informationstechnik

[AIS31] Anwendungshinweise und Interpretationen zum Schema (AIS) – AIS 31, Funktionalitätsklassen und Evaluationsmethodologie für physikalische Zufallszahlengeneratoren, Version 3, 2013-05-15, Bundesamt für Sicherheit in der Informationstechnik

[ANS X9.62] American National Standard for Financial Services ANS X9.62-2005, Public Key Cryptography for the Financial Services Industry, The Elliptic Curve Digital Signature Algorithm (ECDSA), November 16, 2005, American National Standards Institute.

[ANS X9.63] American National Standard for Financial Services X9.63-2011, Public Key Cryptography for the Financial Services Industry - Key Agreement and Key Transport Using Elliptic Curve Cryptography, December 21, 2011, American National Standards Institute

[AGD_PPUM] see reference [15] in bibliography (section 14)

[FIPS186-4] Federal Information Processing Standards Publication FIPS PUB 186-4, Digital Signature Standard (DSS), July 2013, U.S. department of Commerce / National Institute of Standards and Technology (NIST)

[FIPS197] Federal Information Processing Standards Publication 197, Announcing the ADVANCED ENCRYPTION STANDARD (AES), 2001-11-26, National Institute of Standards and Technology (NIST)

[IEEE_P1363] IEEE P1363. Standard specifications for public key cryptography. IEEE, 2000

[ISO_9797-1] Information technology - Security techniques - Message Authentication Codes (MACs) - Part 1: Mechanisms using a block cipher, 1999-12, ISO/IEC

[ISO_11770-3] ISO 11770-3: Information technology - Security techniques – Key management Part 3: Mechanisms using asymmetric techniques, ISO/ IEC 11770-3:2008

[ISO_18033-3] ISO 18033-3: Information technology - Security techniques – Encryption algorithms – Part 3: Block ciphers, ISO/IEC 18033-3:2005

[NIST SP800-38A] NIST SP800-38A, Recommendation for Block Cipher Modes of Operation, Methods and Techniques, 2001, National Institute of Standards and Technology (NIST)

[NIST SP800-38B] NIST SP800-38B, Recommendation for Block Cipher Modes of Operation, The CMAC Mode for Authentication, 2005-05, National Institute of Standards and Technology (NIST)

[NIST SP800-38C] NIST SP800-38C, Recommendation for Block Cipher Modes of Operation: the CCM Mode for Authentication and Confidentiality, 2004-05 with updates as of 2007-07-20, National Institute of Standards and Technology (NIST)

[NIST SP800-67] NIST Special Publication 800-67 – Revision 2, Recommendation for the Triple Data Encryption Algorithm (TDEA) Block Cipher – Revised November 2017, National Institute of Standards and Technology (NIST), Technology Administration, U.S. Department of Commerce

[PKCS-1] PKCS #1: RSA Cryptography Standard, Version 2.2, October 27, 2012, RSA Laboratories

[RFC5639] RFC 5639 - Elliptic Curve Cryptography (ECC) Brainpool Standard Curves and Curve Generation, IETF Trust and the persons identified as the document authors, March 2010 (http://www.ietf.org/rfc/rfc5639.txt)

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, e.g. the Embedded Software using the TOE. 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. In the course of the evaluation of the composite product or system it must be examined if the required measures have been correctly and effectively implemented by the product layer on top. Additionally, the evaluation of the composite product or system must also consider the evaluation results as outlined in the document "ETR for composite evaluation" [10].

At the point in time when evaluation and certification results are reused there might be an update of the document "ETR for composite evaluation" available. Therefore, the certified products list on the BSI website has to be checked for latest information on reassessments, recertifications or maintenance result available for the product.

Furthermore:

The TOE is delivered to the composite product manufacturer and to the security IC embedded software developer. The actual end-consumer obtains the TOE from the composite product issuer together with the application which runs on the TOE.

