

# Certification Report

**BSI-DSZ-CC-0801-2012**

for

**Samsung S3CT9P3 16-Bit RISC Microcontroller for  
Smart Cards, Revision 0 with optional Secure RSA  
and ECC Library (Version 2.0) including specific IC  
Dedicated Software**

from

**Samsung Electronics**

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# Deutsches IT-Sicherheitszertifikat

erteilt vom



Bundesamt für Sicherheit in der Informationstechnik

## BSI-DSZ-CC-0801-2012

### Samsung S3CT9P3 16-Bit RISC Microcontroller for Smart Cards, Revision 0 with optional Secure RSA and ECC Library (Version 2.0) including specific IC Dedicated Software

from Samsung Electronics

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 AVA\_VAN.5 and ALC\_DVS.2



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, 13 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, AVA\_VAN.5, ADV\_FSP.5, ADV\_INT.2, ADV\_TDS.4, ALC\_CMS.5, ALC\_TAT.2 and ATE\_DPT.3 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 Samsung S3CT9P3 16-Bit RISC Microcontroller for Smart Cards, Revision 0 with optional Secure RSA and ECC Library (Version 2.0) including specific IC Dedicated Software, has undergone the certification procedure at BSI. This is a re-certification based on BSI-DSZ-CC-0720-2011. Specific results from the evaluation process BSI-DSZ-CC-0720-2011 were re-used.

The evaluation of the product Samsung S3CT9P3 16-Bit RISC Microcontroller for Smart Cards, Revision 0 with optional Secure RSA and ECC Library (Version 2.0) including specific IC Dedicated Software was conducted by TÜV Informationstechnik GmbH. The evaluation was completed on 31 July 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: Samsung Electronics.

The product was developed by: Samsung Electronics.

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

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<sup>6</sup> 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 Samsung S3CT9P3 16-Bit RISC Microcontroller for Smart Cards, Revision 0 with optional Secure RSA and ECC Library (Version 2.0) including 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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San24  
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Korea

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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 **Samsung S3CT9P3 16-Bit RISC Microcontroller for Smart Cards, Revision 0 with optional Secure RSA and ECC Library (Version 2.0) including specific IC Dedicated Software**, also referred to shortly as S3CT9P3.

The Target of Evaluation (TOE), the S3CT9P3 revision 0 microcontroller with optional Secure RSA/ECC Library version 2.0, featuring the TORNADO™ 2MX2 cryptographic coprocessor, is a smartcard integrated circuit which is composed of a processing unit, security components, contact based I/O ports, hardware circuit for testing purpose during the manufacturing process and volatile and non-volatile memories (hardware). The TOE also includes any IC Designer/Manufacturer proprietary IC Dedicated Software as long as it physically exists in the smartcard integrated circuit after being delivered by the IC Manufacturer. Such software (also known as IC firmware) is used for testing purpose during the manufacturing process but also provides additional services to facilitate the usage of the hardware and/or to provide additional services, including optional RSA/ECC asymmetric cryptography library and AIS31 compliant random number generator ([6]). The RSA/ECC library further includes the functionality of hash computation. The use for keyed hash operations like HMAC or similar security critical operations involving keys and other secrets, is not subject of this TOE and requires specific security improvements and DPA analysis including the operating system, which is not part of this TOE. However, this functionality is intended to be used for signature generation and verification only. All other software is called Smartcard Embedded Software and is not part of the TOE.

The TOE is intended to be used in a range of high security applications like banking and finance applications, communication highways Internet access and transaction processing), transport and ticketing applications (access control cards) and Governmental cards (ID cards, health cards, driving licenses). Several security features independently implemented in hardware or controlled by software will be provided to ensure proper operations and the integrity and confidentiality of stored data. This includes measures for memory protection, leakage protection and sensors to allow operations only under specified conditions.

Regarding the RSA and ECC library, the user has the possibility to tailor this IC Dedicated Software part of the TOE during the manufacturing process by deselecting the RSA and ECC library. Hence the TOE can be delivered with or without the functionality of the RSA and ECC library what's resulting in two TOE configurations. This is considered in this Security Target and corresponding notes (indicated by "optional") are added where required. If the user decides not to use the RSA/ECC crypto library, the library is not delivered to the user and the accompanying "Additional Specific Security Functionality (O.Add-Functions)" RSA and Elliptic Curve Cryptography (ECC) is not provided by the TOE. Deselecting RSA and ECC library means excluding the code implementing functionality, which the user decided not to use. Excluding the code of the deselected functionality has no impact on any other security policy of the TOE, it is exactly equivalent to the situation where the user decides just not to use the functionality. The S3CT9P3 single-chip CMOS micro-controller is designed and packaged specifically for "Smart Card" applications.

