Federal Office
for Information Security

Certification Report

BSI-DSZ-CC-0864-2012

for

Crypto Library V2.7 NXP Smart Card Controller P5CD081V1D and its major configurations

from

NXP Semiconductors Germany GmbH

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Bundesamt
für Sicherheit in der
Informationstechnik

Deutsches IT-Sicherheitszertifikat

erteilt vom Bundesamt für Sicherheit in der Informationstechnik

BSI-DSZ-CC-0864-2012

Crypto Library V2.7 NXP Smart Card Controller P5CD081V1D and its major configurations

from	NXP Semiconductors Germany GmbH
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 4 augmented by ALC_DVS.2 and AVA_VAN.5

Common Criteria Recognition Arrangement for components up to EAL 4

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 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, 19 December 2012

For the Federal Office for Information Security

SOGIS IT SECURITY CERTIFIED

Bernd Kowalski L.S.
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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.

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

Contents

A Certification

1 Specifications of the Certification Procedure

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

- BSIG[2]
- BSI Certification Ordinance[3]
- BSI Schedule of Costs[4]
- 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[5] [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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2 Act on the Federal Office for Information Security (BSI-Gesetz - BSIG) of 14 August 2009, Bundesgesetzblatt I p. 2821

3 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

4 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

5 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 Crypto Library V2.7 NXP Smart Card Controller P5CD081V1D and its major configurations has undergone the certification procedure at BSI. This is a re-certification based on BSI-DSZ-CC-0633-2010. Specific results from the evaluation process BSI-DSZ-CC-0633-2010 were re-used.

The evaluation of the product Crypto Library V2.7 NXP Smart Card Controller P5CD081V1D and its major configurations was conducted by Brightsight BV. The evaluation was completed on 14 December 2012. The Brightsight BV is an evaluation facility (ITSEF)[6] recognised by the certification body of BSI.

For this certification procedure the sponsor and applicant is: NXP Semiconductors Germany GmbH.

The product was developed by: NXP Semiconductors Germany GmbH.

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

[6] Information Technology Security Evaluation Facility

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

- 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 Crypto Library V2.7 NXP Smart Card Controller P5CD081V1D and its major configurations 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[7] of the product. The Certification Report may also be obtained in electronic form at the internet address stated above.

[7] NXP Semiconductors Germany GmbH
Stresemannallee 101
22529 Hamburg

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 evaluated TOE is “NXP Crypto Library V2.7 on SmartMX P5Cx081/CD041/CD021/CD016 V1D”. This TOE is a composite TOE, consisting of:

The TOE is a composite TOE, consisting of:

- the hardware “NXP SmartMX P5Cx081/ CD041/ CD021/ CD016 V1D Secure Smart Card Controller” which is used as evaluated platform, and all its Major Configurations(see [15] for details):
  - P5CD081V1D
  - P5CN081V1D
  - P5CD041V1D
  - P5CD021V1D
  - P5CD016V1D

and

- The “Crypto Library V2.7”, which is built upon this platforms.

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 [7].

The TOE Security Assurance Requirements (SAR) are based entirely on the assurance components defined in Part 3 of the Common Criteria (see part C or [1], Part 3 for details). The TOE meets the assurance requirements of the Evaluation Assurance Level EAL 4 augmented by ALC_DVS.2 and AVA_VAN.5.

The TOE Security Functional Requirements (SFR) relevant for the TOE are outlined in the Security Target [6] and [8], chapter 4. 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 Functions:

TOE Security Functions	Addressed issue
F.AES	The TOE uses the AES hardware coprocessor to provide a AES encryption and decryption facility.
F.DES	The TOE uses the DES hardware coprocessor to provide a DES encryption and decryption facility.
F.RSA_encrypt	The TOE provides functions that implement the RSA algorithm for data encryption and decryption.
F.RSA_sign	The TOE provides functions that implement the RSA algorithm and the RSA-CRT algorithm for signature generation and verification.
F.RSA_public	The TOE provides functions that implement computation of an RSA public key from a private key.
F.ECC_GF_p_ECDSA	The TOE provide functions to perform ECC Signature Generation and Signature Verification according to ISO/IEC 14888-3.
F.ECC_GF_p_ DH_KeyExch	The TOE provides functions to perform Diffie-Hellman Key Exchange according to ISO 11770-3 section 8.4.

