



## Chip Card & Security

SLE 4406SP

SLE 4406SPE

Intelligent 112-Bit EEPROM Counter  
for > 20000 Units with Security Logic

**Revision History: Current Version 2008-10-14**

Previous Releases: 2005-06-29

Page	Subjects (changes since last revision)
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	Editorial update
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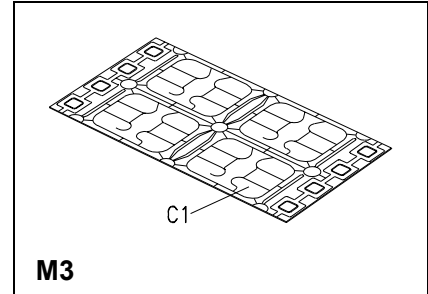
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## Intelligent 112–Bit EEPROM Counter for > 20000 Units with Security Logic

### Features

- **100% functional compatibility to 4406S/06SE**
- **112 bit EEPROM and 16 bit ROM**
  - 104 bit user memory fully compatible with SLE 4406/06E
    - 64 bit Identification Area 1 consisting of
      - 16 bit Manufacturer code
      - SLE 4406SP:
        - 8 bit Manufacturer data, card issuer dependent
        - 40 bit for personalization data of card issuer
      - SLE 4406SPE:
        - 48 bit for personalization data of card issuer
    - 40 bit Counter Area including 1 bit for personalization (PROM/EEPROM)
    - 24 bit additional memory for advanced features configurable during personalization
      - either 24 bit Identification Area 2 for personalization data of card issuer
      - or 24 bit Data Area for free user access
- **Counter with up to 33352 count units**
  - Five stage abacus counter
  - Due to testing purposes a maximum of 21064 count units is guaranteed
- **Transport Code protection for delivery**
- **Contact configuration and Answer-to-Reset (synchronous transmission) in accordance to standard ISO/IEC 7816**
- **Sophisticated electrical characteristics**
  - Ambient temperature  $T_A$  –40 ... +80°C for chip
  - Supply voltage 5 V  $\pm$  10 %
  - Supply current < 1 mA
  - EEPROM programming time 5 ms
  - ESD protection minimum 2,000 V, typical 4,000 V
  - Endurance minimum 100,000 write/erase cycles / bit<sup>1)</sup>
  - Data retention for minimum of 30 years<sup>1)</sup>
- **Advanced 1.2  $\mu$ m CMOS-technology optimised for security layout**
  - EEPROM-cells protected by shield
  - Secure wiring for all security relevant signals
  - Shielding of deeper layers via metal
  - Sensory and logical security functions
  - No isolation on backside necessary

