SAMSUNG ELECTRONICS

S3CC9ED

Advanced Information
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CMOS Microcontroller for Smart Card Applications

OVERVIEW

The ***S3CC9ED*** single-chip CMOS micro-controller is designed for low voltage smart card applications and is fabricated using an advanced 0.18-micron CMOS process. Its fast and reliable 16-bit CPU is based on the smart card-purpose CalmRISC16 processor.

FEATURES

CPU
- 16-bit CalmRISC16 CPU core

Memory Allocation
- 384k Bytes ROM
- 128k Bytes EEPROM
- 8k Bytes static RAM
- Memory Protection Unit

EEPROM Operations
- 1 to 128 bytes EEPROM erase/write operations
- 2.0 ms fast erase/write time
- 500K erase/write cycles (minimum)
- 50 years data retention (minimum)

Data Security
- 128 bytes write protected security area
- 128 bytes of non erasable EEPROM
- Reset operations are selective if abnormal condition is detected.

DES/T-DES
- Built-in hardware DES/T-DES
- circuit for prevent SPA/DPA

Interrupts
- Four interrupt sources and vectors (FIQ, IRQ, SWI)

Clock sources
- External : 1MHz – 5MHz
- Internal variable clock : 10MHz+-10%(Vdd=5V)

Serial I/O interface
- Hardware UART for handing serial interface in accordance with ISO 7816 communication protocols

Random Number Generator
- One 16-bit random number generator
- Start and stop control

Memory Protection Unit
- Read/write access controllable
- Base/Limit region registers : 8 sets
- Configurable range : 4-Mbyte areas with 128-byte resolution.
- All the controls can be done at privilege mode

Bus scrambling
- RAM BUS scrambling with random number
- EEPROM BUS scrambling with user defined seed

Security detector
- Many kind of security detectors

Timers
- 16-bit timer with 8 bit prescaler
- One 20-bit watchdog timer

Operating Characteristics
- Single power supply: 1.62 to 5.5 V
- Operating frequency: 1 to 5 MHz
- Operating temperature: -25 °C to +85 °C

Package
- 8-pin COB (conforms to ISO standard 7816)

BLOCK DIAGRAM

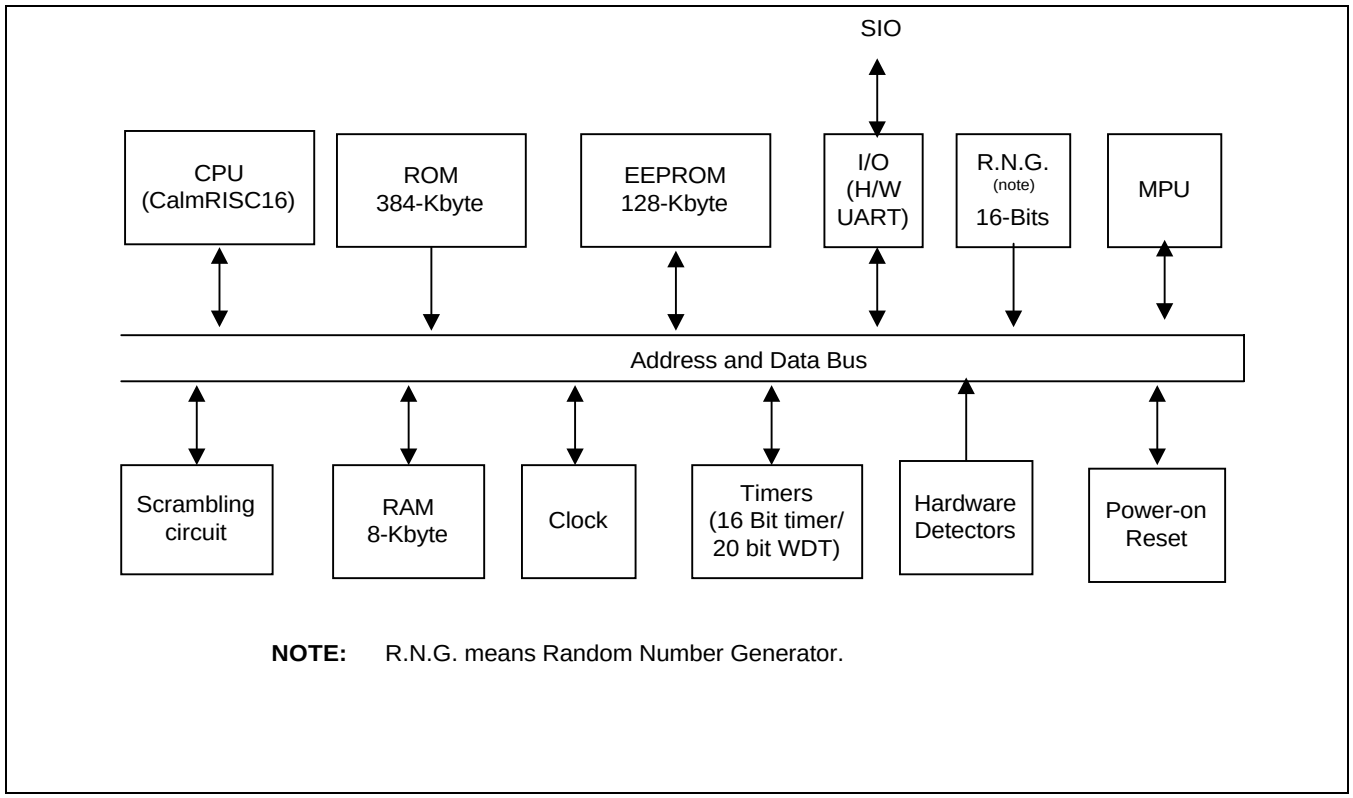

Figure 1. Block Diagram

ELECTRICAL DATA

(T_A = – 25 °C to + 85 °C, V_{DD} = 1.62 V to 5.5 V)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Supply current	I_{DD1}	F_{CLK} = 5 MHz, 5.5 V	–	–	10	mA
		F_{CLK} = 4 MHz, 3.3 V	–	–	6	
Stop Current	I_{DD2}	F_{CLK} = 1 MHz, 5.5 V	–	–	200	µA
	I_{DD3}	F_{CLK} = GND, 5.5 V	–	–	100	µA

Table 1. Electrical Characteristics