TOE Security Functions	Addressed issue
F.RSA_KeyGen	The TOE provides functions to generate RSA key pairs as described in „Regulierungsbehörde für Telekommunikation und Post: Bekanntmachung zur elektronischen Signatur nach dem Signaturgesetz und der Signaturverordnung (Übersicht über geeignete Algorithmen), German "Bundesanzeiger Nr. 59", p. 4695-4696, March 30th, 2005“.
F.ECC_GF_p_KeyGen	The TOE provides functions to perform ECC over GF(p) Key Generation according to ISO/IEC 15946-1 section 6.1.
F.SHA	The TOE implements functions to compute the Secure Hash Algorithms SHA-1, SHA-224 and SHA- 256 according to the standard FIPS 180-2.
F.RNG_Access	The TOE contains both a hardware Random Number Generator (RNG) and a software RNG.
F.Object_Reuse	The TOE provides internal security measures which clear memory areas used by the Crypto Library after usage.
F.COPY	The function F.COPY implements functionality to copy memory content in a manner protected against side channel attacks.
F.LOG	The IT Security Functionality SF.LOG – Logical Protection defined in the Hardware Security Target [15] is extended in this Security Target to include software countermeasures against side channel attacks.

Table 1: TOE Security Functionalities

For more details please refer to the Security Target [6] and [8], chapter 5.

The assets to be protected by the TOE are defined in the Security Target [6] and [8], chapter 2.1 . Based on these assets the TOE Security Problem is defined in terms of Assumptions, Threats and Organisational Security Policies. This is outlined in the Security Target [6] and [8], chapter 2.3 and 2.4.

This certification covers the following configurations of the TOE:

The evaluated TOE is “Crypto Library V2.7 NXP Smart Card Controller P5CD081V1D and its major configurations„. There are no additional version or other identification and configuration characteristics.

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:

Crypto Library V2.7 NXP Smart Card Controller P5CD081V1D and its major configurations

The following table outlines the TOE deliverables:

No	Type	Identifier	Release	Form of Delivery
1	HW	NXP Secure Smart Card Controllers P5CD016V1D / P5CD021V1D / P5CD041V1D / P5Cx081V1D with DESFire EV1	V1D	Wafer, modules and packages (dice include reference T046D)
2	SW	Boot-ROM Software	1.3	Test-ROM on the chip, TestRom_042_107.hex
3	SW	DESFire EV1 Software	1.3	Test-ROM on the chip, TestRom_042_107.hex
4	SW	Test-ROM Software	1.3	Test-ROM on the chip, TestRom_042_107.hex
5	DOC	Product data sheet P5CD016/021/041/051 and P5Cx081 family; Secure dual interface and contact PKI smart card controller	3.6	Electronic document
6	DOC	Instruction Set, SmartMX-Family	1.1	Electronic document
7	DOC	Guidance, Delivery and Operation Manual NXP Secure Smart Card Controllers P5CD016V1D/P5CD021V1D/P5CD041V 1D/P5Cx081V1D	3.0	Electronic document
8	SW	Crypto Library	2.7	Electronic file
9	DOC	Secured Crypto Library on the P5CD016/021/041 and P5Cx081	Revision 1.2	Electronic document
10	DOC	Secured Crypto Library on the SmartMX – Pseudo Random Number Generator & Chi-Squared Test Library	Revision 5.0	Electronic document
11	DOC	Secured Crypto Library on the SmartMX – Secured AES Library	Revision 1.2	Electronic document
12	DOC	Secured Crypto Library on the SmartMX – Secured DES Library	Revision 3.0	Electronic document
13	DOC	Secured Crypto Library on the SmartMX – SHA Library	Revision 4.1	Electronic document
14	DOC	Secured Crypto Library on the SmartMX – Secured RSA Library	Revision 4.5	Electronic document
15	DOC	Secured Crypto Library on the SmartMX – Secured RSA Key Generation Library	Revision 4.3	Electronic document
16	DOC	Secured Crypto Library on the SmartMX – Secured ECC Library	Revision 1.4	Electronic document
17	DOC	Secured Crypto Library on the SmartMX – Utility Library	Revision 1.0	Electronic document

Table 2: Deliverables of the TOE

The hardware part of the TOE is delivered by NXP either as wafers or in packaged form. The hardware part of the TOE will be delivered with the IC Dedicated Support Software.

