



## Security & Chip Card ICs

### SLE 22C05S

16-bit Security Controller with  
8-Kbytes ROM, 128 Bytes RAM and  
512-Bytes EEPROM

<b>SLE 22C05S Short Product Information</b>		Ref.: SPI_SLE 22C05S_1001
<b>This document contains preliminary information on a new product under development. Details are subject to change without notice.</b>		
<b>Revision History: Current Version 10.01</b>		
Previous Releases: 03.99		
Page		

**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

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## 16-bit Security Controller with 8-Kbytes ROM, 128 Bytes RAM and 512-Bytes 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
- **7.5-Kbytes User ROM** for application programs
- 512-bytes reserved ROM for Resource Management System (RMS) with intelligent write/erase routines
- **512-Bytes EEPROM** as program/data memory
- **128 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 < 8 mA at 5 MHz and 5.5 V
- Temperature range: -25 to +70°C
- ESD protection larger than 4 kV

### 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

### EEPROM

- Reading, erasing and writing byte by byte
- Flexible page mode for 1 to 8 bytes write/erase operation
- 24 bytes security area
- Write time 3.62 ms, erase time 1.81 ms
- **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

- 8 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)

### Document References

- Confidential Data Book SLE 22CxxS
- Confidential Instruction SET 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

**Support**

- HW-& SW-Tools (Emulator, ROM Monitor, Card Emulator, Simulator, Softmasking)
- Application notes

**Supported Standards**

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

**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

**Ordering Information**

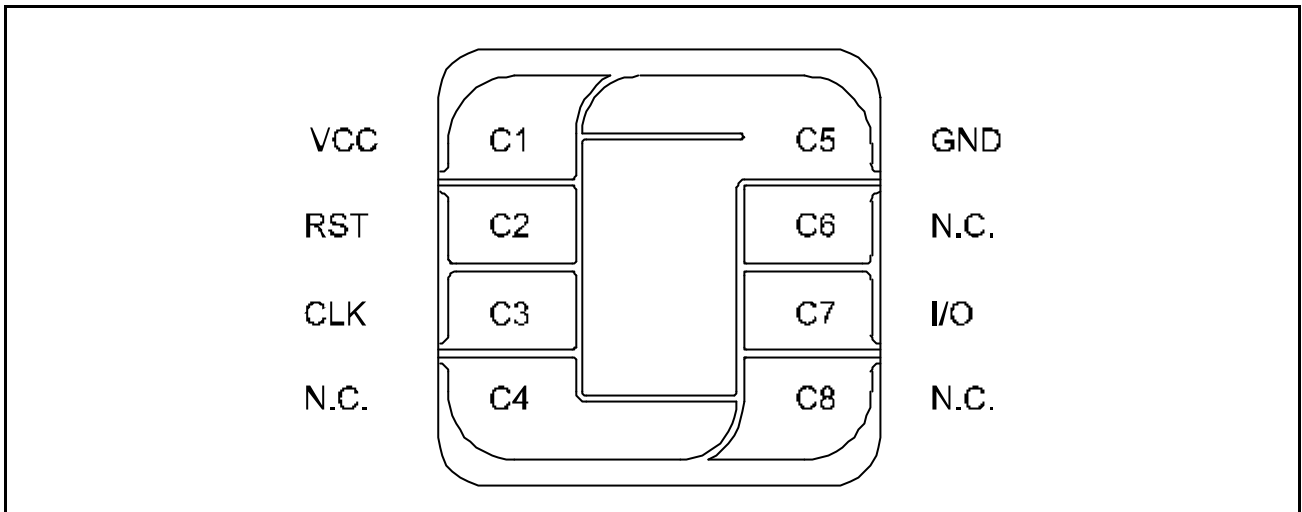
Type	Package <sup>1</sup>	Voltage Range	Temperature Range	Frequency Range
SLE 22C05S -M2	M2	2.7 V - 5.5 V	– 25°C to + 70°C	1 MHz - 5 MHz
SLE 22C05S -C	C			
SLE 22C05S -T85-M2	M2	2.7 V - 5.5 V	– 25°C to + 85°C	1 MHz - 5 MHz
SLE 22C05S -T85-C	C			
SLE 22C05S -V5-M2	M2	4.5 V - 5.5 V	– 25°C to + 70°C	1 MHz - 5 MHz
SLE 22C05S -V5-C	C			
SLE 22C05S -V5-T85-M2	M2	4.5 V - 5.5 V	– 25°C to + 85°C	1 MHz - 5 MHz
SLE 22C05S -V5-T85-C	C			
SLE 22C05S -V5-F7-M2	M2	4.5 V - 5.5 V	– 25°C to + 70°C	1 MHz - 7.5 MHz
SLE 22C05S -V5-F7-C	C			