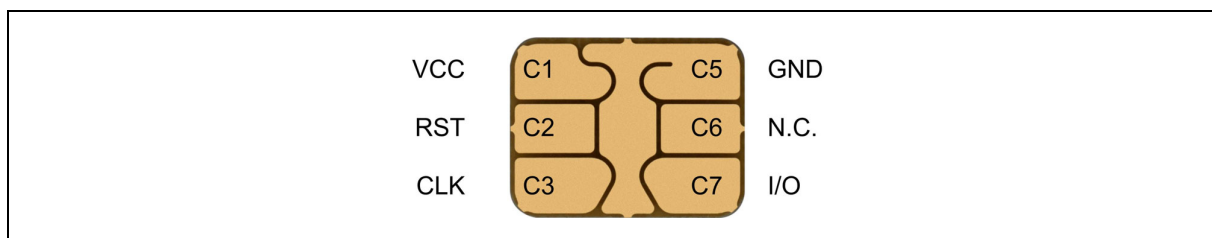


<sup>1)</sup> Values are temperature dependent

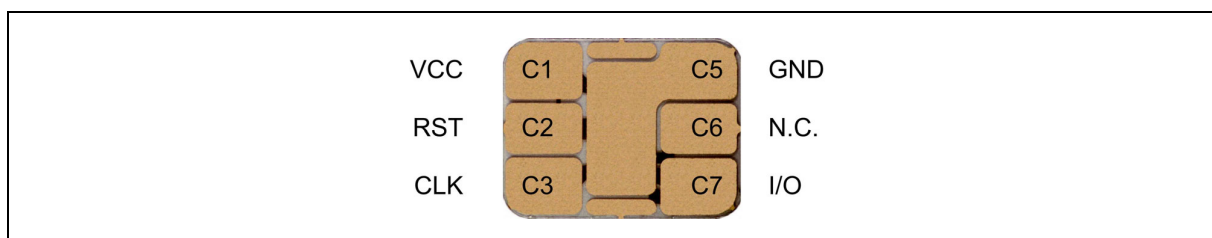
**Table 1 Ordering Information**

Type	Package <sup>1)</sup>	Remark	Access of 3rd byte
SLE 4406SP C	Die (on Wafer)	unsawn	Data of 3rd byte are programmed by Infineon exclusively
SLE 4406SP D	Die (on Wafer)	sawn	
SLE 4406SP M3	T-M3.2-6		
SLE 4406SP MFC3	S-MFC3.1-6-1	FCoS™ <sup>2)</sup>	
SLE 4406SPE C	Die (on Wafer)	unsawn	Data of 3rd byte are programmed by the card manufacturer at personalisation
SLE 4406SPE D	Die (on Wafer)	sawn	
SLE 4406SPE M3	T-M3.2-6		
SLE 4406SPE MFC3	S-MFC3.1-6-1	FCoS™ <sup>2)</sup>	

**Pin Description**



**Figure 1 Pin Configuration Wire-bonded Module M3.2 (top view)**



**Figure 2 Pin Configuration Flip Chip Module MFC3.1 (top view)**

<sup>1)</sup> Available as a Flip Chip Module (MFC3), wire-bonded module (M3) for embedding in plastic cards or as a die on unsawn (C) / sawn wafer (D) for customer packaging