The Crypto Library is delivered in Phase 1 (for a definition of the Phases refer to section ‘1.2.3 TOE life cycle’ of the Protection Profile [7]) as a software package (a set of binary files) to the developers of Smartcard Embedded Software. The Smartcard Embedded Software may comprise in this case an operating system and/or other smart card software

(applications). The Software developer can incorporate the Crypto Library into their product.

As explained in the user guidance, as part of the delivery procedure, the customer shall verify the correctness of the delivered files by calculating the SHA-256 hash value of the delivered files and comparing them to reference values provided in the user guidance, and reproduced in the following Table:

Component	Rev.	SHA-256 Value
PhSmxClAes.lib	1.1	1891a109ad652a61cfa34de34409cb6423a3987cfe4bf82d94ea62d6ca292cfa
phSmxClAes.h	1.1	14babe9b889dfaf365c626fd456dfa8c8472a4fd19338c41e7e3bf792633ac8a
phSmxClDes.lib	2.1	53d0008fa1e5e5a6c6137649337bf46bb399a2974b6784c56502066fb8c8d009
phSmxClDes.h	2.1	3ac882e7589a3174d4cb0ba8e5c54d505b25009ce70edbc81ee64c8b17b26337
phSmxClRsa.lib	3.2	2d4c71b2ce754571f7449841e66c91b740a3a7359e3cf8ad673d6da8c64d0e97
phSmxClRsa_Oaep.lib	3.2	902c94caa2df961f2accf705f5aa8a2289cdfcf13a2af852f99ceb0ae70b8de5
phSmxClRsa_Pss.lib	3.2	15a0a171c8515cc5b61f8443f7bbd4700bc90f2972a7cac056d4d991f5ee58cb
phSmxClRsa_Inverse.lib	3.2	d75c75aef409066c7ef575c01f691cd839602e1bc10a673ab85f9e1a9e740122
phSmxClRsa.h	3.2	a9f41716664f41e916cfaf7e988910867c93c3f8f913798b42b4f53197915a74
phSmxClRsa_Oaep.h	3.2	4900c940de1aa6cf9a18b4479ca52d6de282b61081e7bf676d8d1a42ae0d2f90
phSmxClRsa_Pss.h	3.2	06d8538772b052047a156a620d04271611e53b8605eea4b1af64c50be15b8da8
phSmxClRsaKg.lib	3.1	c8c0ef3813a2b171a9a4635fd33c9614be2e408f38f22765d0cf27ccb9996ff2
phSmxClRsaKg.h	3.1	d9222fe19a40e652ce721b60c48e729621ca04c512fa25596a4e23f559b30f9b
phSmxClECC_GFp.lib	2.2	31c09e8592e8e0e933a7e8fc0ad4e7174c1ac1d7f69c1c1bb60f18d249152486
phSmxClECC_GFp.h	2.2	cadd2f8eabaa2160a89bf8662245a636399c15d70835cf7e023c67f7ef2ada2b
phSmxClSha.lib	3.0	57a86da6e0b6910a26d4bb629a918bbd7336a8a11c775f28ef146414975b5c6b
phSmxClSha.h	3.0	e75f12fd7148e1bff8316a8f177d921416e3a1b32361df036612e0782d647877
phSmxClRng.lib	3.0	2e952c81f040746998a05ca8d88a8041d6b1806e63735f0028099e389cef783e
phSmxClRng.h	3.0	5b7247e2e8ce8472e6f6dd33d295190740e0f2b50981e283319d1eb86c1c3b4b
phSmxClUtility.lib	1.0	011590478b8cbd78ea1fa2b72789c93a931a05fbf0b8c9dee2e7295114d20589
phSmxClUtility.h	1.0	551832b86b658294b02a84e6f00a6aba1785885d3f99ed79e24e4c40d35e9611
phSmxClTypes.h	1.1	67ae8997413e6c3ed0554fced701f97ab162ecf2755fefd922463449e3bd96e9

The subsequent use of the Crypto Library by Smartcard Embedded Software Developers is out of the control of the developer NXP Semiconductors, Business Unit Identification; the integration of the Crypto Library into Smartcard Embedded Software is not part of this evaluation.

