



CardOS V5.0

The smart card operating system
for the highest demand

Certified security for the highest demands

Fullfillment of highest security demands – CardOS V5.0 is a multi-purpose smart card operating system which complies with international smart card Standards and provides simple and efficient use in standardized environments and applications.

Overview

Flexibility, speed and security need to go hand in hand in today's business environment. It's no longer an option to have fixed, static and slow-moving security that prevents business from flowing at the required pace. Yet, security is more critical than ever before.

Smart cards are fast becoming the basis of many of today's security solutions. Atos smart cards are now being used by public authorities, businesses and institutions because they address today's unique business problems.

Through our leading CardOS® solutions, we provide you with smart cards that guarantee identity and control access and make you more efficient for business, customers and people.

Our Atos CardOS V5.0 smart card operating system provides an outstanding level of security and quality. Used in different smart card markets CardOS V5.0 offers a multitude of applications like eID, citizen cards, health insurance and health professional cards, employee badges, signature cards, as well as loyalty cards.

With the CardOS V5.0 Atos has developed a versatile and powerful smart card operating system. It perfectly combines flexibility with the very highest security requirements.

As well, CardOS represents the many years of know-how Atos has developed by being both a world-leading systems integrator and a leader in smart card development.

Highlights

CardOS V5.0 is a multifunctional native smart card operating system, which is extendable by customized packages to amend or adjust the operating system functionality.

In addition the authentication framework is a flexible option to realize authentication protocols by using configuration data.

With the ICAO functionality (ICAO Doc 9303) CardOS V5.0 is suited for contact based eID projects based on BAC and EAC protocols.

CardOS V5.0 offers state-of-the-art crypto algorithms with AES, SHA-2 and elliptic curves.

The ISO compliant security architecture of CardOS V5.0 supports access rules in expanded format.

Atos CardOS API middleware is available separately and provides the best integration to standard applications on Windows, Linux and MacOS.

Hardware platform

CardOS V5.0 is based on the innovative digital security technology 'Integrity Guard' from Infineon and is implemented on the SLE78 next generation security controller platform using SOLID FLASH™¹. SOLID FLASH™ products offer significant value add like increased logistic flexibility and faster time to market.

CardOS V5.0 is available on the chips SLE78CFX3000P and SLE78CFX2400P providing 96 kByte user memory and 36 kByte user memory respectively. Certification covers also the derivate SLE78CFX4000P, which is available on request for higher memory requirements.

CardOS V5.0 is available in wafer form, as M4.8 module, as smart card in ID-1, ID-000 or Micro SIM format and as SMD chip VQFN32.

Certified security

CardOS V5.0 is certified according to Common Criteria EAL4+ in compliance with:

- SSCD-PP Type 3 (CWA 14169),
 - German signature law / ordinance on electronic signatures (SigG/SigV),
- with respective signature applications.

Basic features

CardOS V5.0 offers the following general features:

- ISO/IEC 7816 compatible commands,
- Compatibility with the most important international standards providing long-term security for integration in standardized environments (readers, applications, etc.),
- Expandability of the operating system with the subsequent addition of software packages,
- Integrity protection of all active software packages preventing the use of corrupt software,
- "Command chaining" in accordance with ISO/IEC 7816-4,
- A dynamic, flexible file system based on ISO/IEC 7816-4 with the following characteristics:
 - Number of files and folders with any depth of nesting,
 - Support of Short File IDs,
 - Dynamic memory management for optimal utilization of the available EEPROM,
 - Protection mechanisms against EEPROM defects, power failure and card tearing,
 - Flexible Memory Management for RAM and EEPROM,
- Support of CV (card verifiable) certificates
 - Extraction and use of the public key directly from the certificate,
 - Verification of certificates and certificate chains.

¹ SOLID FLASH™ is a registered trademark of Infineon Technologies AG

Technical Highlights

Cryptographic functions and algorithms

- 3DES
- AES up to 256 bit
- RSA up to 4096 bit
- ECDH up to 521 bit
- SHA-1, SHA-224, SHA-256, SHA-384, SHA-512
- ECDSA up to 521 bit

Standards

- ISO 7816 (parts 3, 4, 8 and 9)
- ICAO Doc 9303 (BAC, EAC)
- BSI TR-03110 (EACv1, RI)

Electrical specification

- Supply Voltage: 1.62 V to 5.5 V
- Frequency Range: 1 MHz to 10 MHz
- Operating Temperature Range: -25 to +85°C (chip, module)

Chip

- Infineon SLE78CFX2400P
- Infineon SLE78CFX3000P
- Infineon SLE78CFX4000P on request

Delivery types

- Wafer
- Contact Module M4.8
- Card formats ID-1, ID-000, Micro SIM
- SMD Chip USON-10 on request

CardOS V5.0 – powerful smart card operating system – deployable for diverse applications in different smart card markets.

eID support

CardOS V5.0 provides support for contact based eID features according to ICAO DOC9303 and BSI TR-03110:

- Basic Access Control (BAC),
- Extended Access Control (EACv1):
 - Chip Authentication (CA) with ECDH,
 - Terminal Authentication (TA) with ECDSA,
- Restricted Identification (RI) with ECDH.

