Security & Chip Card ICs

SLE 66CL160S

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

Preliminary Short Product Information 06.99

SLE 66CL160S Preliminary Short Product Information	
Revision History: Current Version 06.99	
Previous Releases: 1.1 (08.98)	
Page	Subjects (changes since last revision)
	Layout change

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Published by Infineon Technologies AG i.Gr., CC Applications Group
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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).

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Dual Interface 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
- Resource Management System (RMS) with intelligent EEPROM write/ erase routines and I/O routines for contact-less operation
- **16-Kbytes EEPROM** as program/data memory
- **1280 bytes RAM**
- **True random number generator**
- **Interrupt module for I/O interfaces**
- **CRC Module**
- **DES Module supporting Triple-DES and calculation of Elliptic Curves (GF 2^n)**
- **Two 16-bit timers with 8-bit prescaler**
- Power saving sleep mode
- Clock freq. = int. freq.: 1 to 7.5 MHz (contact based interface)
- Contact configuration and serial interface in accordance with ISO 7816
- Software for contact based interface compatible with SLE 44C80S, 44C160S

EEPROM

- Reading, erasing and writing byte by byte
- Flexible page mode for 1 to 64 bytes write/erase operation
- Write time 3.62 ms, erase time 1.81 ms
- 32 bytes security area
- 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

Contactless Interface

- **Interface compatible with ISO 14443**
- Carrier freq. 13.56 MHz
- CPU clock freq. 1.13 MHz (f_C/12) – 3.39 MHz (f_C/4)
- **Modulation ASK 100 % and 10 % (possible with autodetection)**
- Data rate 106 Kbit/s
- Frame length up to 127 bytes
- **Coupling distance 0-10 cm (typ.)**
- Anticollision procedures supported by timer module according to ISO 14443

Security Features

- ROM code not visible due to implantation
- Low and high voltage sensors
- Low-frequency sensor
- High-frequency filter
- Internal power-on-reset
- 16 bytes security PROM, hardware protected
- Unique chip identification number for each chip
- Security optimized layout
- Additional security features

Ordering Information

Type	Package[1]	Voltage Range	Temperature Range	Frequency Range
SLE 66CL160S-M8.4	M8.4	2.7 V - 5.5 V	– 25°C to + 70°C	1 MHz - 5 MHz
SLE 66CL160S-C	C			
SLE 66CL160S-T85-M8.4	M8.4	2.7 V - 5.5 V	– 25°C to + 85°C	1 MHz - 5 MHz
SLE 66CL160S-T85-C	C			

Pin Description

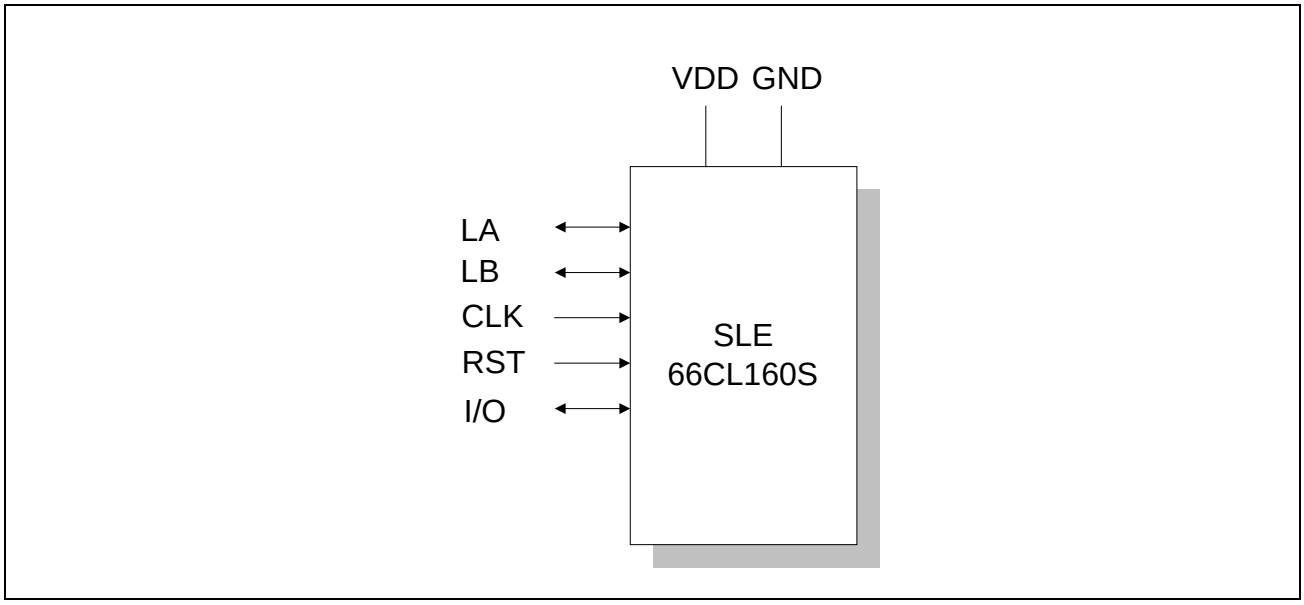

Figure 1 Pin Configuration (top view)