The reference of the software part of the TOE is checked by using the SHA-256 hash values. The values are provided in the user guidance manual [12].

The reference of the hardware part of the TOE is checked by visual inspection. The surface of the TOE consists of the label “T046D”. The chip is manufactured by SSMC in Singapore.

Device coding byte values, according to the data sheet, for the hardware configurations are as follows:

device	DC(0	DC(1)	DC(2)
P5CD081V1D	0x21	0x07	0x53
P5CN081V1D	0x61	0x07	0x54
P5CD041V1D	0x21	0x07	0x52
P5CD021V1D	0x21	0x07	0x51
P5CD016V1D	0x21	0x07	0x50

3 Security Policy

The Security Policy is expressed by the set of Security Functional Requirements and implemented by the TOE. It covers the following issues: The security policy of the TOE is to provide basic Security Functions 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 algorithms to ensure the confidentiality of plain text data by encryption and to support secure authentication protocols and it will provide a random number generator.

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 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 Features 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:

Name	Title
OE.Plat-Appl	Usage of Hardware Platform
OE.Resp-Appl	Treatment of User Data

OE.Process-Sec-IC	Protection during Packaging, Finishing and Personalization
OE.Check-Init	Check of initialization data by the Smart Card Embedded Software.
OE.RSA-Key-Gen	In case that resistance of the fast, but insecure mode of the RSA Key Generation against side channel attacks is needed, the operational environment shall ensure that side-channel attacks cannot be performed.

Details can be found in the Security Target [6] and [8], chapter 3.2.

5 Architectural Information

This chapter provides a high-level description of the IT product and its major components based on the evaluation evidence described in the Common Criteria assurance family entitled “TOE design (ADV_TDS)”. The intent of this chapter is to characterise the degree of architectural separation of the major components and to show dependencies between the TOE and products using the TOE in a composition (e.g. dependencies between HW and SW).

TOE definition

The TOE is the “NXP Crypto Library V2.7 on SmartMX P5Cx081/CD041/CD021/CD016 V1D”. The TOE consists of a hardware part and a software part:

- The hardware part consists of the NXP SmartMX P5CD081V1D / P5CN081V1D / P5CD041V1D / P5CD021V1D / P5CD016V1D Secure Smart Card Controller with IC Dedicated Software stored in the Test-ROM that is not accessible in the System Mode or the User Mode after Phase 3. The hardware part of the TOE includes dedicated guidance documentation. All configurations as defined in [15] are covered by this evaluation. These configurations are:
  - P5CD081V1D
  - P5CN081V1D
  - P5CD041V1D
  - P5CD021V1D
  - P5CD016V1D
- The software part consists of the IC Dedicated Support Software “NXP Crypto Library V2.7 on SmartMX P5Cx081/CD041/CD021/CD016 V1D” which consists of a software library and associated documentation. The Crypto Library is an additional part that provides cryptographic functions that can be operated on the hardware platform

The NXP SmartMX hardware is described in Section 1.4.2.1 “Hardware Description” of the Hardware Security Target [15].

A Smartcard embedded Software developer may create Smartcard embedded Software to execute on the NXP SmartMX hardware. This software is stored in the User ROM of the NXP SmartMX hardware and is not part of the TOE, with one exception: the Smartcard embedded Software may contain the “Crypto Library on SmartMX“ (or parts thereof) and this Crypto Library (or parts thereof) is part of the TOE. The crypto functions are supplied as a library rather than as a monolithic program, and hence a user of the library may include only those functions that are actually required. However, some dependencies exist; details are described in the User Guidance [12].

The TOE provides AES, DES, Triple-DES (3DES), RSA, RSA key generation, RSA public key computation, ECC over GF(p), ECC over GF(p) key generation, ECC Diffie-Hellman key-exchange, SHA-1, SHA-224 and SHA-256 algorithms.