The main security features of the S3CT9P3 integrated circuit are:

- Security sensors or detectors including High and Low Temperature detectors, High and Low Frequency detectors, High and Low Supply Voltage detectors, Supply Voltage Glitch detectors, Light detector and the Passivation Removing Detector,
- Active Shields against physical intrusive attacks,
- Dedicated tamper-resistant design based on synthesizable glue logic and secure topology,
- Dedicated hardware mechanisms against side-channel attacks such as Internal Variable Clock, Random Current Generator, Random Waits Generator, RAM and EEPROM encryption mechanisms,
- Secure DES Symmetric Cryptography support,
- Secure TORNADO™2MX2 coprocessor for RSA and ECC Asymmetric Cryptographic Support,
- A Hardware True Random Number Generator (DTRNG) that meet P2 class of AIS31 [4].

For more details please refer to the Security Target Lite [9], chapter 1.2.2.

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 [10].

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 AVA\_VAN.5 and ALC\_DVS.2.

The TOE Security Functional Requirements (SFR) relevant for the TOE are outlined in the Security Target [6] and [9], chapter 6.1. 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 Functionalities:

TOE Security Functionality	Addressed issue
SFR1	Failure with preservation of secure state
SFR2	Limited fault tolerance
SFR3	Resistance to physical attacks
SFR4	Subset access control
SFR5	Security attribute based access control
SFR6	Static attribute initialization
SFR7	Management of security attributes
SFR8	Specification of management functions
SFR9	Audit Storage
SFR10	Limited capabilities
SFR11	Limited availabilities
SFR12	Subset information flow control
SFR13	Basic internal transfer protection

TOE Security Functionality	Addressed issue
SFR14	Basic internal TSF data transfer protection
SFR15	Random number generation
SFR16	Cryptographic operation
SFR17	Cryptographic key generation

Table 1: TOE Security Functionalities

For more details please refer to the Security Target [6] and [9], chapter 7.1.

The assets to be protected by the TOE are defined in the Security Target [6] and [9], chapter 3.1. 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 [9], chapter 3.1 to 3.4.

This certification covers the following configurations of the TOE:

- Smartcard IC S3CT9P3 Revision 0,
- Smartcard IC S3CT9P3 Revision 0 with Secure Crypto Library V2.0.

For more details refer to chapter 8.

The vulnerability assessment results as stated within this certificate do not include a rating for those cryptographic algorithms and their implementation suitable for encryption and decryption (see BSIG Section 9, Para. 4, Clause 2).

The certification results only apply to the version of the product indicated in the certificate and on the condition that all the stipulations are kept as detailed in this Certification Report. This certificate is not an endorsement of the IT product by the Federal Office for Information Security (BSI) or any other organisation that recognises or gives effect to this certificate, and no warranty of the IT product by BSI or any other organisation that recognises or gives effect to this certificate, is either expressed or implied.

## 2 Identification of the TOE

The Target of Evaluation (TOE) is called:

**Samsung S3CT9P3 16-Bit RISC Microcontroller for Smart Cards, Revision 0 with optional Secure RSA and ECC Library (Version 2.0) including specific IC Dedicated Software**

The following table outlines the TOE deliverables:

No	Type	Identifier	Release	Form of delivery
1	HW	S3CT9P3 incl. ROM code	Revision 0	Wafer or Module
2	SW	DTRNG	V2.0	Object file in electronic form
3	SW	Test ROM Code	V1.0	Included in S3CT9P3 Test ROM
4	SW	Secure RSA/ECC Crypto Library (optional)	V2.0	Object file in electronic form
5	DOC	S3CT9P3 Chip Delivery Specification	V1.0	Softcopy



### 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 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 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 (DTRNG).

The RSA/ECC library is used to provide a high level interface to RSA/ECC cryptography implemented on the hardware component TORNADO™2MX2 and includes countermeasures against SPA, DPA and DFA attacks. Also, the RSA key generation functionality contains countermeasures against SPA and DFA attacks. The SHA library provides the calculation of a hash value of freely chosen data input in the CPU.

