

# Certification Report

**BSI-DSZ-CC-0791-2012**

for

**Infineon smart card IC (Security Controller) M9900  
A21 with specific IC dedicated software**

from

**Infineon Technologies AG**

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# Deutsches IT-Sicherheitszertifikat

erteilt vom



Bundesamt für Sicherheit in der Informationstechnik

## BSI-DSZ-CC-0791-2012

### Infineon smart card IC (Security Controller) M9900 A21 with specific IC dedicated software

from Infineon Technologies AG

PP Conformance: Security IC Platform Protection Profile, Version 1.0, 15 June 2007, BSI-CC-PP-0035-2007

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



Common Criteria  
Recognition  
Arrangement  
for components up to  
EAL 4



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 advice of the Certification Body for components beyond EAL 5 and guidance specific for the technology of the product for conformance to the Common Criteria for IT Security Evaluation (CC), Version 3.1.

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.

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

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

Bonn, 21 August 2012

For the Federal Office for Information Security

Bernd Kowalski  
Head of Department

L.S.



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## Preliminary Remarks

Under the BSIG<sup>1</sup> Act, the Federal Office for Information Security (BSI) has the task of issuing certificates for information technology products.

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

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

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

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

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

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

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## A Certification

### 1 Specifications of the Certification Procedure

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

- BSIG<sup>2</sup>
- BSI Certification Ordinance<sup>3</sup>
- BSI Schedule of Costs<sup>4</sup>
- Special decrees issued by the Bundesministerium des Innern (Federal Ministry of the Interior)
- DIN EN 45011 standard
- BSI certification: Procedural Description (BSI 7125) [3]
- Common Criteria for IT Security Evaluation (CC), Version 3.1<sup>5</sup> [1]
- Common Methodology for IT Security Evaluation, Version 3.1 [2]
- BSI certification: Application Notes and Interpretation of the Scheme (AIS) [4]

### 2 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.

#### 2.1 European Recognition of ITSEC/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 technical domains only.

The basic recognition level includes Common Criteria (CC) Evaluation Assurance Levels EAL1 to EAL4 and ITSEC Evaluation Assurance Levels E1 to E3 (basic). For higher recognition levels the technical domain Smart card and similar Devices has been defined. It includes assurance levels beyond EAL4 resp. E3 (basic). In Addition, certificates issued for Protection Profiles based on Common Criteria are part of the recognition agreement.

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<sup>2</sup> Act on the Federal Office for Information Security (BSI-Gesetz - BSIG) of 14 August 2009, Bundesgesetzblatt I p. 2821

<sup>3</sup> Ordinance on the Procedure for Issuance of a Certificate by the Federal Office for Information Security (BSI-Zertifizierungsverordnung, BSIZertV) of 07 July 1992, Bundesgesetzblatt I p. 1230

<sup>4</sup> 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

<sup>5</sup> Proclamation of the Bundesministerium des Innern of 12 February 2007 in the Bundesanzeiger dated 23 February 2007, p. 3730

As of September 2011 the new agreement has been signed by the national bodies of Austria, Finland, France, Germany, Italy, The Netherlands, Norway, Spain, Sweden and the United Kingdom. Details on recognition and the history of the agreement can be found at <https://www.bsi.bund.de/zertifizierung>.

The SOGIS-MRA logo printed on the certificate indicates that it is recognised under the terms of this agreement by the nations listed above.

## 2.2 International Recognition of CC – Certificates (CCRA)

An arrangement (Common Criteria Recognition Arrangement) on the mutual recognition of certificates based on the CC Evaluation Assurance Levels up to and including EAL 4 has been signed in May 2000 (CCRA). It includes also the recognition of Protection Profiles based on the CC.

As of September 2011 the arrangement has been signed by the national bodies of: Australia, Austria, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, India, Israel, Italy, Japan, Republic of Korea, Malaysia, The Netherlands, New Zealand, Norway, Pakistan, Republic of Singapore, Spain, Sweden, Turkey, United Kingdom, United States of America. The current list of signatory nations and approved certification schemes can be seen on the website: <http://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 nations listed above.

This evaluation contains the components ALC\_DVS.2 and AVA\_VAN.5 that are not mutually recognised in accordance with the provisions of the CCRA. For mutual recognition the EAL4 components of these assurance families are relevant.

## 3 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 smart card IC (Security Controller) M9900 A21 with specific IC dedicated software, has undergone the certification procedure at BSI.

The evaluation of the product Infineon smart card IC (Security Controller) M9900 A21 with specific IC dedicated software, was conducted by TÜV Informationstechnik GmbH. The evaluation was completed on 13 August 2012. The TÜV Informationstechnik GmbH is an evaluation facility (ITSEF)<sup>6</sup> 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.

## 4 Validity of the Certification Result

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

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<sup>6</sup> Information Technology Security Evaluation Facility



- 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 levels please refer to the excerpts from the criteria at the end of the Certification 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-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 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.

## 5 Publication

The product Infineon smart card IC (Security Controller) M9900 A21 with specific IC dedicated software has been included in the BSI list of certified products, which is published regularly (see also Internet: <https://www.bsi.bund.de> and [5]). Further information can be obtained from BSI-Infoline +49 228 9582-111.

Further copies of this Certification Report can be requested from the developer<sup>7</sup> of the product. The Certification Report may also be obtained in electronic form at the internet address stated above.

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<sup>7</sup> Infineon Technologies AG  
Alter Postweg 101  
86159 Augsburg

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## **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 **Infineon smart card IC (Security Controller) M9900 A21 with specific IC dedicated software**. The TOE provides a real 32-bit CPU-architecture and is compatible to the ARMv7-M instruction set architecture. The major components of the core system are the 32-bit CPU as a variant of the ARM Secure Core SC300, the Cache system, the Memory Protection Unit and the Memory Encryption/Decryption Unit. The TOE implements a full 32-bit addressing with up to 4 GByte linear addressable memory space, a simple scalable memory management concept and a scalable stack size. The flexible memory concept is built on the non volatile memory, respectively SOLID FLASH<sup>8</sup>. The TOE consists of a core system, memories, co-processors, security peripherals, control logic and peripherals. The major components of the core system are the 32-bit CPU (Central Processing Unit), the MPU (Memory Protection Unit), the MED (Memory Encryption/Decryption Unit), the Nested Vectored Interrupt Controller (NVIC), the Instruction Stream Signature Checking (ISS) and the Cache system. The TOE contains the co-processors for RSA/EC (Crypto2304T) and DES/AES (SCP) processing, a CRC module and the peripherals random number generator, four timers and two watchdog timers and several external interface services. All data of the memory block is encrypted, RAM and ROM are equipped with an error detection code (EDC) and the SOLID FLASH<sup>TM</sup> is equipped in addition with an error correction code (ECC).

