



## Security & Chip Card ICs

### SLE 44C20S

8-bit Security Controller with  
17-Kbyte ROM, 256 byte RAM  
2-Kbyte EEPROM and Sleep Mode

**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: 07.99

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<p><b>Important:</b> Further information is confidential and on request. Please contact: Infineon Technologies AG in Munich, Germany, Security &amp; 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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Edition 2001

**Published by Infineon Technologies AG, CC Applications Group**  
**St.-Martin-Strasse 53, D-81541 München**  
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#### **Attention please!**

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Infineon Technologies is an approved CECC manufacturer.

#### **Information**

For further information on technology, delivery terms and conditions and prices please contact your nearest Infineon Technologies Office in Germany or our Infineon Technologies Representatives world-wide (see address list).

#### **Warnings**

Due to technical requirements components may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies Office.

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## 8-bit Security Controller with 17-Kbyte ROM, 256-byte RAM, 2-Kbyte EEPROM and Sleep Mode

### Features

- 8-bit microcomputer in CMOS technology
- Instruction set opcode compatible with standard SAB8051 processor
- Dedicated, non-standard architecture with execution time less than half of standard
- SAB 8051 processor
- **15-Kbyte User ROM** for application programs
- 2-Kbyte manufacturer ROM for **Chip Management System (CMS)**
- **2-Kbyte EEPROM** as program/data memory
- 256-byte RAM
- Power saving sleep mode
- Clock freq. = int. freq.:
  - 1 to 5 MHz<sup>1)</sup> at 5 V ± 10 %,
  - 1 to 4 MHz at 3 V ± 10 %
- Contact configuration and serial interface in accordance with ISO 7816
- Supply voltage range: 2.7 V to 5.5 V
- < 10 mA supply current at 5 MHz
- Temperature range: – 25 to + 70 °C. <sup>2)</sup>
- ESD protection larger than 4 kV

### Document References

- Confidential Data Book SLE 44CxxS
- Instruction Set SLE44CxxS – Quick Reference
- Qualification report
- Chip delivery specification for wafer with chip-layout (die size, orientation,...)
- Module specification containing description of package, etc.
- Qualification report module

### Development Tools Overview

- Short Product Information Software Development Kit SDK CC

### EEPROM

- Reading, erasing and writing byte by byte
- Flexible page mode for 1 to 8 bytes write/erase operation
- 32 bytes security area
- Write time 3.5 ms, erase time 1.75 ms
- Frequency-adaptable programming time
- Minimum of 500,000 write/erase cycles<sup>3)</sup>
- Data retention for minimum of ten years.
- EEPROM programming voltage generated on chip

### Security Features

- ROM code not visible due to implantation
- Low voltage sensor
- High voltage sensor
- Low-frequency sensor
- High-frequency protection
- 16 bytes security PROM, hardware protected
- Unique chip identification number for each chip

### CMS

- Intelligent write/erase routines for N bytes programming (0 < N < 256)
- Two serial interface modes according to ISO 7816-3:
  - 9600 bit/s related to 3.57 MHz
  - 9600 bit/s related to 4.91 MHz

### Support

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

### Supported Standards

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

<sup>1)</sup> Extended frequency range up to 7.5 MHz is available, see ordering information.

<sup>2)</sup> Extended temperature range is available for certain applications, e.g. GSM, see ordering information.

<sup>3)</sup> Values are temperature dependent for further information please refer to your Infineon Technologies Sales Office.

## **Ordering Information**

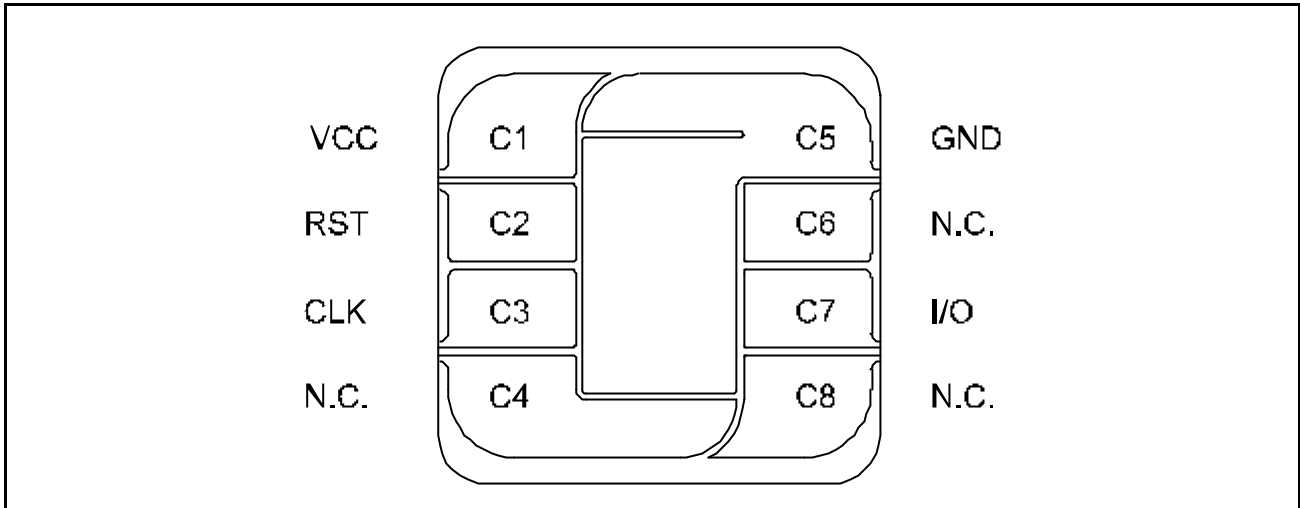
Type	Package <sup>1</sup>	Voltage Range	Temperature Range	Frequency Range
SLE 44C20S-M4	M4	2.7 V - 5.5 V	– 25°C to + 70°C	1 MHz - 5 MHz @ 5 V
SLE 44C20S -C	C			1 MHz – 4 MHz @ 3V
SLE 44C20S -S	S			
SLE 44C20S -T85-M4	M4	2.7 V - 5.5 V	– 25°C to + 85°C	1 MHz - 5 MHz @ 5 V
SLE 44C20S -T85-C	C			1 MHz – 4 MHz @ 3V
SLE 44C20S -T85-S	S			
SLE 44C20S -V5-M4	M4	4.5 V - 5.5 V	– 25°C to + 70°C	1 MHz - 5 MHz
SLE 44C20S -V5-C	C			
SLE 44C20S -V5-S	S			
SLE 44C20S -V5-T85-M4	M4	4.5 V - 5.5 V	– 25°C to + 85°C	1 MHz - 5 MHz
SLE 44C20S -V5-T85-C	C			
SLE 44C20S -V5-T85-S	S			
SLE 44C20S -V5-F7-M4	M4	4.5 V - 5.5 V	– 25°C to + 70°C	1 MHz - 7.5 MHz
SLE 44C20S -V5-F7-C	C			
SLE 44C20S -V5-F7-S	S			

**Production sites:**

- Regensburg SLE 44CxxS
- UMC Taiwan SLE 44CxxU

**Pin Description**

<sup>1</sup> available as wire-bonded module (M4) for embedding in plastic cards, as die (C) for customer packaging or on request as SMT package (S)



**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 44C20S is a member of the Infineon Technologies 44 security microcontroller series, especially designed for smart card applications. The device is fabricated in a Infineon Technologies proprietary CMOS technology, resulting in a significant reduction of die size. New features such as low voltage operation, extended page mode and I/O routines offer additional performance required in applications like 3V SIM cards for GSM, payment, health care, loyalty or electronic purses.