Federal Office
for Information Security

Certification Report

BSI-DSZ-CC-1102-2019

for

Infineon Technologies Security Controller IFX_CCI_001Fh, IFX_CCI_002Fh, IFX_CCI_0030h, IFX_CCI_0033h, IFX_CCI_0035h, IFX_CCI_0036h, IFX_CCI_0038h design step S11 and M11 with optional HSL v2.62.7626, optional SCL version v2.04.003, UMSLC lib v01.00.0234 with specific IC-dedicated firmware identifier 80.304.01.0 and user guidance

from

Infineon Technologies AG

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Bundesamt
für Sicherheit in der
Informationstechnik

Deutsches IT-Sicherheitszertifikat

erteilt vom Bundesamt für Sicherheit in der Informationstechnik

BSI-DSZ-CC-1102-2019 (*)

Infineon Technologies Security Controller IFX_CCI_001Fh, IFX_CCI_002Fh, IFX_CCI_0030h, IFX_CCI_0033h, IFX_CCI_0035h, IFX_CCI_0036h, IFX_CCI_0038h design step S11 and M11 with optional HSL v2.62.7626, optional SCL version v2.04.003, UMSLC lib v01.00.0234 with specific IC-dedicated firmware identifier 80.304.01.0 and user guidance

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 5 augmented by ALC_DVS.2 and AVA_VAN.5

SOGIS
Recognition Agreement

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 4

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, 15 February 2019

For the Federal Office for Information Security

Bernd Kowalski
Head of Division

L.S.

DAkkS
Deutsche
Akkreditierungsstelle
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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 03 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.sogisportal.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 Infineon Technologies Security Controller IFX_CCI_001Fh, IFX_CCI_002Fh, IFX_CCI_0030h, IFX_CCI_0033h, IFX_CCI_0035h, IFX_CCI_0036h, IFX_CCI_0038h design step S11 and M11 with optional HSL v2.62.7626, optional SCL version v2.04.003, UMSLC lib v01.00.0234 with specific IC-dedicated firmware identifier 80.304.01.0 and user guidance has undergone the certification procedure at BSI.

The evaluation of the product Infineon Technologies Security Controller IFX_CCI_001Fh, IFX_CCI_002Fh, IFX_CCI_0030h, IFX_CCI_0033h, IFX_CCI_0035h, IFX_CCI_0036h, IFX_CCI_0038h design step S11 and M11 with optional HSL v2.62.7626, optional SCL version v2.04.003, UMSLC lib v01.00.0234 with specific IC-dedicated firmware identifier 80.304.01.0 and user guidance was conducted by TÜV Informationstechnik GmbH. The evaluation was completed on 8 February 2019. 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 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 15 February 2019 is valid until 14 February 2024. Validity can be re-newed by re-certification.

[5] Information Technology Security Evaluation Facility

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 Infineon Technologies Security Controller IFX_CCI_001Fh, IFX_CCI_002Fh, IFX_CCI_0030h, IFX_CCI_0033h, IFX_CCI_0035h, IFX_CCI_0036h, IFX_CCI_0038h design step S11 and M11 with optional HSL v2.62.7626, optional SCL version v2.04.003, UMSLC lib v01.00.0234 with specific IC-dedicated firmware identifier 80.304.01.0 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 1-12
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 the Smart Card device “Infineon Technologies Security Controller IFX_CCI_001Fh, IFX_CCI_002Fh, IFX_CCI_0030h, IFX_CCI_0033h, IFX_CCI_0035h, IFX_CCI_0036h, IFX_CCI_0038h design step S11 and M11 with optional HSL v2.62.7626, optional SCL version v2.04.003, UMSLC lib v01.00.0234 with specific IC-dedicated firmware identifier 80.304.01.0 and user guidance“.

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 5 augmented by ALC_DVS.2 and AVA_VAN.5.

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:

Infineon Technologies Security Controller IFX_CCI_001Fh, IFX_CCI_002Fh, IFX_CCI_0030h, IFX_CCI_0033h, IFX_CCI_0035h, IFX_CCI_0036h, IFX_CCI_0038h design step S11 and M11 with optional HSL v2.62.7626, optional SCL version v2.04.003, UMSLC lib v01.00.0234 with specific IC-dedicated firmware identifier 80.304.01.0 and user guidance.