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. Additionally an optional external Flash-memory (EXF) connected via the SSC/GPIO interfaces is available. The data stored in the external Flash-memory are not protected as the external Flash-memory is not part of the security functional requirements (SFR) of the TOE and not in the scope of the evaluation.

The TOE offer a wide range of peripherals, including a UART (using the ISO interface), four timers, two watchdogs, a CRC module, a true RNG (TRNG), coprocessors for symmetric (e.g. DES, AES) and asymmetric (e.g. RSA, EC) cryptographic algorithms. Additionally a range of communication interfaces, such as GPIO, I2C, SWP, USB, SSC/SPI and a Mifare-compatible Interface are offered. The RSA and EC crypto software are not part of the TOE.

The Smartcard Embedded Software, RSA and EC crypto library are not part of the TOE. For more details please refer to [7, chapter 2.1].

The TOE is able to communicate using the contact based interfaces. The five ISO 7816 pads consist particularly of the contacted RES, I/O, CLK lines and supply lines VCC and GND. The contact based communication is according to ISO 7816/ETSI/EMV. The I2C communication can be driven via the ISO 7816 pads. In this case no other communication using the ISO 7816 pads is possible. The GPIO interface consists of 4 pads which can be individually configured and combined in various ways. Also the I2C and the SSC/SPI communication can be exclusively driven via the GPIO pads. In this case no other communication using the GPIO pads is possible. The USB interface is build out of two dedicated pads for data communication and two pads used from the ISO 7816 interface supplying power and ground. The SWP interface is build out of one pad to support the

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<sup>8</sup> SOLID FLASH<sup>TM</sup> is an Infineon Trade Mark and stands for Flash EEPROM technology.

SWP slave functionality. The data-oriented I/O interface to the TOE is formed by the I/O pad. For more details please refer to [6] and [7], chapter 1.2.3.

This TOE is intended to be used in smart cards for particularly security relevant applications and for its previous use as developing platform for smart card operating systems according to the life cycle model from [8].

The symmetric co-processor (SCP) combines both AES and Triple-DES with dual-key or triple-key hardware acceleration. The Asymmetric Crypto Co-processor, called Crypto2304T in the following, supports RSA-2048 bit (4096-bit with CRT) and Elliptic Curve (EC) cryptography with high performance.

The entire firmware and software of the TOE consists of different parts: One part comprises the RMS routines for SOLID FLASH programming and security functions test (Resource Management System, IC Dedicated Support Software in PP [8]). The RMS routines are stored in the ROM. The second part is the BOS, consisting of test and initialization routines (Boot System, IC Dedicated Test Software in PP [8]). The BOS routines are stored in the especially protected test ROM and are not accessible for the user software. The third part is the Flash Loader, a piece of software located in the ROM and allowing downloading the user software or parts of it to the SOLID FLASH memory. After completion of the download the Flash Loader can be permanently deactivated by the user. The fourth part is the Mifare compatible Interface routines called via RMS routines if the Mifare compatible interface option is active. Note that the Mifare compatible Interface portion is always present but deactivated in case of the non Mifare compatible Interface derivatives. Thus the user interface is identically in both cases and subsequently the Mifare compatible Interface routines can be called in each of the derivatives. In case Mifare compatible Interface routines are called in derivatives without Mifare compatible Interface a dedicated error code is returned and in case of the Mifare compatible Interface derivative the according function is performed. For more details please refer to the Security Target [6] and [7], chapter 2.2.2.

The Security Target [6] is the basis for this certification. It is based on the certified Protection Profile Security IC Platform Protection Profile, Version 1.0, 15 June 2007, BSI-CC-PP-0035-2007 [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 [7], chapter 7. 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 Features:

TOE Security Features	Addressed issue
SF_DPM	Device Phase Management
SF_PS	Protection against Snooping
SF_PMA	Protection against Modification 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 Security Target Lite [7], chapter 8.

The assets to be protected by the TOE are defined in the Security Target [6] and Security Target Lite [7], chapter 4.1.2. Based on these assets the TOE Security Environment is defined in terms of Assumptions, Threats and Organisational Security Policies. This is outlined in the Security Target [7] chapter 4.2.

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 smart card IC (Security Controller) M9900 A21 with specific IC dedicated software**

The following table outlines the TOE deliverables:

No	Type	Identifier	Release	Form of delivery
1	HW	M9900 Smart Card IC	A21 (produced in Dresden)	Complete modules, with or without inlay antenna mounting, in form of plain wafers, in an IC case or in bare dies.
2	FW	Flash Loader	FW Identifier 80 00 11 40	Stored in reserved area of User ROM on the IC
3	FW	BOS Boot System (the IC Dedicated Test Software)	FW Identifier 80 00 11 40	Stored in Test ROM on the IC
4	FW	RMS Resource Management System (the IC Dedicated Support Software)	FW Identifier 80 00 11 40	Stored in reserved area of User ROM on the IC (patch in NVM)
5	FW	Mifare-compatible Interface routines (optional)	FW Identifier 80 00 11 40	Stored in reserved area of User ROM on the IC
6	SW <sup>9</sup>	NVM image (including Embedded Software)	–	Stored in Flash memory on the IC

<sup>9</sup> Only in case the IC Embedded Software Developer provides Infineon with code for Flash memory.

No	Type	Identifier	Release	Form of delivery
7	DOC	<i>SLE 97 32-bit Security Controller Family based on SC300™ in 90 nm CMOS Technology M9900 Solid Flash™ Controller for HD-SIM Applications Hardware Reference Manual</i>	2012-03-26	Hardcopy or pdf-file
8	DOC	M9900 Errata Sheet	2012-05-09	Hardcopy or pdf-file
9	DOC	M9900 Security Guidelines User's Manual	2012-07-31	Hardcopy or pdf-file
10	DOC	<i>SLE 97 Flash Controller Family Programmer's Reference User's Manual</i>	2012-05-24	Hardcopy and pdf-file
11	DOC	<i>ARMv7-M Architecture Reference Manual</i>	2010-02-12	Hardcopy and pdf-file
12	DOC	<i>SLE 97 /SLC 14 Family Production and Personalization User's Manual</i>	2012-05-10	Hardcopy and pdf-file

Table 2: Deliverables of the TOE

A processing step during production testing incorporates the chip-individual features into the hardware of the TOE. The individual TOE hardware is uniquely identified by its serial number. The serial number comprises the lot number, the wafer number and the coordinates of the chip on the wafer. Each individual TOE can therefore be traced unambiguously and thus assigned to the entire development and production process.