In addition, the Crypto Library implements a software (pseudo) random number generator, which is initialised (seeded) by the hardware random number generator of the SmartMX.

Finally, the TOE provides a secure copy routine and includes internal security measures for residual information protection.

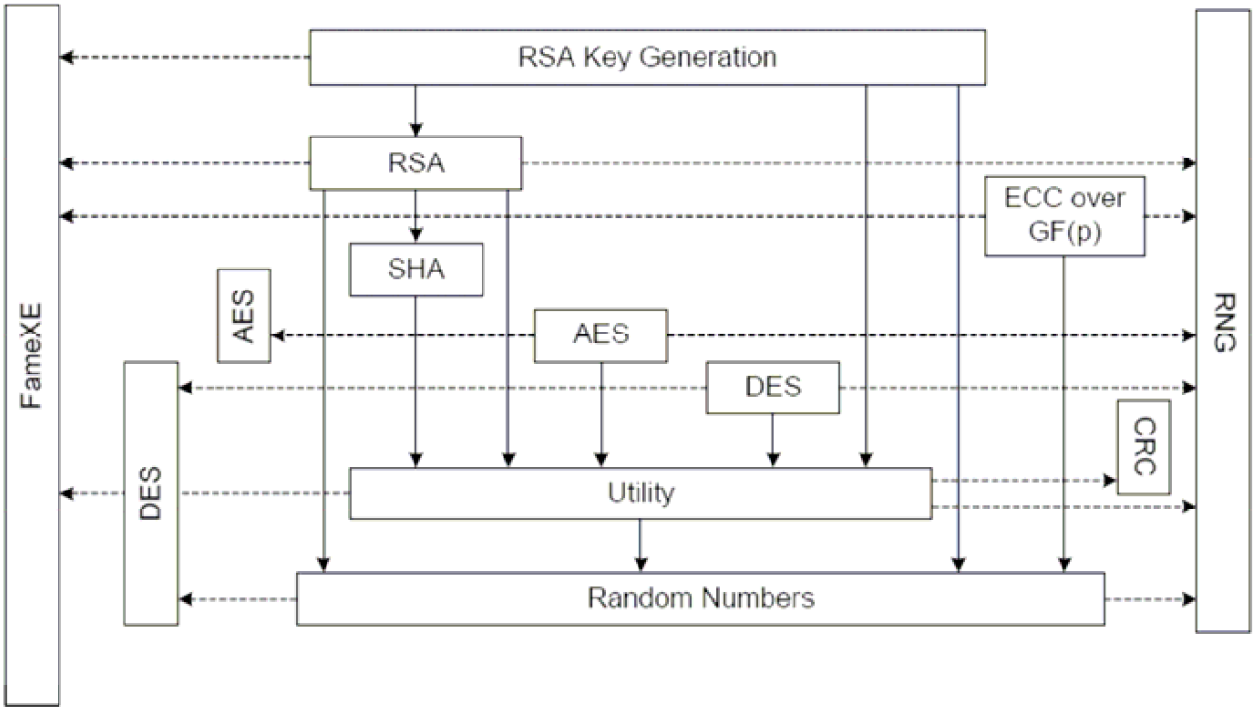
Logical Architecture

The Crypto Library is implemented as a set of subsystems. The division into subsystems is chosen according to the cryptographic algorithms provided and, as such, corresponds directly with most of the TSF.

The Crypto Library subsystems are:

- RSA Key Generation
- RSA
- SHA
- AES
- DES
- ECC over GF(p)
- Random Numbers
- Utility

The library relies on the underlying hardware for some functionality. The figure below, taken from Chapter 15 of the TOE design specification shows the relations between the subsystems and the functionality provided by the underlying hardware.



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

Test subset selection for independent testing

The evaluator judges that tests, supplementing the developer’s tests, should be defined based on how much assurance is provided by the developer's tests on how well the TOE security functionalities are implemented, rather than on how well the different standards are met.