Pin Definitions and Functions

Pin symbol	Function
VDD	Operating voltage
RST	Reset input
CLK	Processor clock input
GND	Ground
I/O	Bi-directional data port
LA	Coil connection pin LA
LB	Coil connection pin LB

[1] available as wire-bonded module (M8.4) for embedding in plastic cards or as die (C) for customer packaging

General Description

The dual interface controller SLE 66CL160S is a member of the Infineon Technologies high-end security controller family in 0.6 µm CMOS technology. It contains on a single chip a contactless and a contact-based interface. The CPU provides the high efficiency of the SAB 8051 instruction set extended by additional powerful instructions with enhanced performance.
The controller offers 31,5 Kbytes of User-ROM, 256 bytes internal RAM, 1 Kbyte XRAM and 16 Kbytes EEPROM. It suits the requirements of the new generation of operating systems.

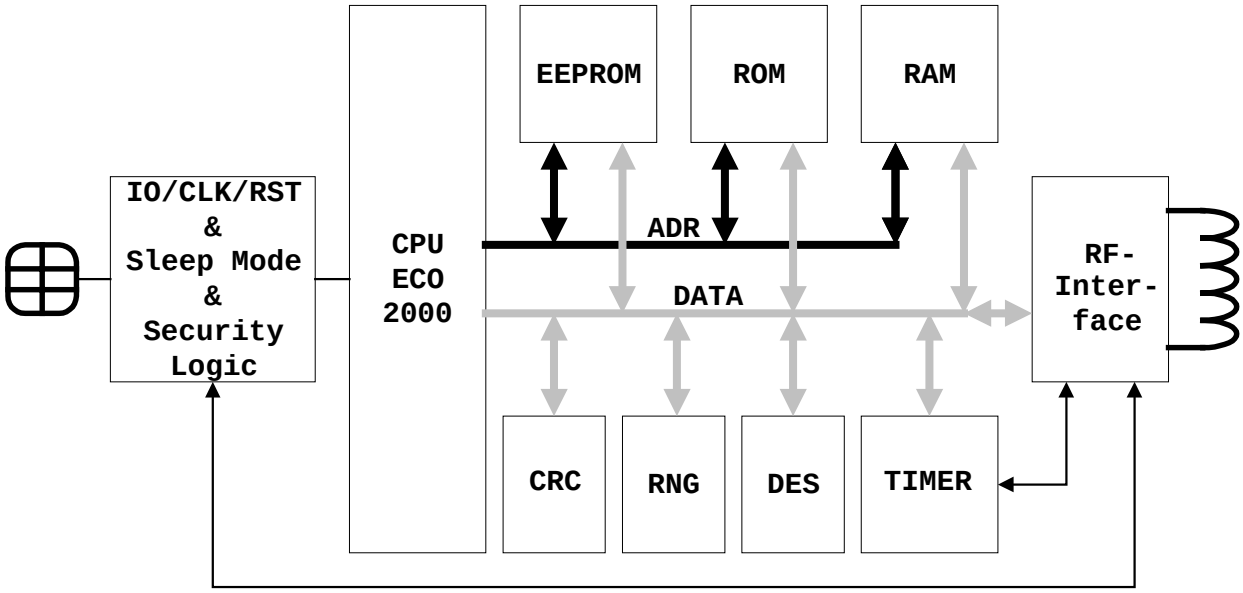

Figure 2: Block Diagram SLE 66CL160S

In contactless operation, the SLE 66CL160S is able to communicate with a Card Operating Device (COD) over a coupling distance of 10 cm. The power supply and data are received by an antenna, which consists of a coil with a few turns directly connected to the IC. DES acceleration by a factor of more than 2000 compared to software solutions in combination with the high data transfer rate of 106 Kbit/s keep the transaction times short. In accordance with the requirements of ISO 14443 WD the controller offers the two modulation types ASK 100% and ASK 10%.
The autodetection option allows a fast recognition of the modulation type used by the COD. Different anticollision procedures can be realized in software with the help of the 16-bit timer.
The random number generator (RNG) is able to supply the CPU with true random numbers under all conditions. The CRC module allows the easy generation of checksums according to ISO 3309 (16-Bit-CRC). The timer eases the implementation of advanced communication protocols such as T=1 and all other time critical processes for contact-based and contactless communications. An additional interrupt capability of the I/O module allows parallel operation of chip card and terminal.
To minimize the overall power consumption, the chip card controller can be set into sleep mode. Additionally, the chip is leading the industry with a new and enhanced level of on-chip security features.

Therefore the SLE 66CL160S fulfills the requirements for both contact-based and contactless chip card applications. Especially the field of electronic banking and electronic purses will benefit from the convenient handling and short transaction times achieved by the contactless interface. The SLE 66CL160S is a powerful chip card controller integrating outstanding memory sizes, additional peripherals in combination with enhanced performance and optimized power consumption on a minimized die size.