Data security

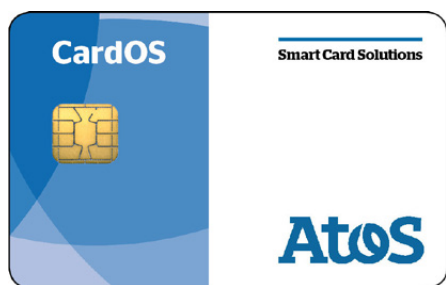
CardOS V5.0 provides optimal data security with a clearly structured ISO compliant security architecture and a wide variety of extremely flexible protection mechanisms, such as:

- Different life cycle phases influencing the permitted commands,
- Access Rules in expanded format, stored either in one or more EF.ARRs or supplied directly with the command creating the file or object,
- Secure storage of PINs and keys as objects (without reservation of file IDs),
- Test objects like PINs defined to allow unlimited or limited (up to 254) uses until a new authentication is necessary („Security Status Evaluation Counter“),
- Stepwise refinement of the security structure after file generation without loss of data,
- Secure messaging for cryptographically secured communication between the card and the terminal or host.

Cryptographic functions

CardOS V5.0 provides a large number of cryptographic functions and algorithms, such as:

- Symmetric Algorithms:
 - Triple DES (CBC) with ISO padding,
 - DES MAC3 and Retail MAC with ISO or ANSI padding,
 - AES (CBC) with key length 128, 192, 256 bit,
 - AES CMAC with ISO padding,
- Asymmetric algorithms:
 - RSA based on CRT with an arbitrary public exponent with key length up to 4096 bit,
 - PKCS#1-BT1 or PKCS#1-BT2 padding,
 - PSS Padding according to PKCS#1 V2.1,
 - Elliptic Curve Cryptography based on GF(p) with key length up to 512 bit,
- Calculation of cryptographic hash values with SHA-1, SHA-224, SHA-256, SHA-384, SHA-512,
- Creation and verification of digital signatures with RSA and ECDSA,
- Internal and external key generation for RSA and EC keys,
- Secured key import with Secure Messaging,
- Key Agreement with EC-Diffie-Hellmann (ECDH), EC Key Agreement of ElGamal Type (EC-KAEG),
- Flexible derivation of session keys,
- True random number generator.



Initialization and personalization

The partly patented personalization and initialization procedures facilitate cost-efficient mass production of the CardOS V5.0 cards as well as high performance, highly secure modification of existing applications and the addition of new applications in the field.

- Support of independent personalization for individual applications,
- Integrated security concept for initialization and personalization.

Communication protocols

Transmission protocol according to ISO/IEC 7816-3:

- T=1 protocol,
- Support of extended length APDUs according to ISO/IEC 7816-4,
- Up to four logical channels,
- Support of protocol parameter selection (PPS),
- Support of WTX (Waiting Time eXtension),
- Fast, selectable card communication with up to 446 kbaud.

Tools and support

To help with the integration of CardOS V5.0 the following are offered to customers:

- Manuals and script files,
- Script tool for executing card commands and loading packages,
- Professional Services:
 - Professional support for integration projects,
 - Customized Packages and File Structures,
- CardOS API, the standard cryptographic interface for CardOS token with Microsoft Base CSP and PKCS#11 support,
- Delivery of complete turn-key solutions for registration, usage and revocation of smart cards.

About Atos

Atos is a global leader in digital transformation with approximately 100,000 employees in 72 countries and annual revenue of around € 12 billion. The European number one in Big Data, Cybersecurity, High Performance Computing and Digital Workplace, The Group provides Cloud services, Infrastructure & Data Management, Business & Platform solutions, as well as transactional services through Worldline, the European leader in the payment industry. With its cutting-edge technologies, digital expertise and industry knowledge, Atos supports the digital transformation of its clients across various business sectors: Defense, Financial Services, Health, Manufacturing, Media, Energy & Utilities, Public sector, Retail, Telecommunications and Transportation. The Group is the Worldwide Information Technology Partner for the Olympic & Paralympic Games and operates under the brands Atos, Atos Consulting, Atos Worldgrid, Bull, Canopy, Unify and Worldline. Atos SE (Societas Europaea) is listed on the CAC40 Paris stock index.

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Bull is the Atos brand for its technology products and software, which are today distributed in over 50 countries worldwide. With a rich heritage of over 80 years of technological innovation, 2000 patents and a 700 strong R&D team supported by the Atos Scientific Community, it offers products and value-added software to assist clients in their digital transformation, specifically in the areas of Big Data and Cybersecurity.

Bull is the European leader in HPC and its products include bullx, the energy-efficient supercomputer; bullion, one of the most powerful x86 servers in the world developed to meet the challenges of Big Data; Evidian, the software security solutions for identity and access management; Trustway, the hardware security module and Hoox, the ultra-secure smartphone. Bull is part of Atos.

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