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.

The hardware part of the TOE is identified by M9900 A21. Another characteristic of the TOE are the chip identification data. These chip identification data is accessible via the Generic Chip Identification Mode (GCIM). This GCIM outputs amongst other identifiers for the platform, chip mode, ROM code, chip type, design step, fabrication facility, wafer, die position, and firmware. Thereby, the exact and clear identification of any product with its exact configuration of this TOE is given. Additionally, dedicated RMS functions allow a customer to extract the present hardware configuration and the original Chip Identifier Byte, which was valid before blocking.

For the version number of firmware and software parts of the TOE refer to table 2.

### 3 Security Policy

The Security Policy is expressed by the set of Security Functional Requirements and implemented by the TOE.

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 TOE includes countermeasures against SPA, DPA and DFA 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, 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.

## 4 Assumptions and Clarification of Scope

The Assumptions defined in the Security Target and some aspects of Threats and Organisational Security Policies are not covered by the TOE itself. These aspects lead to specific security objectives to be fulfilled by the TOE-Environment. The following topics are of relevance: protection during packaging, finishing and personalization, usage of hardware platform and treatment of user data.

The augmented organizational security policy P.Add-Functions, derived from the additional security functionality of the cryptographic libraries, the augmented assumption A.Key-Function, related to the usage of key-dependent functions, and the threat of memory access violation T.Mem-Access, due to specific TOE memory access control functionality, have been added. Details can be found in the Security Target [6] and Security Target Lite [7], chapter 3.4 and 4.3.

## 5 Architectural Information

The TOE is an integrated circuits (IC) providing a platform to a smart card operating system and smart card application software. A top level block diagram and a list of subsystems can be found within the TOE description of the Security Target Lite [7], chapter 2.1.

The TOE provides a real 32-bit CPU-architecture and is compatible to the ARMv7-M instruction set architecture. The major components of the core system are the 32-bit CPU as a variant of the ARM Secure Core SC300, the Cache system, the Memory Protection Unit and the Memory Encryption/Decryption Unit. The TOE implements a full 32-bit addressing with up to 4 GByte linear addressable memory space, a simple scalable memory management concept and a scalable stack size. The flexible memory concept is built on the non volatile memory, respectively SOLID FLASH.

The symmetric coprocessor (SCP) combines both AES and triple DES with dual-key or triple-key hardware acceleration.

The BOS (Boot Software) and the RMS (Resource Management System) compose the TOE firmware stored in the ROM and the patches hereof in the SOLID FLASH™. All mandatory functions for start-up and internal testing (BOS) are protected by a dedicated



hardware firewall. Additionally two levels are provided, the privileged level and the user level, both are protected by a hardwired Memory Protection Unit (MPU) setting. The RMS is accessible in privileged level only. The FL (Flash Loader) and the Mifare-compatible software compose the TOE software stored in the SOLID FLASH™. The FL allows downloading of user software to the NVM during the manufacturing process and can be completely deactivated. The Mifare-compatible software includes support for the Mifare-compatible card as well as support to ease the implementation of the reader functionality.

For more details please refer to the Security Target Lite [7], chapter 1.2 and 2.2.2.

## 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 tests performed by the developer were divided into six categories:

1. Technology development tests as the earliest tests to check the technology against the specification and to get the technology parameters used in simulations of the circuitry (this testing is not strictly related to Security Functionalities);
2. Tests which are performed in a simulation environment with different tools for the analogue circuitries and for the digital parts of the TOE;
3. Regression tests of the hardware within a simulation environment based on special software dedicated only for the regression tests;
4. Regression tests which are performed for the IC Dedicated Test Software and for the IC Dedicated Support Software on emulator versions of the TOE and within a software simulation of chip in special hardware;
5. Characterisation and verification tests to release the TOE to production:
  - a) used to determine the behaviour of the chip with respect to different operating conditions and varied process parameters (often also referred to as characterisation tests);
  - b) special verification tests for Security Functionalities which were done with samples of the TOE (referred also as developers security evaluation) and which include also layout tests by automatic means and optical control, in order to verify statements concerning the layout;
6. Functional production tests, which are done for every chip to check its correct functionality as a last step of the production process (phase 3).

The developer tests cover all security functionalities and all security mechanisms as identified in the functional specification.

The evaluators were able to repeat the tests of the developer either using the library of programs, tools and prepared chip samples delivered to the evaluator or at the developers site. They performed independent tests to supplement, augment and to verify the tests

performed by the developer. The tests of the developer were repeated by sampling, by repetition of complete regression tests and by software routines developed by the evaluators and computed on samples with an evaluation operating system. For the developer tests repeated by the evaluators other test parameters were used and the test equipment was varied. Security features of the TOE realised by specific design and layout measures were checked by the evaluators during layout inspections both in design data and on the final product.

The evaluation has shown that the actual version of the TOE provides the security functionalities as specified by the developer. The test results confirm the correct implementation of the TOE security functionalities.

For penetration testing the evaluators took all security functionalities into consideration. Intensive penetration testing was planned based on the analysis results and performed for the underlying mechanisms of security functionalities using bespoke equipment and expert know how. The penetration tests considered both the physical tampering of the TOE and attacks which do not modify the TOE physically. The penetration tests results confirm that the TOE is resistant to attackers with high attack potential in the intended environment for the TOE.

## 8 Evaluated Configuration

This certification covers the following configurations of the TOE:

- Smartcard IC M9900 A21.

Type	Name	Version number / patch
Hardware	M9900 A21	Development code A12
Firmware	FW Identifier including RMS, RMS patch, BOS, FL, Mifare	80 00 11 40

Table 3: Identification of the TOE

This TOE is represented by various configurations called products, which are all derived from the equal hardware design M9900. The same mask is used to produce different products of the TOE. The first metal mask (called the M1 mask) contains the specific information to identify the TOE. The M9900 product offers different configuration options, which a customer can choose. The mechanism to choose a configuration can be done by the following methods:

- by product selection or dialog-based in Tools,
- via Bill-per-Use (BPU) and Flash Loader (FL).