**Production sites:**

- Regensburg SLE 11CxxS
- UMC Taiwan SLE 11CxxU

<sup>1</sup> available as wire-bonded module (M2) for embedding in plastic cards or as die (C) for customer packaging

## Pin Configuration



**Figure 1 Pin Configuration (top view)**

## Pin Definitions and Functions

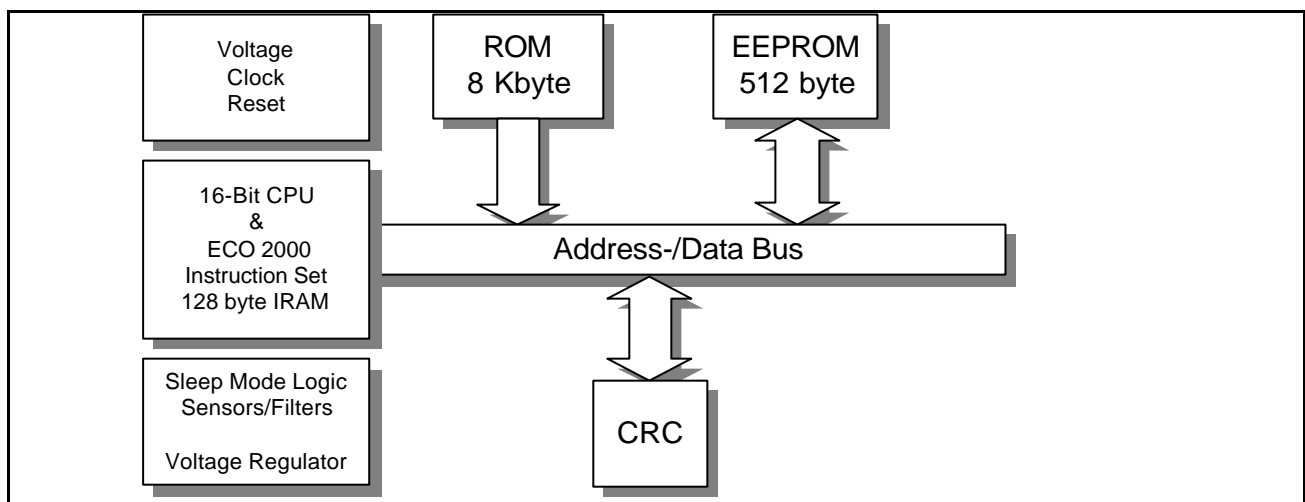
Card Contact	Symbol	Function
C1	VCC	Operating voltage
C2	RST	Reset input
C3	CLK	Processor clock input
C5	GND	Ground
C4; C6; C8	N.C.	Not connected
C7	I/O	Bi-directional data port

## General Description

SLE 22C05S is a member of the Infineon Technologies low cost security controller family in 0.6  $\mu\text{m}$  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 7.5 Kbytes of User-ROM, 128 bytes internal RAM and 512 Bytes EEPROM.

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 22C05S fulfills the requirements for all chip card applications, like loyalty, Metering, Membership Cards etc. The SLE 22C05S is a powerful chip card controller IC with enhanced performance and optimized power consumption on a minimized die size. Therefore, the SLE 22C05S offers the basis for new chip card applications.