The following table outlines the TOE deliverables:

No	Type	Identifier	Release/Version	Form of Delivery
1	HW	IFX_CCI_001Fh, IFX_CCI_002Fh, IFX_CCI_0030h, IFX_CCI_0033h, IFX_CCI_0035h, IFX_CCI_0036h, IFX_CCI_0038h	S11 and M11 (produced in Singapore)	Plain wafers in an IC case or in bare dies.
2	FW	Flash Loader	v8.07.007	Located at the end of User NVM for nonblocked derivatives.
3	FW	BOS	FW identifier: 80.304.01.0	Stored in IFX ROM region on IC (BOS Patch Area in IFX region on NVM).
4	FW	HSL library (optional)	v2.62.7626	Secure download (object code) via ishare. (optional)
5	FW	UMSLC library	v01.00.0234	Secure download (object code) via ishare.
6	FW	SCL library (optional)	v2.04.003	Secure download (object code) via ishare. (optional)
7	DOC	32-bit Security Controller – V15, Hardware Reference Manual [18]	3.2, 2018-09-03	Secured download (PDF) via ishare.
8	DOC	32-bit ARM-based Securtity Controller, SLC 37/40-nm Technology, Programmer's Reference Manual [12]	4.1, 2018-08-08	Secured download (PDF) via ishare.
9	DOC	32-bit Security Controller – V15, Security Guidelines [13]	1.00-1792, 2018-04-24	Secured download (PDF) via ishare.
10	DOC	Production and personalization 32-bit ARM-based security controller [14]	3.4, 2018-05-14	Secured download (PDF) via ishare.

No	Type	Identifier	Release/Version	Form of Delivery
11	DOC	HSL library for SLCx7 in 40nm (optional) [15]	02.62.7626, 2017-12-13	Secured download of compiled html help (chm) file via ishare. (optional)
12	DOC	UMSLC library for SLCx7 in 40nm, v01.00.0234 [16]	V1.1, 2018-05-23	Secured download of compiled html help (chm) file via ishare.
13	DOC	SCL37-uSCP-v3-C40 Symmetric Crypto Library for uSCP-v3 DES/AES [17]	2.04.003, 2018-05-22	Secured download (PDF) via ishare. (optional)

Table 2: Deliverables of the TOE

The individual TOE hardware is uniquely identified by its identification data.

As the TOE is under control of the user software, the TOE manufacturer can only guarantee the integrity up to the delivery procedure. It is in the responsibility of the composite product manufacturer to include mechanisms in the implemented software (developed by the IC embedded software developer) which allows detection of modifications after the delivery.

In detail, regarding identification:

The hardware part of the TOE is identified by its Common Criteria Identifiers (CCI) IFX_CCI_001Fh, IFX_CCI_002Fh, IFX_CCI_0030h, IFX_CCI_0033h, IFX_CCI_0035h, IFX_CCI_0036h, IFX_CCI_0038h and the design steps S11 and M11. The complete chip identification data is accessible via the Generic Chip Identification Mode (GCIM).

The Generic Chip Identification Mode (GCIM) can be activated after power-on with a dedicated signalling sequence and is also accessible by the user software. This GCIM outputs amongst other identifiers for the platform, chip mode, ROM code, chip type, design step, fabrication facility, wafer, die position, firmware, temperature range, system frequency and the CCI. The interpretation of the chip identification data is described in [18], section 4.6.2.

Additionally, the customer can identify the present configuration by reading the relevant data in the IFX-Mailbox Area (see [12], section 7.9).

Several bytes of the GCIM include the Common Criteria Certification Identifier, which can be used to uniquely identify the certified TOE. These identifiers reflect the name of the TOE as given in the ST. Note, that these identifiers are used by the developer only for this TOE and reflect the same underlying basic hardware.

In addition to the hardware part, the TOE consists of firmware parts and software parts:

The firmware part of the TOE is identified also via the GCIM. The versions for the individual firmware parts can be mapped as well as the hardware.

The SCL (optional), UMSLC and HSL library (optional), as separate software parts of the TOE, are identified by their unique version numbers. The user can identify these versions by calculating the hash signatures of the provided library files. The mapping of these hash signatures to the version numbers is provided in [6] and [9], sections 9–11.

In detail, regarding delivery:

“TOE Delivery” is uniquely used to indicate

- after Phase 3 (or before Phase 4) if the TOE is delivered in form of wafers or sawn wafers (dice) or
- after Phase 4 (or before Phase 5) if the TOE is delivered in form of packaged products.

Therefore three different delivering 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-personalization data, Bundle Business package) 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).