Based on how rigorous the TOE's behaviour is tested by the developer, and their test results, the evaluator has selected the following items to be tested:

- Correctness of operation during RSA key generation under different clock settings, when primes p and q are generated such that they have equal length;
- Establish most promising approach for side-channel testing (Worst-Case Testing)
- Possibility to identify RSA operations in side-channel traces;
- The effect of basis and exponent blinding on side-channel traces;
- Correctness and timing of ECDSA signature generation;
- Possibility to identify ECC operations in side-channel traces;
- The effect of randomising of modular parameters (ECC) on side-channel traces;
- The effect of randomising of projective coordinates (ECC) on side-channel traces;

- ECC side-channel analysis:
  - point leakage
  - ephemeral key leakage
  - leakage of differences between additions
- Verification of the developer's PRNG test results;
- Sensitivity to fault injection by performing optical fault injection on the FameXE coprocessor operations.

Developer test selection for validation testing

The crypto library has been evaluated before (version 2.1, certification ID: BSI-DSZ-CC-0417). During the work performed for the previous evaluation, the evaluator has selected the entire set of the developer’s automated tests for the subset. ATE_COV and ATE_DPT have shown that these scripts cover all SFRs and all functions, so, in that procedure, the evaluator has tested all functions.

The version of the crypto library evaluated in procedure BSI-DSZ-CC-0417 has been re-evaluated as major maintenance in procedure BSI-DSZ-0608, and that version (2.2) has been certified, and therefore ATE is considered covered for that version. Since the evaluation of version 2.2 (BSI-DSZ-CC-0608), the crypto library has undergone no changes that influence the functionality of the interfaces. Therefore the evaluator judges that the developer's tests need not be repeated in order to confirm their validity.

Testing results and verdict

The testing results show that the TOE exhibits the expected behaviour. No deviations were found.

Independent testing conclusion

The overall judgement of the evaluators is that the evaluator and the independent testing showed the TSF to operate correctly. The hardware test results are extendable to composite evaluations on this hardware TOE, provided that TOE is operated according to its guidance and the composite evaluation requirements are met.

Penetration testing

The penetration tests are devised after performing the Evaluator Vulnerability Analysis. This analysis has followed the following steps: The reference for attack techniques against which smart card-based devices controllers such as the Crypto Library on SmartMX must be protected against is the document "Attack methods for smart cards". Additional guidance for testing was provided by the certification body in the form of a number of questions regarding the TOE. The vulnerability of the Crypto Library for these attacks has been analysed in a white box investigation conforming to AVA_VAN.5.

Results

All test results were as expected.

The overall conclusion is that the Crypto Library is protected against attackers possessing a high attack potential, provided the user guidance of both the Crypto Library and the underlying hardware are followed, and the recommendations from the ETR of the underlying hardware are followed.

The user of the Crypto Library must implement the advices of the hardware user guidance. Important to mention are

- Section 4.3.2 limit the use of a single key for AES operations under certain circumstances (A) or implement a mechanism with dummy AES operations (B); It should be stressed that the ETR for composition of the underlying hardware mandates testing of the AES implementation if mechanism (B) is implemented in a composite TOE
- Section 4.4: appropriate handling of sensor resets and exceptions;
- Section 5.1: error counter mechanism.

If a composite TOE uses RSA exponents with low Hamming Weight, additional testing for leakage of the exponent value during the exponent blinding operation is required.

Furthermore, for proper functioning of the countermeasures, the user must ensure that the RNG is properly seeded, as described in the user guidance manual, section 6.13.

Finally, in all circumstances, user guidance must be followed and be carefully considered when certain interfaces are used, in particular

- phSmxClRsa_DecryptSF(),
- phSmxClRsa_DecryptCRT(),
- phSmxClRsa_SignSF(),
- phSmxClRsa_SignCRT(),
- phSmxClRsa_OaepDec(),
- phSmxClECC_GFp_KeyGen() and
- phSmxClECC_GFp_DHKeyExch().

As was the case for the evaluator's penetration testing, the developer test results also indicate that the TOE is sufficiently resistant to achieve the required VAN.5 rating.

8 Evaluated Configuration

This certification covers the following configurations of the TOE: The evaluated TOE is "**Crypto Library V2.7 NXP Smart Card Controller P5CD081V1D and its major configurations**". There are no additional version or other identification and configuration characteristics.

