



## Security & Chip Card ICs

### SLE 44C24S

8-bit Security Controller with  
26-Kbyte ROM, 256 byte-RAM, 512-byte XRAM,  
2-Kbyte EEPROM and Sleep Mode

|                                                                                                                                         |  |                           |
|-----------------------------------------------------------------------------------------------------------------------------------------|--|---------------------------|
| <b>SLE 44C24S Short Product Information</b>                                                                                             |  | Ref.: SPI_SLE 44C24S_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: 07.99                                                                                                                |  |                           |
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|                                                                                                                                         |  |                           |

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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).

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## 8-bit Security Controller with 26-Kbyte ROM, 256-byte RAM, 512-byte XRAM, 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
- **24-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
- 512-byte XRAM
- Power saving sleep mode
- Cold-/warm reset detection
- Clock freq. = int. freq.:  
1 to 5 MHz<sup>1)</sup> at 5 V  $\pm$  10 %,  
1 to 4 MHz at 3 V  $\pm$  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

### 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.

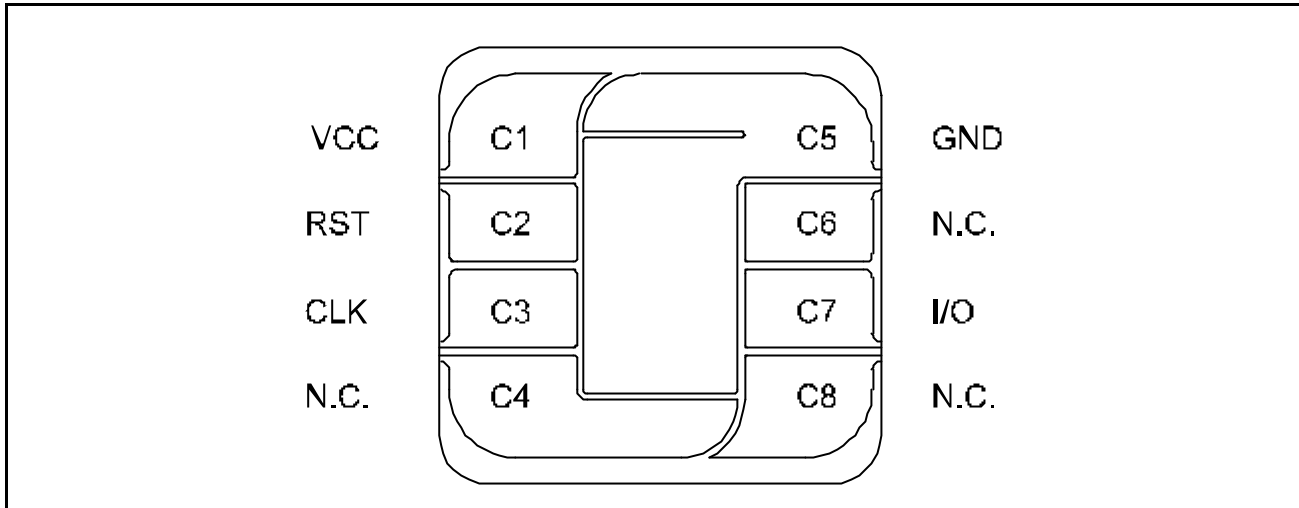
<sup>3)</sup> Values are temperature dependent for further information please refer to your Infineon Technologies Sales Office.

## **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 -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 -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-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-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                    |               |                   |                     |

## 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 44C24S is a member of the Infineon Technologies security controller family produced in 0.6  $\mu\text{m}$  CMOS technology. The CPU provides the high efficiency of the SAB 8051 instruction set together with enhanced performance and a new level of security features.

The controller IC offers 24 Kbytes of User-ROM, 256 bytes internal RAM, 512 bytes XRAM and 2 Kbytes EEPROM. To minimize the overall power consumption, the chip card controller IC offers a sleep mode.

SLE 44C24S offers high performance and large memory sizes combined with outstanding security features on a minimized chip size. Therefore the device fulfills all chip card requirements and is especially well fitting for payment, loyalty, health care and access control.

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