The TOE is delivered via the logistics sites:

- DHL Singapore (Distribution Center Asia),
- G&D Neustadt,
- K&N Großostheim (Distribution Center Europe).

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 a True Random Number Generator (TRNG).

The optional SCL provides TDES and AES cryptography, which is partly implemented on the hardware component µSCP and includes countermeasures against SPA, DPA and DFA attacks. The SCL is delivered as object code and in this way integrated into the user software.

The optional HSL provides functionality via APIs to the Smartcard Embedded Software, which contains SOLID FLASH™ NVM service routines and functionality for tearing-safe programming of SOLID FLASH™ NVM.

The UMSLC library provides a wrapper around the UMSLC hardware functionality with some software measures to counter fault attacks.

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 and Triple-DES 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 Chapter 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 TOE environment, the user or the risk manager. The following topics are of relevance:

The ST only includes one security objective for the IC Embedded Software Developer, the objective OE.Resp-Appl.

The objective OE.Resp-Appl states that the IC Embedded Software Developer shall treat user data (especially keys) appropriately. The IC Embedded Software Developer gets sufficient information on how to protect user data adequate in the security guidelines [13].

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 and OE.TOE_Auth.

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 [14], section 4.2.2.

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. [PPM, 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 [14], section 4.5.1.3. 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

Detailed information in the TOE architecture is to be found in [6] and [9] 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

The developers' testing effort can be summarised in the way described in the following:

TOE test configuration: The tests are performed with the TOE and a simulator.

Developer's testing: All TSFs and related security mechanisms, subsystems and modules are tested in order to assure complete coverage of all SFRs.

Different classes of developer tests are performed to test the TOE in a sufficient manner:

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

The evaluator's testing effort can be summarised in the way described in the following:

The evaluator's objective regarding this aspect was to test the functionality of the TOE, and to verify the developer's test results by repeating developer's tests and to add independent tests.

In the course of the evaluation of the TOE the following classes of tests were carried out:

- Module tests,
- Simulation tests,
- Emulation tests,
- Tests in user mode,
- Tests in test mode,
- Hardware tests.

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

The penetration testing was partially performed using the developer's testing environment, partially using the test environment of the evaluation body.

All configurations of the TOE being intended to be covered by the current evaluation were tested.

The overall test result is that no deviations were found between the expected and the actual test results; moreover, no attack scenario with the attack potential high was actually successful.

8. Evaluated Configuration

This certification covers the following configurations of the TOE:

- Smartcard IC IFX_CCI_001Fh, IFX_CCI_002Fh, IFX_CCI_0030h, IFX_CCI_0033h, IFX_CCI_0035h, IFX_CCI_0036h, IFX_CCI_0038h S11 and M11 (Singapore).

Hardware configuration:

The hardware of the TOE can be ordered with different SOLID FLASHTM and RAM sizes (up to 240 kBytes SOLID FLASH™ and up to 12 kBytes RAM). The configuration (as listed in [6] and [9] (table 3) can be done during the manufacturing process of the TOE according to the choice of the user.

Firmware configuration:

The firmware of the TOE comprises the BOS (FW identifier provided in Table 5) and the Flash Loader (version provided in Table 5). The latter can be configured in three different ways as outlined in the following:

- Option 1: The user or/and a subcontractor downloads the software into the SOLID FLASH™ memory. Infineon Technologies does not receive any user software.
  - Flash Loader can be activated or reactivated by the user or subcontractor to download software into the SOLID FLASH™ memory.
- Option 2: The user provides software to download into the SOLID FLASH™ memory to Infineon Technologies AG. The software is loaded into the SOLID FLASH™ memory during chip production.
  - No Flash Loader present.
- Option 3: The user provides software to download into the SOLID FLASH™ memory to Infineon Technologies AG. The software is loaded into the NVM memory during chip production.
  - Flash Loader is blocked by Infineon but can be activated or reactivated by the user or subcontractor to download software into the SOLID FLASH™ memory. The user is required to provide a reactivation procedure as part of the software to Infineon Technologies AG.

An overview about the different Flash Loader options is also given in [6] and [9] (section 1.4.8).

Optional Software libraries:

The optional software libraries listed in table 2 can be combined according to the demands of the user. Based on the library selection the TOE can be delivered with or without the functionality of the HSL and/or SCL library. This is considered in the developer documentation and corresponding notes are added where required.

If the user decides not to use the HSL and/or SCL library, it is not delivered to the user and the accompanying additional specific security functionality is not provided by the TOE. Upon deselection of a library, the code implementing the functionality is excluded and thus this functionality is not available to the user.