<sup>2)</sup> FCoS™ Flip Chip on Substrate

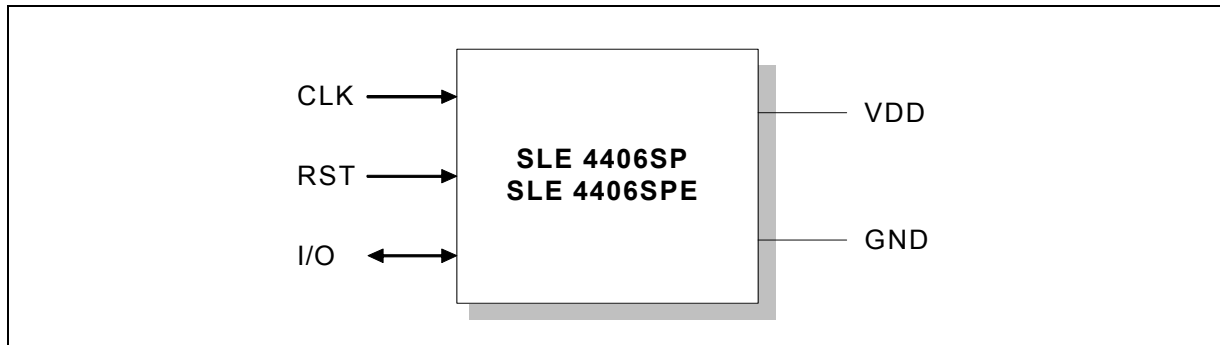


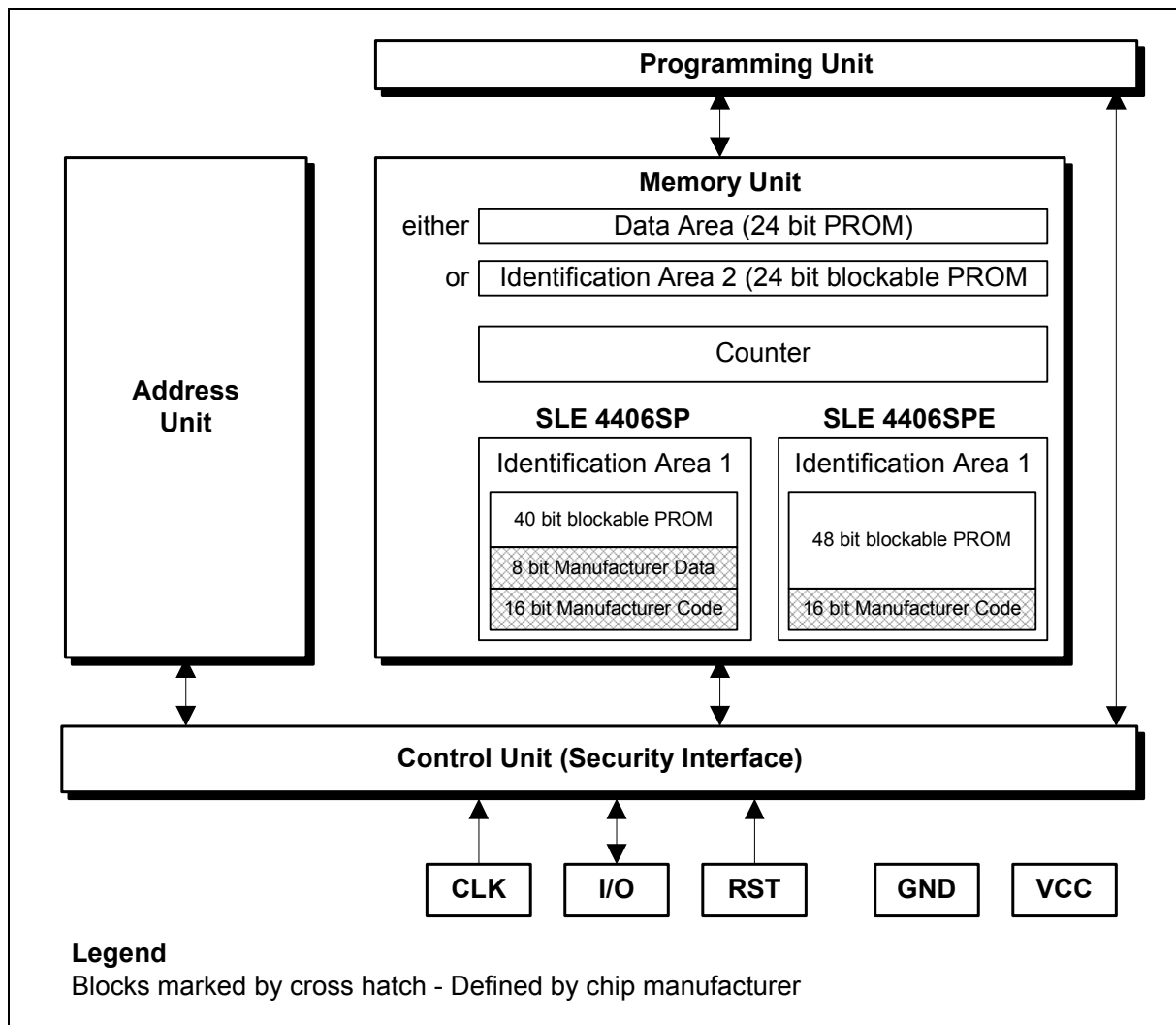
Figure 3 Pad Configuration Die

Table 2 Pin Definitions and Functions

Card Contact	Symbol	Function
C1	VCC	Supply voltage
C2	RST	Control input (Reset Signal)
C3	CLK	Clock input
C5	GND	Ground
C6	N.C.	Not connected
C7	I/O	Bi-directional data line (open drain)

## General Description

SLE 4406SP/06SPE is designed for applications in prepaid telephone cards. The chip consists of an EEPROM memory of 112 bit, a ROM of 16 bits and a control/security unit.



**Figure 4 Block Diagram**

- **Memory Unit**  
Counter, Identification Data (e.g. serial number, expiry date) and Data Area.
- **Address Unit**  
Setting of the address counter is synchronously with the CLK.
- **Programming Unit**  
The programming voltage for the EEPROM/PROM is generated internally.
- **Security Interface**  
Ensures a minimum and a maximum frequency and proper logical voltage levels.