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 Triple-DES, RSA/ECC 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: Usage of Hardware Platform, Treatment of User Data, Protection during TOE Development and Production, Protection during Packaging, Finishing and Personalisation. Details can be found in the Security Target [6] and [9], chapter 4.2.

### 5 Architectural Information

The **Samsung S3CT9P3 16-Bit RISC Microcontroller for Smart Cards, Revision 0 with optional Secure RSA and ECC Library (Version 2.0) including specific IC Dedicated Software** is an integrated circuit (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 [9], chapter 1.2.2. The complete hardware description and the complete instruction set of the TOE is to be found in guidance documents delivered to the customer, see table 2.

The TOE consists of the 18 subsystems (15 hardware / 3 software). For the implementation of the TOE security functionalities basically the components processing unit (CPU) with ROM, EEPROM, RAM, I/O, True Random Number Generator (DTRNG), TORNADO™, Clock, Timer / 16-bit Timer and 20-bit Watchdog, Detectors and Security Control, Reset, Address and Data Bus, DES, Power Control, MPU / Memory Protection



Unit, Testrom\_code, Crypto Library RSA/ECC and DTRNG Library are used. Security measures for physical protection are realised within the layout of the whole circuitry. The Special Function Registers, the CPU instructions and the various on-chip memories provide the interface to the software using the security functionalities of the TOE. For more details refer to [9, chapter 1.1.1].

## 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

The TOE can be delivered in two configurations:

- Smartcard IC S3CT9P3 Revision 0,
- Smartcard IC S3CT9P3 Revision 0 with Secure Crypto Library V2.0.

No further generation of the TOE takes place after delivery to the customer. After delivery the TOE only features one fixed configuration (normal mode), which cannot be altered by the user. The TOE was tested in this configuration. All the evaluation and certification results therefore are only effective for this version of the TOE. For all evaluation activities performed in test mode, there was a rationale why the results are valid for the normal mode, too.

Every information of how to use the TOE and its Security Functionality by the software is provided within the user documentation.

## 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 EAL5 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).

For DTRNG assessment, the scheme interpretations AIS 31 was used (see [4]).

To support composite evaluations according to AIS 36 the document ETR for composite evaluation [11] 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 AVA\_VAN.5 and ALC\_DVS.2 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-0720-2011, re-use of specific evaluation tasks was possible. The focus of this re-evaluation was on improved Hardware and specific Library parts.

The evaluation has confirmed:

- PP Conformance: Security IC Platform Protection Profile, Version 1.0, 15 June 2007, BSI-CC-PP-0035-2007 [10]
- for the Functionality: PP conformant plus product specific extensions  
Common Criteria Part 2 extended
- for the Assurance: Common Criteria Part 3 conformant / extended  
EAL 5 augmented by AVA\_VAN.5 and ALC\_DVS.2

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: SFR16.

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

- hash functions: SHA-224, SHA-256, SHA-384 and SHA-512
- algorithms for the encryption and decryption: 3DES, RSA and ECC

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 Functionality 2-key Triple DES (3DES) provided by the TOE achieves a security level of maximum 80 Bits (in general context). SHA1 is not within the scope of this evaluation.

## 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 [11].

The TOE is delivered to the Composite Product Manufacturer and to the Security IC Embedded Software Developer. The actual end-consumer obtains the TOE from the Composite Product Issuer together with the application which runs on the TOE. The Security IC Embedded Software Developer receives all necessary recommendations and hints to develop his software in form of the delivered documentation.

- All security hints described in [12] and the delivered documents [13]..[15] 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 [16] have to be considered.

## 11 Security Target

For the purpose of publishing, the Security Target [9] of the Target of Evaluation (TOE) is provided within a separate document as Annex A of this report. It is a sanitised version of the complete Security Target [6] used for the evaluation performed. Sanitisation was performed according to the rules as outlined in the relevant CCRA policy (see AIS 35 [4]).

