



Security & Chip Card ICs

SLE 11C001S

16-bit Security Controller with
32-Kbyte ROM, 1280 bytes RAM and
16-Kbyte EEPROM

This document contains preliminary information on a new product under development. Details are subject to change without notice.

Revision History: Current Version 10.01

Previous Releases: 03.99

Page	

<p>Important: Further information is confidential and on request. Please contact: Infineon Technologies AG in Munich, Germany, Security & Chip Card ICs, Tel +49 - (0)89 234-80000 Fax +49 - (0)89 234-81000 E-Mail: security.chipcard.ics@infineon.com</p>
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Information

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16-bit Security Controller with 32-Kbyte ROM, 1280 Bytes RAM and 16-Kbyte EEPROM

Features

- 16-bit microcomputer in 0.6 μm CMOS technology
- Instruction set opcode compatible with standard SAB 8051 processor
- Enhanced 16-bit arithmetic
- Additional powerful instructions optimized for chip card applications
- Dedicated, non-standard architecture with **execution time six times faster** than standard SAB 8051 processor
- **31.5-Kbytes User ROM** for application programs
- 512-bytes reserved ROM for Resource Management System (RMS) with intelligent write/erase routines
- **16-Kbytes EEPROM** as program/data memory
- **1280 bytes RAM**
- **CRC Module**
- Power saving sleep mode
- Clock freq. = int. freq.: 1 to 7.5 MHz
- Contact configuration and serial interface in accordance with ISO 7816
- Supply voltage range: 2.7 V to 5.5 V
- Current consumption < 10 mA at 5 MHz and 5.5 V
- Temperature range: -25 to +70°C
- ESD protection larger than 4 kV
- Software compatible with SLE 66C160S, SLE 44C160S

EEPROM

- Reading, erasing and writing byte by byte
- Flexible page mode for 1 to 64 bytes write/erase operation
- 32 bytes security area
- Write time 3.6 ms, erase time 1.8 ms
- Programming time adaptable to clock frequency
- **Minimum of 500,000 write/erase cycles**
- Data retention for a minimum of ten years
- EEPROM programming voltage generated on chip

Security Features

Operation state monitoring mechanism

- Low and high voltage sensors
- Frequency sensors and filters

Memory Security

- 16 bytes security PROM, hardware protected
- Unique chip identification number for each chip
- MED – memory encryption/decryption device for XRAM, ROM and EEPROM
- Security optimised layout and layout scrambling
- Mask specific encryption key for EEPROM
- Move code blocking (from EEPROM)

Support

- HW-& SW-Tools (Emulator, ROM Monitor, Card Emulator, Simulator, Softmasking)
- Application notes (e.g.: T=0, T=1, DES, etc.)

Testmode

- Irreversible Lock - Out of testmode

Anti Snooping

- HW-countermeasures against SPA/DPA-, Timing- and DFA-attacks (differential fault analysis – DFA)
- CRC - Module
- Non standard dedicated Smart Card CPU - Core

Development Tools Overview

- Short Product Information Software Development Kit SDK CC
- Short Product Information Card Emulator SCE66
- Short Product Information ROM Monitor SRM66
- Short Product Information Emulator SET66 Hitex or SET66 KSC
- Short Product Information Smart Mask Package

Supported Standards

- ISO/IEC 7816
- EMV 2000
- GSM 11.1x
- ETS I TS 102 221

Document References

- Confidential Data Book SLE 11CxxS
- Confidential Instruction SLE 66CxxS
- Confidential Quick Reference SLE 66CxxS
- Qualification report
- Chip delivery specification for wafer with chip-layout (die size, orientation,...)
- Module specification containing description of package, etc.
- Qualification report module

Ordering Information

Type	Package ¹	Voltage Range	Temperature Range	Frequency Range
SLE 11C001S-M4	M4	2.7 V - 5.5 V	– 25°C to + 70°C	1 MHz - 5 MHz
SLE 11C001S-C	C			
SLE 11C001S -T85-M4	M4	2.7 V - 5.5 V	– 25°C to + 85°C	1 MHz - 5 MHz
SLE 11C001S -T85-C	C			
SLE 11C001S -V5-M4	M4	4.5 V - 5.5 V	– 25°C to + 70°C	1 MHz - 5 MHz
SLE 11C001S -V5-C	C			
SLE 11C001S -V5-T85-M4	M4	4.5 V - 5.5 V	– 25°C to + 85°C	1 MHz - 5 MHz
SLE 11C001S -V5-T85-C	C			
SLE 11C001S -V5-F7-M4	M4	4.5 V - 5.5 V	– 25°C to + 70°C	1 MHz - 7.5 MHz
SLE 11C001S -V5-F7-C	C			

Production sites:

- Regensburg SLE 11CxxS
- UMC Taiwan SLE 11CxxU

¹ available as wire-bonded module (M4) for embedding in plastic cards or as die (C) for customer packaging