The degree of freedom for configuring the TOE is predefined by Infineon Technologies AG. The list of predefined TOE configurations is given in the Hardware Reference Manual [13], chapter 18.

All these possible TOE configurations equal and/or within the specified ranges are covered by the certificate. Beside fix TOE configurations, which can be ordered as usual, this TOE implements optionally the so called Bill-Per-Use (BPU) ability. This solution enables the customer to tailor the product on his own to the required configuration by blocking parts of

the chip on demand into the final configuration at his own premises, without further delivery or involving support by Infineon Technology AG. Customers, who are intended to use this feature receiving the TOE in a predefined configuration including the Flash Loader software, enhanced with the BPU blocking software. The blocking information is part of a chip configuration area and can be modified by customers using specific APDUs. Once a final blocking is done, further modifications are disabled. The BPU software part is only present on the products which have been ordered with the BPU option. In all other cases this software is not present on the product. For more details please refer to the Security Target Lite [7], chapter 2.2.7 and 2.2.8.

## 9 Results of the Evaluation

### 9.1 CC specific results

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

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

The following guidance specific for the technology was used:

- The Application of CC to Integrated Circuits
- The Application of Attack Potential to Smartcards
- Functionality classes and evaluation methodology of physical random number generators

(see [4], AIS 25, AIS 26, AIS 31).

TRNG assessment the scheme interpretations AIS 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, Version 1.0, 15 June 2007, BSI-CC-PP-0035-2007 [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 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). This holds for: SF\_CS (Cryptographic Support).

The following cryptographic algorithms are used by the TOE to enforce its security policy:

- algorithms for the encryption and decryption: 3DES, AES

The strength of the cryptographic algorithms was not rated in the course of the product certification (see BSIG Section 9, Para. 4, Clause 2). But Cryptographic Functionalities with a security level of 80 bits or lower can no longer be regarded as secure against attacks with high attack potential without considering the application context. Therefore for these functions 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' ([www.bsi.bund.de](http://www.bsi.bund.de)).

The Cryptographic Functionalities 2-key Triple DES (3DES) provided by the TOE achieves a security level of maximum 80 Bits (in general context).

## 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 for 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.

Some security measures are partly implemented in the hardware and require additional configuration or control or measures to be implemented by the IC Dedicated Support Software or Embedded Software.

For this reason the TOE includes guidance documentation (see table 2) which contains guidelines for the developer of the IC Dedicated Support Software and Embedded Software on how to securely use the microcontroller chip and which measures have to be implemented in the software 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 software. 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].

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

- All security hints described in the delivered documents [12] to [16] especially the recommendations for secure usage in [12] 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 [17] have to be considered.

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

## 12 Definitions

### 12.1 Acronyms

<b>AES</b>	Advanced Encryption Standard
<b>AIS31</b>	“Anwendungshinweise und Interpretationen zu ITSEC und CC Funktionalitätsklassen und Evaluationsmethodologie für physikalische Zufallszahlengeneratoren”
<b>ANA</b>	Analog Units
<b>APB™</b>	Advanced Peripheral Bus
<b>APDU</b>	Application Protocol Data Unit
<b>API</b>	Application Programming Interface
<b>AXI™</b>	Advanced eXtensible Interface Bus Protocol
<b>BPU</b>	Bill Per Use
<b>BSI</b>	Bundesamt für Sicherheit in der Informationstechnik / Federal Office for Information Security, Bonn, Germany
<b>BOS</b>	Boot System
<b>BSIG</b>	BSI-Gesetz / Act on the Federal Office for Information Security

<b>CC</b>	Common Criteria for IT Security Evaluation
<b>CEM</b>	Common Methodology for Information Technology Security Evaluation
<b>CI</b>	Chip Identification Mode (STS-CI)
<b>CIM</b>	Chip Identification Mode (STS-CI), same as CI
<b>CPU</b>	Central Processing Unit
<b>CCRA</b>	Common Criteria Recognition Arrangement
<b>Crypto2304T</b>	Asymmetric Cryptographic Processor
<b>CRC</b>	Cyclic Redundancy Check
<b>CRT</b>	Chinese Remainder Theorem
<b>DES</b>	Data Encryption Standard; symmetric block cipher algorithm
<b>DPA</b>	Differential Power Analysis
<b>DFA</b>	Differential Failure Analysis
<b>EAL</b>	Evaluation Assurance Level
<b>EC</b>	Elliptic Curve Cryptography
<b>ECC</b>	Error Correction Code
<b>ECDH</b>	Elliptic Curve Diffie–Hellman
<b>ECDSA</b>	Elliptic Curve Digital Signature Algorithm
<b>EDC</b>	Error Detection Code
<b>EDU</b>	Error Detection Unit
<b>EEPROM</b>	Electrically Erasable and Programmable Read Only Memory
<b>EMA</b>	Electro Magnetic Analysis
<b>Flash EEPROM</b>	Flash Memory
<b>FL</b>	Flash Loader software
<b>FW</b>	Firmware
<b>GCIM</b>	Generic Chip Identification Mode
<b>GPIO</b>	General Purpose IO
<b>HW</b>	Hardware
<b>IC</b>	Integrated Circuit
<b>ICO</b>	Internal Clock Oscillator
<b>ID</b>	Identification
<b>IMM</b>	Interface Management Module
<b>I2C</b>	Inter Integrated Chip
<b>IT</b>	Information Technology
<b>ITP</b>	Interrupt and Peripheral Event Channel Controller
<b>I/O</b>	Input/Output