Excluding the code of the deselected functionality has no impact on any other security policy of the TOE; it is exactly equivalent to the situation where the user decides just not to use this functionality.

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,
- 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,
- 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,
- Anwendungshinweise und Interpretationen zum Schema (AIS) – AIS 20, Funktionalitätsklassen und Evaluationsmethodologie für deterministische Zufallszahlengeneratoren, Version 3, 2013-05-15,
- Anwendungshinweise und Interpretationen zum Schema (AIS) – AIS 23, Zusammentragen von Nachweisen der Entwickler, Version 4, 2017-03-15,
- Application Notes and Interpretation of the Scheme (AIS) – AIS 25, Anwendungen der CC auf integrierte Schaltungen, Version 9, 2017-03-15,
- Anwendungshinweise und Interpretationen zum Schema (AIS) – AIS 26, Evaluationsmethodologie für in Hardware integrierte Schaltungen, Version 10, 2017-07-03,
- Special Attack Methods for Smartcards and Similar Devices, Version 1.4, 2011-06-08,
- Anwendungshinweise und Interpretationen zum Schema (AIS) – AIS 31, Funktionalitätsklassen und Evaluationsmethodologie für physikalische Zufallszahlengeneratoren, Version 3, 2013-05-15,
- Anwendungshinweise und Interpretationen zum Schema (AIS) – AIS 32, CC-Interpretationen im deutschen Zertifizierungsschema, Version 7, 2011-06-08,

- 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,
- Anwendungshinweise und Interpretationen zum Schema (AIS) – AIS 35, Öffentliche Fassung eines Security Target (ST-lite), Version 2, 2007-11-12,
- Anwendungshinweise und Interpretationen zum Schema (AIS) – AIS 36, Kompositionsevaluierung, Version 5, 2017-03-15,
- Anwendungshinweise und Interpretationen zum Schema (AIS) – AIS 37, Terminologie und Vorbereitung von Smartcard-Evaluierungen, Version 3, 2010-05-17,
- Application Notes and Interpretation of the Scheme (AIS) – AIS 38, Reuse of evaluation results, Version 2, 2007-09-28,
- Application Notes and Interpretation of the Scheme (AIS), AIS 41, Guidelines for PPs and STs, Version 2, 2011-01-31,
- 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,
- Anwendungshinweise und Interpretationen zum Schema (AIS) - AIS 47, Regelungen zu Site Certification, Version 1.1, 2013-12-04

are considered.

Additionally, the respective CC Supporting Mandatory Technical Documents are considered.

For RNG assessment the scheme interpretations AIS 20/31 was used (see [4]).

To support composite evaluations according to AIS 36 the document ETR for composite evaluation [10] was provided and approved. This document provides details of this platform evaluation that have to be considered in the course of a composite evaluation on top.

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 5 package including the class ASE as defined in the CC (see also part C of this report)

- The components ALC_DVS.2 and AVA_VAN.5 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 5 augmented by ALC_DVS.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.

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 gives 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	**Cryptographic Mechanism**	**Standard of Implementation**	**Key Size in Bits**	**Security Level above 100 Bits**
Cryptographic Primitive	TDES in modes ECB, CBC, CFB and CTR CMAC	[NIST SP 800-67] [NIST SP 800-38A] [NIST SP 800-38B]	All modes: |k| = 112, 168	CBC, CFB, CTR, CMAC: 168: Yes, 112: No ECB: 168, 112: No
	AES in modes ECB, CBC, CFB and CTR CMAC	[FIPS197] [NIST SP 800-38A] [NIST SP 800-38B]	All modes: |k| = 128, 192, 256	CBC, CFB, CTR, CMAC: 128, 192, 256: Yes ECB: 128, 192, 256: No
	Physical True RNG PTG.2	[AIS31] (proprietary)	N/A	N/A

Table 3: TOE cryptographic functionality

The Flash Loader's and the ICS' (internal ciphering system, see [6] and [9]) cryptographic strength was not assessed by BSI. However, the evaluation according to the TOE's Evaluation Assurance Level did not reveal any implementation weaknesses.

Please note, that this holds true also for those algorithms, where no cryptographic 100-Bit-Level assessment was given. Consequently, the targeted Common Criteria Evaluation Assurance Level has been achieved for those functionalities as well.

Detailed results on conformance have been compiled into the report [19].