The security IC embedded software developer receives all necessary recommendations and hints to develop his software in form of the delivered documentation.

- All security hints described in the delivered documents in [11] - [22] have to be considered.

The composite product manufacturer receives all necessary recommendations and hints to develop his software in form of the delivered documentation.

- All security hints described in [15] have to be considered.

In addition the following hint resulting from the evaluation of the ALC evaluation aspect has to be considered:

- The security IC embedded software developer can deliver his software either to Infineon to let them implement it in the TOE (in the Flash memory) or to the composite product manufacturer to let him download the software in the Flash memory.
- The delivery procedure from the security IC embedded software developer to the composite product manufacturer is not part of this evaluation and a secure delivery is required. The TOE provides a flash loader with mutual authentication to establish a secure channel. In this case a secure transport is not required.
- The TOE can come with a pre-loaded image called Performance Flash Loader, which is a non-TOE component. Using the PFL results in a non-certified product.
- The firmware flash loader requires either mutual authentication to establish a secure channel or a one-way authentication of the user without establishing a secure channel even though the communication is encrypted and integrity protected. This latter configuration does not satisfy the Loader Package 2 of [8].

11. Security Target

For the purpose of publishing, the Security Target [9] 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)

None.

13. Definitions

13.1. Acronyms

AIS	Application Notes and Interpretations of the Scheme
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
CCRA	Common Criteria Recognition Arrangement
CC	Common Criteria for IT Security Evaluation
CEM	Common Methodology for Information Technology Security Evaluation
cPP	Collaborative Protection Profile
EAL	Evaluation Assurance Level
ETR	Evaluation Technical Report

IT	Information Technology
ITSEF	Information Technology Security Evaluation Facility
PP	Protection Profile
SAR	Security Assurance Requirement
SFP	Security Function Policy
SFR	Security Functional Requirement
ST	Security Target
TOE	Target of Evaluation
TSF	TOE Security Functionality

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[7] https://www.bsi.bund.de/AIS

[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-1107-V2-2021, Version 4.3, 2021-06-14, "IFX_CCI_00002Dh, IFX_CCI_000039h, IFX_CCI_00003Ah, IFX_CCI_000044h, IFX_CCI_000045h, IFX_CCI_000046h, IFX_CCI_000047h, IFX_CCI_000048h, IFX_CCI_000049h, IFX_CCI_00004Ah, IFX_CCI_00004Bh, IFX_CCI_00004Ch, IFX_CCI_00004Dh, IFX_CCI_00004Eh T11 Security Target", Infineon Technologies AG (confidential document)

[7] Evaluation Technical Report, Version 3, 2021-06-24, "ETR Summary", TÜV Informationstechnik GmbH (confidential document)

[8] Security IC Platform Protection Profile with Augmentation Packages Version 1.0, 13 January 2014, BSI-CC-PP-0084-2014

[9] Security Target Lite BSI-DSZ-CC-1107-V2-2021, Version 4.3, 2021-06-14, "IFX_CCI_00002Dh, IFX_CCI_000039h, IFX_CCI_00003Ah, IFX_CCI_000044h, IFX_CCI_000045h, IFX_CCI_000046h, IFX_CCI_000047h, IFX_CCI_000048h, IFX_CCI_000049h, IFX_CCI_00004Ah, IFX_CCI_00004Bh, IFX_CCI_00004Ch, IFX_CCI_00004Dh, IFX_CCI_00004Eh T11 Security Target Lite", Infineon Technologies AG (sanitised public document)

[10] ETR for composite evaluation according to AIS 36 for BSI-DSZ-CC-1107-V2-2021, Version 3, 2021-06-24, "ETR for Composition", TÜV Informationstechnik GmbH (confidential document)

[11] Configuration list for the TOE, Version 2.0, 2021-03-02, "Infineon Technologies AG Chipcard and Security Evaluation Documentation Life Cycle Support" (confidential document)