<b>IRAM</b>	Internal Random Access Memory
<b>ISS</b>	Instruction Stream Signature Checking
<b>MED</b>	Memory Encryption and Decryption
<b>MMU</b>	Memory Management Unit
<b>NVM</b>	Non-Volatile Memory
<b>NVIC</b>	Nested Vectored Interrupt Controller
<b>OS</b>	Operating system
<b>ST</b>	Security Target
<b>PEC</b>	Peripheral Event Channel
<b>PP</b>	Protection Profile
<b>PRNG</b>	Pseudo Random Number Generator
<b>PROM</b>	Programmable Read Only Memory
<b>RAM</b>	Random Access Memory
<b>RMS</b>	Resource Management System
<b>RNG</b>	Random Number Generator
<b>ROM</b>	Read Only Memory
<b>RSA</b>	Rives-Shamir-Adleman Algorithm
<b>SAM</b>	Service Algorithm Minimal
<b>SCP</b>	Symmetric Cryptographic Processor
<b>SF</b>	Security Feature
<b>SFR</b>	Special Function Register, as well as Security Functional Requirement, the specific meaning is given in the context
<b>SOLID FLASH™</b>	An Infineon Trade Mark and Stands for Flash EEPROM Technology
<b>SPA</b>	Simple Power Analysis
<b>SPI</b>	Serial Peripheral Interface
<b>SSC</b>	Synchronous Serial Communication
<b>STS</b>	Self Test Software
<b>SW</b>	Software
<b>SO</b>	Security Objective
<b>SWP</b>	Single Wire Protocol
<b>TOE</b>	Target of Evaluation
<b>TM</b>	Test Mode (STS)
<b>TSF</b>	TOE Security Functions
<b>TRNG</b>	True Random Number Generator
<b>TSC</b>	TOE Security Functions Control
<b>TSF</b>	TOE Security Functionality

<b>UART</b>	Universal Asynchronous Receiver/Transmitter
<b>UM</b>	User Mode (STS)
<b>UmSLC</b>	User Mode Security Life Control
<b>WDT</b>	Watch Dog Timer
<b>XRAM</b>	eXtended Random Access Memory
<b>3DES</b>	Triple DES Encryption Standards

## 12.2 Glossary

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

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

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

**Informal** - Expressed in natural language.

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

**Protection Profile** - An implementation-independent statement of security needs for a TOE type.

**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** - A set of software, firmware and/or hardware possibly accompanied by guidance.

**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

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Part 2: Security functional components, Revision 3, July 2009  
Part 3: Security assurance components, Revision 3, July 2009
- [2] Common Methodology for Information Technology Security Evaluation (CEM), Evaluation Methodology, Version 3.1, Rev. 3, July 2009
- [3] BSI certification: Procedural Description (BSI 7125)
- [4] Application Notes and Interpretations of the Scheme (AIS) as relevant for the TOE<sup>10</sup>.
- [5] German IT Security Certificates (BSI 7148), periodically updated list published also in the BSI Website
- [6] Security Target, M9900 A21, Version 1.1, 2012-07-31, Infineon Technologies AG (confidential document)
- [7] Security Target Lite, M9900 A21, Version 1.1, 2012-07-31 (sanitised public document)
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- [11] Configuration Management Scope M9900 A21, Version 0.2, 2012-04-30, Infineon Technologies AG (confidential document)
- [12] M9900 Security Guidelines User's Manual, 2012-07-31, Infineon Technologies AG

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<sup>10</sup>specifically

- AIS 25, Version 7, Anwendung der CC auf Integrierte Schaltungen including JIL Document and CC Supporting Document
- AIS 26, Version 8, Evaluationsmethodologie für in Hardware integrierte Schaltungen including JIL Document and CC Supporting Document
- AIS 31, Version 2.1, Funktionalitätsklassen und Evaluationsmethodologie für physikalische Zufallszahlengeneratoren
- AIS 32, Anwendungshinweise und Interpretationen zum Schema, AIS 32: CC-Interpretationen im deutschen Zertifizierungsschema, Version 6, 2010-08-06, Bundesamt für Sicherheit in der Informationstechnik.
- AIS 34, Version 3, Evaluation Methodology for CC Assurance Classes for EAL5+ (CCv2.3 & CCv3.1) and EAL6 (CCv3.1)
- AIS 35, Version 2.0, Öffentliche Fassung des Security Targets (ST-Lite) including JIL Document and CC Supporting Document and CCRA policies
- AIS 36, Version 3, Kompositionsevaluierung including JIL Document and CC Supporting Document
- AIS 38, Version 2.0, Reuse of evaluation results.

- [13] SLE 97 32-bit Security Controller Family based on SC300 in 90 nm CMOS Technology M9900 Solid Flash Controller for HD-SIM Applications Hardware Reference Manual, Version 2.0, 2012-03-26, Infineon Technologies AG
- [14] SLE 97 Flash Controller Family Programmer's Reference User's Manual, Version 1.8, 2012-05-24, Infineon Technologies AG
- [15] ARMv7-M Architecture Reference Manua, ID 021310, 2010-02-07, ARM Limited
- [16] M9900 SOLID FLASH 32-bit Security Controller based on SC300 in 90 nm CMOS Technology Errata Sheet, Version 1.0, 2012-05-09, Infineon Technologies AG
- [17] SLE 97 / SLC 14 Family Production and Personalization User's Manual, 2012-05-10, Infineon Technologies AG.

## C Excerpts from the Criteria

CC Part1:

### Conformance Claim (chapter 10.4)

“The conformance claim indicates the source of the collection of requirements that is met by a PP or ST that passes its evaluation. This conformance claim contains a CC conformance claim that:

- describes the version of the CC to which the PP or ST claims conformance.
- describes the conformance to CC Part 2 (security functional requirements) as either:
  - **CC Part 2 conformant** - A PP or ST is CC Part 2 conformant if all SFRs in that PP or ST are based only upon functional components in CC Part 2, or
  - **CC Part 2 extended** - A PP or ST is CC Part 2 extended if at least one SFR in that PP or ST is not based upon functional components in CC Part 2.
- describes the conformance to CC Part 3 (security assurance requirements) as either:
  - **CC Part 3 conformant** - A PP or ST is CC Part 3 conformant if all SARs in that PP or ST are based only upon assurance components in CC Part 3, or
  - **CC Part 3 extended** - A PP or ST is CC Part 3 extended if at least one SAR in that PP or ST is not based upon assurance components in CC Part 3.

Additionally, the conformance claim may include a statement made with respect to packages, in which case it consists of one of the following:

- **Package name Conformant** - A PP or ST is conformant to a pre-defined package (e.g. EAL) if:
  - the SFRs of that PP or ST are identical to the SFRs in the package, or
  - the SARs of that PP or ST are identical to the SARs in the package.
- **Package name Augmented** - A PP or ST is an augmentation of a predefined package if:
  - the SFRs of that PP or ST contain all SFRs in the package, but have at least one additional SFR or one SFR that is hierarchically higher than an SFR in the package.
  - the SARs of that PP or ST contain all SARs in the package, but have at least one additional SAR or one SAR that is hierarchically higher than an SAR in the package.

Note that when a TOE is successfully evaluated to a given ST, any conformance claims of the ST also hold for the TOE. A TOE can therefore also be e.g. CC Part 2 conformant.