Reference of Legislatives and Standards quoted above:

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

[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 SP 800-38B] NIST Special Publication 800-38B, Recommendation for Block Cipher Modes of Operation: the CMAC Mode for Authentication, 2005-05, National Institute of Standards and Technology (NIST), Technology Administration, U.S. Department of Commerce.

[FIPS197] Federal Information Processing Standards Publication 197, ADVANCED ENCRYPTION STANDARD (AES), November 2001, U.S. department of Commerce / National Institute of Standards and Technology (NIST).

[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.

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.

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 [12]-[13] and [15]-[18] (also listed in Table 2) 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 [14] have to be considered.

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

- The IC Embedded Software Developer can deliver his software either to Infineon to let them implement it in the TOE (in Flash memory) or to the Composite Product Manufacturer to let him download the software in the Flash memory.
- The delivery procedure from the IC Embedded Software Developer to the Composite Product Manufacturer is not part of this evaluation and a secure delivery is required.

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. Definitions

12.1. 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

12.2. 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.

13. 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-1102-2019, Version 1.7, 2018-12-12, "IFX_CCI_001Fh, IFX_CCI_002Fh, IFX_CCI_0030h, IFX_CCI_0033h, IFX_CCI_0035h, IFX_CCI_0036h, IFX_CCI_0038h S11 and M11 Security Target", Infineon Technologies AG (confidential document)

[7] Evaluation Technical Report, Version, v3, 2019-02-04, "EVALUATION TECHNICAL REPORT SUMMARY (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 for BSI-DSZ-CC-1102-2019, Version 1.7, 2018-12-12, "IFX_CCI_001Fh, IFX_CCI_002Fh, IFX_CCI_0030h, IFX_CCI_0033h, IFX_CCI_0035h, IFX_CCI_0036h, IFX_CCI_0038h S11 and M11 Security Target Lite", Infineon Technologies AG (sanitised public document)

[10] ETR for composite evaluation according to AIS 36 for BSI-DSZ-CC-1102-2019, Version 3, 2019-02-04, "EVALUATION TECHNICAL REPORT FOR COMPOSITE EVALUATION (ETR COMP)", TÜV Informationstechnik GmbH (confidential document)

[11] Configuration list for the TOE, Version 1.1, 2018-10-12, "Configuration Management Scope" (confidential document)

[12] "32-bit ARM-based Securtity Controller, SLC 37/40-nm Technology, Programmer's Reference Manual", v4.1, 2018-08-08, Infineon Technologies AG

[13] "32-bit Security Controller – V15, Security Guidelines", v1.00-1792, 2018-04-24, Infineon Technologies AG

[14] "Production and personalization 32-bit ARM-based security controller", v3.4, 2018-05-14, Infineon Technologies AG

[15] "HSL library for SLCx7 in 40nm", v02.62.7626, 2017-12-13, Infineon Technologies AG

[16] "UMSLC library for SLCx7 in 40nm, Version 01.00.0234", V1.1, 2018-05-23, Infineon Technologies AG

[17] "SCL37-uSCP-v3-C40 Symmetric Crypto Library for uSCP-v3 DES/AES", v2.04.003, 2018-05-22, Infineon Technologies AG

[7] See section 9.1 for detailed list of used AIS

[18] “32-bit Security Controller –V15 Controller, Hardware Reference Manual”, v3.2, 2018-09-03, Infineon Technologies AG

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-1102-2019

Evaluation results regarding development and production environment

The IT product Infineon Technologies Security Controller IFX_CCI_001Fh, IFX_CCI_002Fh, IFX_CCI_0030h, IFX_CCI_0033h, IFX_CCI_0035h, IFX_CCI_0036h, IFX_CCI_0038h design step S11 and M11 with optional HSL v2.62.7626, optional SCL version v2.04.003, UMSLC lib v01.00.0234 with specific IC-dedicated firmware identifier 80.304.01.0 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 15 February 2019, 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.5, ALC_DEL.1, ALC_DVS.2, ALC_LCD.1, ALC_TAT.2)

are fulfilled for the development and production sites of the TOE.

The relevant delivery sites are as follows:

Site ID	Company name and address
DHL Singapore	DHL Exel Supply Chain Richland Business Centre 11 Bedok North Ave 4, Level 3, Singapore 489949
G&D Neustadt	Giesecke & Devrient Secure Data Management GmbH Austraße 101b 96465 Neustadt bei Coburg Germany
K&N Großostheim	Kühne & Nagel Stockstädter Strasse 10 – Building 8A 63762 Großostheim Germany

Table 4: TOE Delivery / Distribution Sites

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