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 EAL5 extended by advice of the Certification Body for components beyond EAL 5 and guidance specific for the technology of the product [4] (AIS 34).

The following guidance specific for the technology was used:

(i) Functionality classes and evaluation methodology of deterministic random number generators

(ii) Composite product evaluation for Smart Cards and similar devices (see AIS 36). According to this concept the relevant guidance documents of the underlying platform and the documents ETR for Composition from the platform evaluations have been applied in the TOE evaluation.

(iii) The Application of CC to Integrated Circuits

(iv) Application of Attack Potential to Smart Cards

(v) Functionality classes and evaluation methodology of physical random number generators

(see [4], AIS 20, AIS 25, AIS 26, AIS 31, AIS 36).

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 4 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.

As the evaluation work performed for this certification procedure was carried out as a re-evaluation based on the certificate BSI-DSZ-CC-0633-2010, re-use of specific evaluation tasks was possible. The focus of this re-evaluation was on ECC and RSA.

The evaluation has confirmed:

- PP Conformance: Security IC Platform Protection Profile, Version 1.0, 15 June 2007, BSI-CC-PP-0035-2007 [7]
- for the Functionality: PP conformant plus product specific extensions
  Common Criteria Part 2 extended
- for the Assurance: Common Criteria Part 3 conformant
  EAL 4 augmented by ALC_DVS.2 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:

- the TOE Security functionality F.AES (128, 192 or 256 bit),
- the TOE Security functionality F.DES (two-key and three-key),
- the TOE Security functionality F.RSA_encrypt (256 bits to 5024 bits),
- the TOE Security functionality F.RSA_sign (256 bits to 5024 bits),

- the TOE Security functionality F.RSA_public (1024 bits to 2048 bits (Straight Forward) or from 1024 to 4096 bits (CRT)),
- the TOE Security functionality F.ECC_GF_p_ECDSA (128 bits to 544 bits),
- the TOE Security functionality F.SHA (SHA-1, SHA-224 and SHA-256) and
- for other usage of encryption and decryption within the TOE.

The strength of the cryptographic algorithms was not rated in the course of this certification procedure (see BSIG Section 4, Para. 3, 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 this functionalites 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 Cryptographic Functionalities 2-key Triple DES (2TDES), RSA 1024, ECC 160 and SHA1 used as collision-resistent hash function provided by the TOE achieve 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:

The user of the Crypto Library must implement the advices of the hardware user guidance.

Furthermore, for proper functioning of the countermeasures, the user must ensure that the RNG is properly seeded, as described in the user guidance manual, section 6.13.

11 Security Target

For the purpose of publishing, the Security Target [8] 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

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.

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

[1] Common Criteria for Information Technology Security Evaluation, Version 3.1,
Part 1: Introduction and general model, Revision 3, July 2009
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[8].

[5] German IT Security Certificates (BSI 7148), periodically updated list published also in the BSI Website

[6] Security Target “Crypto Library V2.7 on SmartMX P5Cx081 / CD041/ CD021/ CD016 V1D”, Rev 1.1, 6 Nov 2012 (confidential document)

[7] Security IC Platform Protection Profile, Version 1.0, 15 June 2007, BSI-CC-PP-0035-2007

[8] Security Target Lite “Crypto Library V2.7 on SmartMX P5Cx081 / CD041/ CD021/ CD016 V1D”, Rev 1.1, 6 Nov 2012

[9] Evaluation Technical Report, V4.0, NXP Crypto Library V2.7 on SmartMX P5Cx081/CD041/CD021/CD016 V1D, Brightsight, 13 December 2012 (confidential document)

[10] ETR for composite evaluation according to AIS 36, V3.0, NXP Crypto Library V2.7 on SmartMX P5Cx081/CD041/CD021/CD016 V1D, Brightsight, 12 December 2012 (confidential document)

[11] List of Configuration Items, Version 1.0, 15 September 2010 (confidential document)

[12] User Guidance Manual “Secured Crypto Library on the P5CD016/021/041/081 and P5CC081” – Overview – Rev. 1.2, 21 January 2011, and also