Finally, the conformance claim may also include two statements with respect to Protection Profiles:

- **PP Conformant** - A PP or TOE meets specific PP(s), which are listed as part of the conformance result.
- **Conformance Statement (Only for PPs)** - This statement describes the manner in which PPs or STs must conform to this PP: strict or demonstrable. For more information on this Conformance Statement, see Annex D.”

CC Part 3:

**Class APE: Protection Profile evaluation** (chapter 10)

“Evaluating a PP is required to demonstrate that the PP is sound and internally consistent, and, if the PP is based on one or more other PPs or on packages, that the PP is a correct instantiation of these PPs and packages. These properties are necessary for the PP to be suitable for use as the basis for writing an ST or another PP.

Assurance Class	Assurance Components
Class APE: Protection Profile evaluation	APE_INT.1 PP introduction
	APE_CCL.1 Conformance claims
	APE_SPD.1 Security problem definition
	APE_OBJ.1 Security objectives for the operational environment APE_OBJ.2 Security objectives
	APE_ECD.1 Extended components definition
	APE_REQ.1 Stated security requirements APE_REQ.2 Derived security requirements

APE: Protection Profile evaluation class decomposition”

**Class ASE: Security Target evaluation** (chapter 11)

“Evaluating an ST is required to demonstrate that the ST is sound and internally consistent, and, if the ST is based on one or more PPs or packages, that the ST is a correct instantiation of these PPs and packages. These properties are necessary for the ST to be suitable for use as the basis for a TOE evaluation.”

Assurance Class	Assurance Components
Class ASE: Security Target evaluation	ASE_INT.1 ST introduction
	ASE_CCL.1 Conformance claims
	ASE_SPD.1 Security problem definition
	ASE_OBJ.1 Security objectives for the operational environment ASE_OBJ.2 Security objectives
	ASE_ECD.1 Extended components definition
	ASE_REQ.1 Stated security requirements ASE_REQ.2 Derived security requirements
	ASE_TSS.1 TOE summary specification ASE_TSS.2 TOE summary specification with architectural design summary

ASE: Security Target evaluation class decomposition

### Security assurance components (chapter 7)

“The following Sections describe the constructs used in representing the assurance classes, families, and components.”

“Each assurance class contains at least one assurance family.”

“Each assurance family contains one or more assurance components.”

The following table shows the assurance class decomposition.

Assurance Class	Assurance Components
ADV: Development	ADV_ARC.1 Security architecture description
	ADV_FSP.1 Basic functional specification ADV_FSP.2 Security-enforcing functional specification ADV_FSP.3 Functional specification with complete summary ADV_FSP.4 Complete functional specification ADV_FSP.5 Complete semi-formal functional specification with additional error information ADV_FSP.6 Complete semi-formal functional specification with additional formal specification
	ADV_IMP.1 Implementation representation of the TSF ADV_IMP.2 Implementation of the TSF
	ADV_INT.1 Well-structured subset of TSF internals ADV_INT.2 Well-structured internals ADV_INT.3 Minimally complex internals
	ADV_SPM.1 Formal TOE security policy model
	ADV_TDS.1 Basic design ADV_TDS.2 Architectural design ADV_TDS.3 Basic modular design ADV_TDS.4 Semiformal modular design ADV_TDS.5 Complete semiformal modular design ADV_TDS.6 Complete semiformal modular design with formal high- level design presentation

Assurance Class	Assurance Components	
AGD:	AGD_OPE.1 Operational user guidance	
Guidance documents	AGD_PRE.1 Preparative procedures	
ALC: Life cycle support	ALC_CMC.1 Labelling of the TOE ALC_CMC.2 Use of a CM system ALC_CMC.3 Authorisation controls ALC_CMC.4 Production support, acceptance procedures and automation ALC_CMC.5 Advanced support	
	ALC_CMS.1 TOE CM coverage ALC_CMS.2 Parts of the TOE CM coverage ALC_CMS.3 Implementation representation CM coverage ALC_CMS.4 Problem tracking CM coverage ALC_CMS.5 Development tools CM coverage	
	ALC_DEL.1 Delivery procedures	
	ALC_DVS.1 Identification of security measures ALC_DVS.2 Sufficiency of security measures	
	ALC_FLR.1 Basic flaw remediation ALC_FLR.2 Flaw reporting procedures ALC_FLR.3 Systematic flaw remediation	
	ALC_LCD.1 Developer defined life-cycle model ALC_LCD.2 Measurable life-cycle model	
	ALC_TAT.1 Well-defined development tools ALC_TAT.2 Compliance with implementation standards ALC_TAT.3 Compliance with implementation standards - all parts	
	ATE: Tests	ATE_COV.1 Evidence of coverage ATE_COV.2 Analysis of coverage ATE_COV.3 Rigorous analysis of coverage
		ATE_DPT.1 Testing: basic design ATE_DPT.2 Testing: security enforcing modules ATE_DPT.3 Testing: modular design ATE_DPT.4 Testing: implementation representation
		ATE_FUN.1 Functional testing ATE_FUN.2 Ordered functional testing
ATE_IND.1 Independent testing – conformance ATE_IND.2 Independent testing – sample ATE_IND.3 Independent testing – complete		
AVA: Vulnerability assessment	AVA_VAN.1 Vulnerability survey AVA_VAN.2 Vulnerability analysis AVA_VAN.3 Focused vulnerability analysis AVA_VAN.4 Methodical vulnerability analysis AVA_VAN.5 Advanced methodical vulnerability analysis	

Assurance class decomposition

## Evaluation assurance levels (chapter 8)

“The Evaluation Assurance Levels (EALs) provide an increasing scale that balances the level of assurance obtained with the cost and feasibility of acquiring that degree of assurance. The CC approach identifies the separate concepts of assurance in a TOE at the end of the evaluation, and of maintenance of that assurance during the operational use of the TOE.

It is important to note that not all families and components from CC Part 3 are included in the EALs. This is not to say that these do not provide meaningful and desirable assurances. Instead, it is expected that these families and components will be considered for augmentation of an EAL in those PPs and STs for which they provide utility.”

### Evaluation assurance level (EAL) overview (chapter 8.1)

“Table 1 represents a summary of the EALs. The columns represent a hierarchically ordered set of EALs, while the rows represent assurance families. Each number in the resulting matrix identifies a specific assurance component where applicable.