## 12 Definitions

### 12.1 Acronyms

<b>AES</b>	Advanced Encryption Standard
<b>AIS</b>	Application Notes and Interpretations of the Scheme
<b>BSI</b>	Bundesamt für Sicherheit in der Informationstechnik / Federal Office for Information Security, Bonn, Germany
<b>BSIG</b>	BSI-Gesetz / Act on the Federal Office for Information Security
<b>CBC</b>	Cipher Block Chaining
<b>CC</b>	Common Criteria for IT Security Evaluation
<b>CRC</b>	Cyclic Redundancy Check
<b>CPU</b>	Central Processing Unit
<b>CMOS</b>	Complimentary Metal Oxide Semiconductor
<b>DES</b>	Data Encryption Standard; symmetric block cipher algorithm
<b>DPA</b>	Differential Power Analysis
<b>DTRNG</b>	A Hardware True Random Number Generator
<b>EAL</b>	Evaluation Assurance Level
<b>ECB</b>	Electronic Code Book
<b>ECC</b>	Elliptic Curve Cryptography
<b>EEPROM</b>	Electrically Erasable Programmable Read Only Memory
<b>EMA</b>	Electro Magnetic Analysis
<b>ETR</b>	Evaluation Technical Report
<b>HMAC</b>	Hash-based Message Authentication Code
<b>IC</b>	Integrated Circuit
<b>I/O</b>	Input/Output
<b>IT</b>	Information Technology
<b>ITSEF</b>	Information Technology Security Evaluation Facility
<b>MPU</b>	Memory Protection Unit
<b>PP</b>	Protection Profile
<b>RAM</b>	Random Access Memory
<b>RNG</b>	Random Number Generator
<b>ROM</b>	Read Only Memory
<b>RSA</b>	Rivest, Shamir, Adleman – a public key encryption algorithm
<b>SF</b>	Security Function
<b>SFP</b>	Security Function Policy
<b>SFR</b>	Security Functional Requirement

<b>SOF</b>	Strength of Function
<b>ST</b>	Security Target
<b>TOE</b>	Target of Evaluation
<b>Triple-DES</b>	Symmetric block cipher algorithm based on the DES
<b>TRNG</b>	True Random Number Generator
<b>TSC</b>	TSF Scope of Control
<b>TSF</b>	TOE Security Functions
<b>TSP</b>	TOE Security Policy
<b>TSS</b>	TOE Summary Specification
<b>UART</b>	Universal Asynchronous Receiver and Transmitter
<b>USB</b>	Universal Serial Bus

**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<sup>8</sup>.
- [5] German IT Security Certificates (BSI 7148), periodically updated list published also in the BSI Website
- [6] Security Target of S3CT9P3 16-bit RISC Microcontroller for Smart Card with optional Secure RSA and ECC Library including specific IC Dedicated Software – Project Crow V, Version 1.3, 2012-03-22, Samsung Electronics (confidential document)
- [7] Evaluation Technical Report Summary (ETR Summary), BSI-DSZ-CC-0801, S3CT9P3 Revision 0, Version 1, 2012-04-30, TÜViT (confidential document)
- [8] Life Cycle Definition (Class ALC\_CMC.4/CMS.5) – Project Crow V, Version 1.1, 2012-03-06, Samsung Electronics (confidential document)
- [9] Security Target Lite of S3CT9P3 16-bit RISC Microcontroller for Smart Card with optional Secure RSA and ECC Library including specific IC Dedicated Software – Project Crow V, Version 1.0, 2012-03-23, Samsung Electronics (sanitised public document)

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<sup>8</sup>specifically

- AIS 25, Application Notes and Interpretation of the Scheme (AIS), AIS25, Anwendung der CC auf Integrierte Schaltungen, Version 7, 2011-06-30, Bundesamt für Sicherheit in der Informationstechnik.
- AIS 26, Application Notes and Interpretation of the Scheme (AIS), AIS 26, Evaluationsmethodologie für in Hardware Integrierte Schaltungen, Version 8, 2011-06-08, Bundesamt für Sicherheit in der Informationstechnik.
- AIS 31, Application Notes and Interpretation of the Scheme (AIS), AIS 31, Functionality classes and evaluation methodology for physical random number generators, Version 1, 2001-09-25, Bundesamt für Sicherheit in der Informationstechnik.
- AIS 32, Application Notes and Interpretation of the Scheme (AIS), AIS32, CC-Interpretationen im deutschen Zertifizierungsschema, Version 7, 2011-06-08, Bundesamt für Sicherheit in der Informationstechnik
- AIS 34, Application Notes and Interpretation of the Scheme (AIS), AIS34, Evaluation Methodology for CC Assurance Classes for EAL5+ (CC v2.3 & v3.1) and EAL6 (CC v3.1), Version 3, 2009-09-03, Bundesamt für Sicherheit in der Informationstechnik.
- AIS 35, Application Notes and Interpretation of the Scheme (AIS), AIS35, Öffentliche Fassung eines Security Target (ST-lite), Version 2, 12.11.2007, Bundesamt für Sicherheit in der Informationstechnik.
- AIS 36, Anwendungshinweise und Interpretationen zum Schema (AIS), AIS 36, Kompositionsevaluierung, Version 3, 2010-10-19, Bundesamt für Sicherheit in der Informationstechnik.
- AIS 38, Application Notes and Interpretation of the Scheme (AIS), AIS38, Reuse of evaluation results, version 2, 2007-09-28, Bundesamt für Sicherheit in der Informationstechnik.