[8] specifically

- AIS 20, Version 2, Funktionalitätsklassen und Evaluationsmethodologie für deterministische Zufallszahlengeneratoren
- 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, Funktionalitätsklassen und Evaluationsmethodologie für physikalische Zufallszahlengeneratoren
- AIS 32, Version 7, CC-Interpretationen im deutschen Zertifizierungsschema
- AIS 34, Version 3, Evaluation Methodology for CC Assurance Classes for 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 2.9, Reuse of evaluation results

- AES Library User Guidance Manual “Secured Crypto Library on the SmartMX”, Rev. 1.2 – August 19th, 2010
- DES Library User Guidance Manual “Secured Crypto Library on the SmartMX”, Rev. 3.0 – 24 August 2007
- ECC over GF(p) User Guidance Manual “Secured Crypto Library on the SmartMX”, Rev. 1.4 – 30 March 2010
- Random Number Generator User Guidance Manual “Secured Crypto Library on the SmartMX”, Rev. 5.0 – 24 August 2007
- RSA Library User Guidance Manual “Secured Crypto Library on the SmartMX”, Rev. 4.5, April 15th, 2010
- RSA Key Generation User Guidance Manual “Secured Crypto Library on the SmartMX”, Rev. 4.3 – 30 March 2010
- SHA Library User Guidance Manual “Secured Crypto Library on the SmartMX”, Rev. 4.1 – 12 June 2008
- Utility Library User Guidance Manual “Secured Crypto Library on the SmartMX”, Rev. 1.0 – 24 August 2007

[13] Certification Report BSI-DSZ-CC-0707-2012 “NXP Secure Smart Card Controllers P5CD016V1D /P5CD021V1D / P5CD041V1D / P5Cx081V1D withDESFire EV1”, BSI, 13 August 2012

[14] P5CD081V1D ETR for composition, BSI-DSZ-CC-0707, version 1.2, June 8th, 2012

[15] Security Target Lite P5Cx081V1D/P5CD016V1D/P5CD021V1D/P5CD041V1D NXP Secure Smart Card Controllers, Revision 1.1, NXP Semiconductors, Business Unit Identification, October 24th, 2011 (sanitised public document)

C Excerpts from the Criteria

CC Part1:

Conformance Claim

“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: Guidance documents	AGD_OPE.1 Operational user guidance
	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-0864-2012

Evaluation results regarding development and production environment

The IT product Crypto Library V2.7 NXP Smart Card Controller P5CD081V1D and its major configurations (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 19 December 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, ALC_TAT.1) are fulfilled for the development and production sites of the TOE listed below:

1. NXP Semiconductors Germany GmbH, Business Unit Identification, Stresemannallee 101, D-225292 Hamburg (Development and Customer Support).
2. NXP Semiconductors (Thailand), Assembly Plant Bangkok, Thailand (APB), 303 Moo Chaengwattana Rd., Laksi, Bangkok 10210 Thailand (Test center, module assembly and delivery).
3. NXP Semiconductors GmbH, Business Unit Identification, Document Control, Office Mikron-Weg 1, A-8101 Gratkorn (Document control).
4. Systems on Silicon Manufacturing Co. Pte. Ltd. (SSMC), 70 Pasir Ris Drive, 1 Singapore 519527 (Wafer fab).
5. Toppan Photomasks Korea Ltd., 345-1, Sooha-Ri ShinDoon-Myon, 467-840 Ichon, South Korea (Mask Shop).
6. Chipbond Technology Corporation, No. 3, Li-Hsin Rd. V, Science Based Industrial Park, Hsin-Chu City, Taiwan R.O.C. (Bumping).
7. NXP Semiconductors Germany GmbH, IC Manufacturing Operations – Test Center Hamburg (IMO TeCH), Stresemannallee 101, D-22529 Hamburg (Delivery, Test and Assembly).
8. NedCard B.V., Bijsterhuizen 25-29, 6604 LM Wijchen, The Netherlands (Module Assembly), Site Certification ID BSI-DSZ-CC-S-0003
9. NXP Semiconductors Taiwan Ltd., Assembly Plant Kaohsiung (APK), #10, Jing 5th Road, N.E.P.Z Kaohsiung 81170, Taiwan R.O.C. (Test center and module assembly)

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

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