As outlined in the next Section, seven hierarchically ordered evaluation assurance levels are defined in the CC for the rating of a TOE's assurance. They are hierarchically ordered inasmuch as each EAL represents more assurance than all lower EALs. The increase in assurance from EAL to EAL is accomplished by substitution of a hierarchically higher assurance component from the same assurance family (i.e. increasing rigour, scope, and/or depth) and from the addition of assurance components from other assurance families (i.e. adding new requirements).

These EALs consist of an appropriate combination of assurance components as described in Chapter 7 of this CC Part 3. More precisely, each EAL includes no more than one component of each assurance family and all assurance dependencies of every component are addressed.

While the EALs are defined in the CC, it is possible to represent other combinations of assurance. Specifically, the notion of “augmentation” allows the addition of assurance components (from assurance families not already included in the EAL) or the substitution of assurance components (with another hierarchically higher assurance component in the same assurance family) to an EAL. Of the assurance constructs defined in the CC, only EALs may be augmented. The notion of an “EAL minus a constituent assurance component” is not recognised by the standard as a valid claim. Augmentation carries with it the obligation on the part of the claimant to justify the utility and added value of the added assurance component to the EAL. An EAL may also be augmented with extended assurance requirements.

Assurance Class	Assurance Family	Assurance Components by Evaluation Assurance Level						
		EAL1	EAL2	EAL3	EAL4	EAL5	EAL6	EAL7
Development	ADV_ARC		1	1	1	1	1	1
	ADV_FSP	1	2	3	4	5	5	6
	ADV_IMP				1	1	2	2
	ADV_INT					2	3	3
	ADV_SPM						1	1
	ADV_TDS		1	2	3	4	5	6
Guidance Documents	AGD_OPE	1	1	1	1	1	1	1
	AGD_PRE	1	1	1	1	1	1	1
Life cycle Support	ALC_CMC	1	2	3	4	4	5	5
	ALC_CMS	1	2	3	4	5	5	5
	ALC_DEL		1	1	1	1	1	1
	ALC_DVS			1	1	1	2	2
	ALC_FLR							
	ALC_LCD			1	1	1	1	2
	ALC_TAT				1	2	3	3
Security Target Evaluation	ASE_CCL	1	1	1	1	1	1	1
	ASE_ECD	1	1	1	1	1	1	1
	ASE_INT	1	1	1	1	1	1	1
	ASE_OBJ	1	2	2	2	2	2	2
	ASR_REQ	1	2	2	2	2	2	2
	ASE_SPD		1	1	1	1	1	1
	ASE_TSS	1	1	1	1	1	1	1
Tests	ATE_COV		1	2	2	2	3	3
	ATE_DPT			1	1	3	3	4
	ATE_FUN		1	1	1	1	2	2
	ATE_IND	1	2	2	2	2	2	3
Vulnerability assessment	AVA_VAN	1	2	2	3	4	5	5

Table 1: Evaluation assurance level summary”



**Evaluation assurance level 1 (EAL1) - functionally tested** (chapter 8.3)

## “Objectives

EAL1 is applicable where some confidence in correct operation is required, but the threats to security are not viewed as serious. It will be of value where independent assurance is required to support the contention that due care has been exercised with respect to the protection of personal or similar information.

EAL1 requires only a limited security target. It is sufficient to simply state the SFRs that the TOE must meet, rather than deriving them from threats, OSPs and assumptions through security objectives.

EAL1 provides an evaluation of the TOE as made available to the customer, including independent testing against a specification, and an examination of the guidance documentation provided. It is intended that an EAL1 evaluation could be successfully conducted without assistance from the developer of the TOE, and for minimal outlay.

An evaluation at this level should provide evidence that the TOE functions in a manner consistent with its documentation.”

**Evaluation assurance level 2 (EAL2) - structurally tested** (chapter 8.4)

## “Objectives

EAL2 requires the co-operation of the developer in terms of the delivery of design information and test results, but should not demand more effort on the part of the developer than is consistent with good commercial practise. As such it should not require a substantially increased investment of cost or time.

EAL2 is therefore applicable in those circumstances where developers or users require a low to moderate level of independently assured security in the absence of ready availability of the complete development record. Such a situation may arise when securing legacy systems, or where access to the developer may be limited.”

**Evaluation assurance level 3 (EAL3) - methodically tested and checked** (chapter 8.5)

## “Objectives

EAL3 permits a conscientious developer to gain maximum assurance from positive security engineering at the design stage without substantial alteration of existing sound development practises.

EAL3 is applicable in those circumstances where developers or users require a moderate level of independently assured security, and require a thorough investigation of the TOE and its development without substantial re-engineering.”

**Evaluation assurance level 4 (EAL4) - methodically designed, tested, and reviewed**  
(chapter 8.6)**“Objectives**

EAL4 permits a developer to gain maximum assurance from positive security engineering based on good commercial development practises which, though rigorous, do not require substantial specialist knowledge, skills, and other resources. EAL4 is the highest level at which it is likely to be economically feasible to retrofit to an existing product line.

EAL4 is therefore applicable in those circumstances where developers or users require a moderate to high level of independently assured security in conventional commodity TOEs and are prepared to incur additional security-specific engineering costs.”

**Evaluation assurance level 5 (EAL5) - semiformally designed and tested** (chapter 8.7)**“Objectives**

EAL5 permits a developer to gain maximum assurance from security engineering based upon rigorous commercial development practises supported by moderate application of specialist security engineering techniques. Such a TOE will probably be designed and developed with the intent of achieving EAL5 assurance. It is likely that the additional costs attributable to the EAL5 requirements, relative to rigorous development without the application of specialised techniques, will not be large.

EAL5 is therefore applicable in those circumstances where developers or users require a high level of independently assured security in a planned development and require a rigorous development approach without incurring unreasonable costs attributable to specialist security engineering techniques.”

**Evaluation assurance level 6 (EAL6) - semiformally verified design and tested**  
(chapter 8.8)**“Objectives**

EAL6 permits developers to gain high assurance from application of security engineering techniques to a rigorous development environment in order to produce a premium TOE for protecting high value assets against significant risks.

EAL6 is therefore applicable to the development of security TOEs for application in high risk situations where the value of the protected assets justifies the additional costs.”

**Evaluation assurance level 7 (EAL7) - formally verified design and tested**  
(chapter 8.9)**“Objectives**

EAL7 is applicable to the development of security TOEs for application in extremely high risk situations and/or where the high value of the assets justifies the higher costs. Practical application of EAL7 is currently limited to TOEs with tightly focused security functionality that is amenable to extensive formal analysis.”