Pin Description

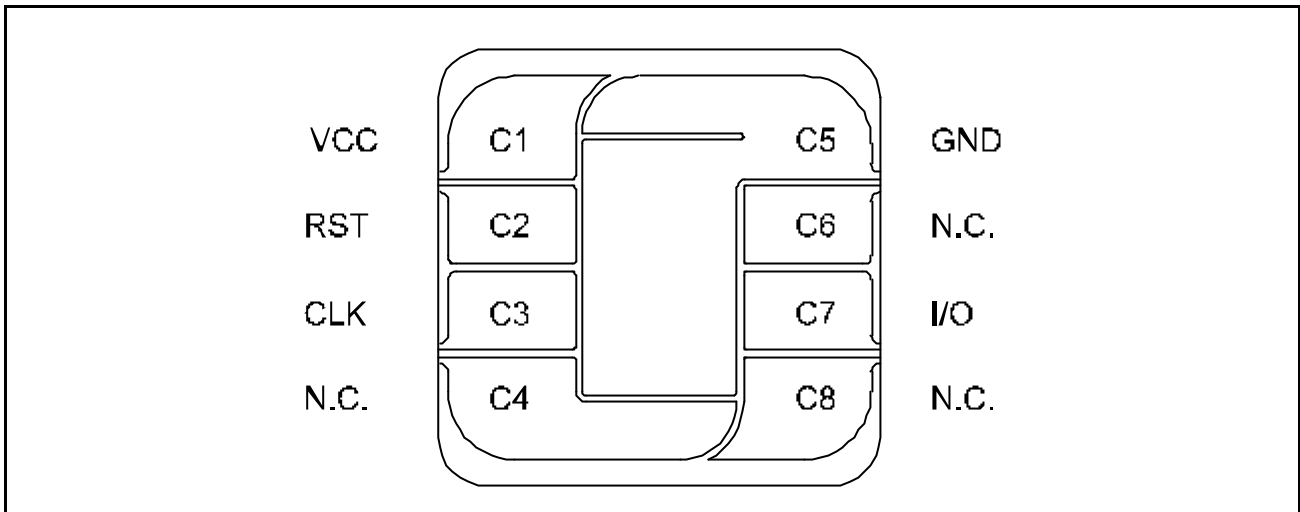


Figure 1 Pin Configuration (top view)

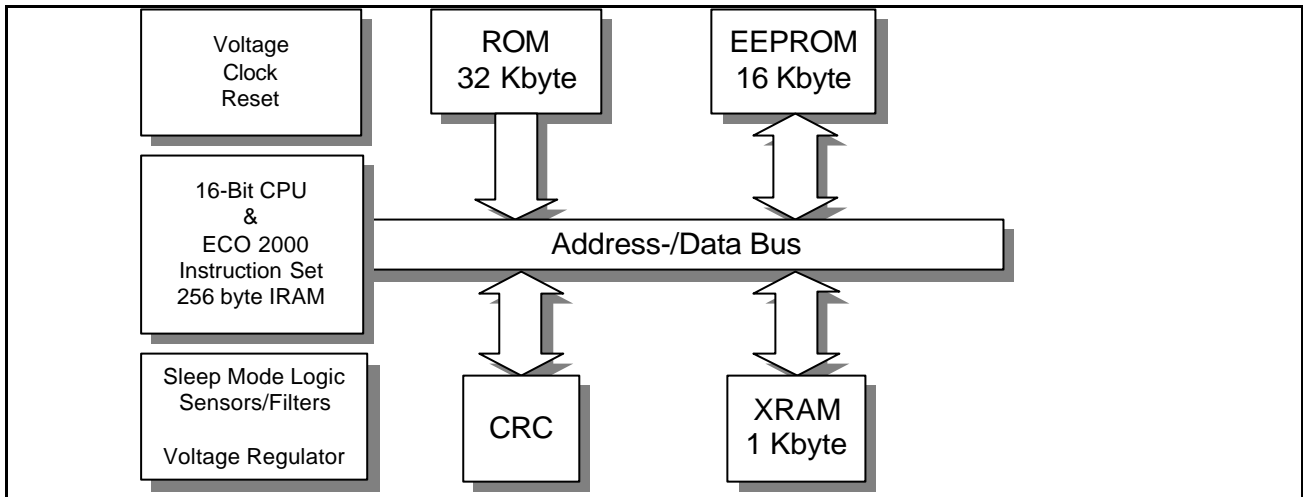
Pin Definitions and Functions

Card Contact	Symbol	Function
C1	VCC	Operating voltage
C2	RST	Reset input
C3	CLK	Processor clock input
C5	GND	Ground
C4;C6,C8	N.C.	Not connected
C7	I/O	Bi-directional data port

General Description

SLE 11C001S is a member of the Infineon Technologies high end security controller family in 0.6 µm CMOS technology. The CPU provides the high efficiency of the SAB 8051 instruction set extended by additional powerful instructions together with enhanced performance, memory sizes and security features.

The controller IC offers 31.5 Kbytes of User-ROM, 256 bytes internal RAM, 1024 bytes XRAM and 16 Kbytes EEPROM. It suits the requirements of the new generation of operating systems.



The CRC module allows the easy generation of checksums according to ISO 3309 (16-Bit-CRC). To minimize the overall power consumption, the chip card controller IC offers a sleep mode.

As an important measure, the chip provides a new and enhanced level of on-chip security features.

In conclusion, the SLE 11C001S fulfills the requirements of many chip card applications, and is especially well suited for use in SIM cards for GSM phones and also in health care applications. The SLE 11C001S is a powerful chip card controller IC integrating outstanding memory sizes, additional peripherals in combination with enhanced performance and optimized power consumption on a minimized die size. Therefore, the SLE 11C001S offers the basis for new chip card applications.