- [10] Security IC Platform Protection Profile, Version 1.0, 15 June 2007, BSI-CC-PP-0035-2007
- [11] ETR for composite evaluation according to AIS 36 for the Product S3CT9P3 Revision 0, Version 1.0, 2012-04-30, TÜViT (confidential document)
- [12] User's manual S3CT9XX 16-Bit CMOS Microcontroller for Smart Card, Supported Device: S3CT9KW/KC/KA/K9/K7/K3/PC/PA/P 7/P3/AC/AA/A7, Version 1.21, November 2011, Samsung Electronics
- [13] Security Application Note, S3CT9KA\_K7\_K3\_PC\_PA\_P7\_P3\_AC\_AA\_A7, Version 1.5, 2012-03-05, Samsung Electronics
- [14] TORNADO-2Mx2 RSA/ECC Library API Manual, Version 2.04, 2012-03-05, Samsung Electronics
- [15] S3xT9xx DTRNG library application note, Version 1.3, 2012-03-23, Samsung Electronics
- [16] S3CT9P3 Chip Delivery Specification, Version 1.0, 03.2012, Samsung Electronics



## C Excerpts from the Criteria

CC Part1:

### Conformance Claim (Release 3 = 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:







## **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-0801-2012

### Evaluation results regarding development and production environment



The IT product Samsung S3CT9P3 16-Bit RISC Microcontroller for Smart Cards, Revision 0 with optional Secure RSA and ECC Library (Version 2.0) including 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 13 August 2012, the following results regarding the development and production environment apply. The Common Criteria assurance requirements ALC–Life cycle support ALC\_CMC.4, ALC\_CMS.5, ALC\_DEL.1, ALC\_DVS.2, ALC\_LCD.1 and ALC\_TAT.2 are fulfilled for the development and production sites of the TOE listed below:

Site	Address	Function
Giheung Plant	Samsung Electronics. Co., Ltd. San24, Nongseodong, Giheung-gu, Yongin-City, Gyeonggido , 449-711, Korea	Development, Production (Wafer Fab, Initialisation and Pre-personalisation)
Hwasung Plant	Samsung Electronics. Co., Ltd. San #16, Banwol-Ri, Hwasung-Eup, Gyeonggi-Do, 445-701, Korea	Development (Server room, Mask data preparation)
Onyang Plant	Samsung Electronics. Co., Ltd., San #74, Buksoo-Ri, Baebang-Myun, Asan-City, Chungcheongnam-Do, 449-711, Korea	Production (Warehouse/Delivery)
Cheonan Plant (PKL)	PKL Co., Ltd. Plant, 493-3 Sungsung-Dong, Cheonan-City, Choongcheongnam-Do, 330-300, Korea	Production (Mask House)
Asan Plant (Hanamicron)	Hanamicron Co., Ltd., #95-1, Wonnam-Li, Umbong-Myeon, Asan-City, Choongcheongnam-Do, 449-711, Korea	Production (Grinding, Sawing)
Shanghai Plant I (ChangFeng)	Changfeng Co., Ltd., No. 818 Jin Yu Road, Jin Qiao Export Processing Zone Pudong, Shanghai, China	Production (Sawing, COB Assembly)
Shanghai Plant II (Eternal)	ETERNAL Co., Ltd., No.1755, Hong Mei South Road, Shanghai, China	Production (Sawing, COB Assembly, Warehouse and Delivery)

For the sites listed above, the requirements have been specifically applied in accordance with the Security Target [6]. The evaluators verified, that the threats, security objectives and requirements for the TOE life cycle phases up to delivery (as stated in the Security Target [6] and [9]) are fulfilled by the procedures of these sites.

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