**Class AVA: Vulnerability assessment** (chapter 16)

“The AVA: Vulnerability assessment class addresses the possibility of exploitable vulnerabilities introduced in the development or the operation of the TOE.”

**Vulnerability analysis (AVA\_VAN)** (chapter 16.1)**"Objectives**

Vulnerability analysis is an assessment to determine whether potential vulnerabilities identified, during the evaluation of the development and anticipated operation of the TOE or by other methods (e.g. by flaw hypotheses or quantitative or statistical analysis of the security behaviour of the underlying security mechanisms), could allow attackers to violate the SFRs.

Vulnerability analysis deals with the threats that an attacker will be able to discover flaws that will allow unauthorised access to data and functionality, allow the ability to interfere with or alter the TSF, or interfere with the authorised capabilities of other users.”

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## **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

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## Annex B of Certification Report BSI-DSZ-CC-0791-2012

### Evaluation results regarding development and production environment



The IT product Infineon smart card IC (Security Controller) M9900 A21 with specific IC dedicated software (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 advice of the Certification Body for components beyond EAL 5 and guidance specific for the technology of the product for conformance to the Common Criteria for IT Security Evaluation (CC), Version 3.1.

As a result of the TOE certification, dated 21 August 2012, the following results regarding the development and production environment apply. The Common Criteria assurance requirements ALC – Life cycle support (i.e. ALC\_CMC.4, ALC\_CMS.4, ALC\_DEL.1, ALC\_DVS.2, ALC\_LCD.1 and ALC\_TAT.1)

are fulfilled for the development and production sites of the TOE listed below:

Site	Address	Function
Agrate - DNP	DNP Photomask Europe S.p.A. Via C. Olivetti 2/A 20041 Agrate Brianza Italy	Mask Production
Augsburg	Infineon Technologies AG Alter Postweg 101 86159 Augsburg Germany	Development
Bangalore	Infineon Technologies India Pvt. Ltd. 13 <sup>th</sup> Floor, Discoverer Building International Technology Park Whitefield Road Bangalore, India – 560066	SW Development and Testing
Bangkok – SmarTrac covered by [AIS47]  Site certification from 2011-10-25 (cert ID BSI-DSZ-CC-S-0007-2011)	Smartrac Technology Ltd., 142/121/115 Moo, Hi-Tech industrial Estate, Tambon Ban Laean, Amphor Bang-Pa-In, 13160 Ayutthaya, Thailand	Inlay Mounting
Bukarest	Infineon Technologies Romania Blvd. Dimitrie Pompeiu Nr. 6 Sector 2 020335 Bucharest, Romania	Development

Site	Address	Function
Chanhassen	Smartrac Technology US Inc. 1546 Lake Drive West Chanhassen, MN 55317 USA	Inlay Mounting
Corbeil Essones - Toppan	Toppan Photomask, Inc. European Technology Center Boulevard John Kennedy 224 91105 Corbeil Essonnes France	Mask Production
Dresden	Infineon Technologies Dresden GmbH & Co. OHG Königsbrücker Str. 180 01099 Dresden Germany	Wafer Production, Initialization and Pre- personalizaiton
Dresden-Toppan	Toppan Photomask, Inc Rähnitzer Allee 9 01109 Dresden Germany	Mask Production
Graz / Villach / Klagenfurt	<p>Infineon Technologies Austria AG Development Center Graz Babenbergerstr. 10 8020 Graz Austria</p> <p>Infineon Technologies Austria AG Siemensstr. 2 9500 Villach Austria</p> <p>Infineon Technologies Austria AG Lakeside B05 9020 Klagenfurt Austria</p>	Development, IT
Großostheim – K&N	Infineon Technology AG DCE Kühne & Nagel Stockstädter Strasse 10 – Building 8A 63762 Großostheim Germany	Distribution Center
Hayward – K&N	Kuehne & Nagel 30805 Santana Street Hayward, CA 94544 U.S.A.	Distribution Center
Hsinchu - ARDT	Ardentec Corporation No. 3, Gungye 3rd Rd., Hsin-Chu Industrial Park, Hu-Kou, Hsin-Chu Hsien, Taiwan 30351, R.O.C. Taiwan 30351, R.O.C.	Wafer Test



Site	Address	Function
Manila - Amkor	Amkor Technology Philippines Km. 22 East Service Rd. South Superhighway Muntinlupa City 1702 Philippines  Amkor Technology Philippines 119 North Science Avenue Laguna Technopark, Binan Laguna 4024 Philippines	Module Mounting
Munich	Infineon Technologies AG Am Campeon 1-12 85579 Neubiberg Germany	Development
Munich - G&D	Giesecke & Devrient GmbH Distribution Center DLC Prinzregentenstraße 159 81677 Munich Germany	Distribution Center
Ranzan - Toppan	Toppan Printing Co., Ltd. 6-2, Hanami-Dai, Ranzan-Machi, Hiki-Gun Saitama 355-0204 Japan	Inlay Mounting
Regensburg-West	Infineon Technologies AG Wernerwerkstraße 2 93049 Regensburg Germany	Inlay Mounting, Module Mounting, Distribution Center
Reichshof - SmarTrac	Smartrac Technology Germany Building RW2 Gewerbeparkstr. 10 51580 Reichshof-Wehrath Germany	Inlay Mounting, Delivery
Round Rock - Toppan	Toppan Printing Company America, Inc. Round Rock Site 2175 Greenhill Drive Round Rock, Texas 78664	Inlay Mounting
Singapore - DHL	DHL Exel Supply Chian Richland Business Centre 11 Bedok North Ave 4, Level 3, Singapore 489949	Distribution Center
Singapore Kallang	Infineon Technologies Asia Pacific PTE Ltd. 168 Kallang Way Singapore 349253	Electrical Module Testing, Module Mounting

Site	Address	Function
Tainan - TSMC	Taiwan Semiconductor Manufacturing Company Ltd. 1, Nan-Ke North Rd. Tainan Science Park Tainan 741-44 Taiwan	Mask & Wafer Production, Initialization and Pre-personalization
Wuxi	Infineon Technologies (Wuxi) Co. Ltd. No. 118, Xing Chuang San Lu Wuxi-Singapore Industrial Park Wuxi 214028, Jiangsu P.R. China	Module Mounting, Distribution Center

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