[12] see [HRM] in table 2

[13] see [PRM] in table 2

[14] see [SecGuide] in table 2

[15] see [PPUM] in table 2

[16] see [UM_2304T] in table 2

[17] see [HSL] in table 2

[18] see [UMSLC] in table 2

[19] see [SCL] in table 2

[20] see [ACL] in table 2

[7] See section 9.1 for relevant AIS

[21] see [RCL] in table 2

[22] see [HCL] in table 2

[23] “Cryptographic Standards Compliance Verification”, Version 4, 2021-05-19, TÜV Informationstechnik GmbH (confidential document)

[24] “Site Technical Audit Report (STAR) DNP Photomask Europe S.p.A., Agrate, Italy”, Version 2, 2021-06-11, TÜV Informationstechnik GmbH (confidential document)

[25] “Site Technical Audit Report (STAR) Infineon Technologies AG, Augsburg”, Version 2, 2021-06-24, TÜV Informationstechnik GmbH (confidential document)

[26] “Site Technical Audit Report (STAR) Infineon Technologies Austria AG, Graz”, Version 2, 2021-06-11, TÜV Informationstechnik GmbH (confidential document)

[27] “Site Technical Audit Report (STAR) Infineon Technologies IT Services GmbH, Klagenfurt”, Version 2, 2021-06-11, TÜV Informationstechnik GmbH (confidential document)

[28] “Site Technical Audit Report (STAR) Infineon Technologies Austria AG, Villach”, Version 2, 2021-06-11, TÜV Informationstechnik GmbH (confidential document)

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 detailled 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-1107-V2-2021

Evaluation results regarding development and production environment

The IT product IFX_CCI_00002Dh, IFX_CCI_000039h, IFX_CCI_00003Ah, IFX_CCI_000044h, IFX_CCI_000045h, IFX_CCI_000046h, IFX_CCI_000047h, IFX_CCI_000048h, IFX_CCI_000049h, IFX_CCI_00004Ah, IFX_CCI_00004Bh, IFX_CCI_00004Ch, IFX_CCI_00004Dh, IFX_CCI_00004Eh design step T11 with firmware 80.306.16.0 & 80.306.16.1, optional NRG™ SW 05.03.4097, optional HSL v3.52.9708, UMSLC lib v01.30.0564, optional SCL v2.15.000 and v2.11.003, optional ACL v3.33.003 and v3.02.000, optional RCL v1.10.007, optional HCL v1.13.002 and user guidance (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 7 July 2021, the following results regarding the development and production environment apply. The Common Criteria assurance requirements ALC – Life cycle support (i.e. ALC_CMC.5, ALC_CMS.5, ALC_DEL.1, ALC_DVS.2, ALC_FLR.1, ALC_LCD.1, ALC_TAT.3) are fulfilled for the development and production sites of the TOE.

The Site Technical Audit Reports (STAR) ([24] – [28]) are thus part of this certification procedure.

Besides the production and development sites, the relevant TOE distribution centers are as follows:

Distribution Center name	Address
DHL Singapore	DHL Exel Supply Chain Singapore Pte Ltd., Advanced Regional Center Tampines LogisPark 1 Greenwich Drive Singapore 533865
G&D Neustadt	Giesecke & Devrient Secure Data management GmbH Austraße 101b 96465 Neustadt b. Coburg Germany

Distribution Center name	Address
IFX Morgan Hill	Infineon Technologies North America Corp. 18275 Serene Drive Morgan Hill, CA 95037 USA
KWE Shanghai	KWE Kintetsu World Express (China) Co., Ltd. Shanghai Pudong Airport Pilot Free Trade Zone No. 530 Zheng Ding Road Shanghai, P.R. China
K&N Großostheim	Infineon Technology AG Distribution Center Europe (DCE) Kühne & Nagel Stockstädter Strasse 10 – Building 8A 63762 Großostheim Germany

Table 4: TOE Distribution Centers

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] and [9]) are fulfilled by the procedures of these sites.

Note: End of report