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## Features

### General

- High-performance, Low-power Secure AVR® RISC Architecture
  - 133 Powerful Instructions (Most Executed in a Single Clock Cycle)
  - Linear Addressing of up to 8M Bytes of Code and up to 16M Bytes of Data
- Low-power Idle and Power-down Modes
- Bond Pad Locations Conforming to ISO 7816-2
- ESD Protection to ± 6000V
- Operating Ranges: from 2.7V to 5.5V
- Compliant with GSM, 3GPP and EMV 2000 Specifications; PC Industry Compatible
- Available in Wafers, Modules and Industry-standard Packages

### Memory

- 32K Bytes of Flash Program Memory
- 32K Bytes of EEPROM, Including 128-byte OTP Area and 384-byte Bit-addressable Area
  - 1 to 128-byte Program/Erase
  - 2 ms Program, 2 ms Erase
  - Typically 1,000,000 Write/Erase Cycles
  - 10 Years Data Retention
- 3K Bytes of RAM

### Peripherals

- ISO 7816 Controller
  - Up to 625 kbs at 5 MHz
  - Compliant with T = 0 and T = 1 Protocols
- Two I/O Ports (Configurable to Support Communication Protocols Including 2-wire Interfaces)
- Serial Peripheral Interface (SPI) Controller
- Programmable Internal Oscillator (Up to 16 MHz on ROM)
- Two 16-bit Timers
- Random Number Generator (RNG)
- 2-level, 8-vector Interrupt Controller
- Hardware DES and Triple DES DPA Resistant
- Checksum Accelerator
- CRC 16 Engine (Compliant with ISO/IEC 3309)
- 8-bit GF(2<sup>n</sup>) Multiplier
- Crypto-coprocessor (Pre-programmed Functions for Cryptography and Authentication Including RSA, DSA, Key Generation, ECC)

### Security

- Dedicated Hardware for Protection Against SPA/DPA Attacks
- Advanced Protection Against Physical Attack, Including Active Shield
- Environmental Protection Systems
- Voltage Monitor
- Frequency Monitor
- Temperature Monitor
- Secure Memory Management/Access Protection (Supervisor Mode)

### Development Tools

- Hardware/Software Development Support on Voyager Emulation Platform (ATV1)
- IAR Systems C-Spy® Debugger
- Software Libraries and Application Notes



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## Secure Microcontroller for Smart Cards

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**AT90SC3232CS**

**Preliminary**

Rev. 1572BS–SMIC–10/02



Note: This is a summary document. A complete document will be available under NDA. For more information, please contact your local Atmel sales office.

## Description

The AT90SC3232CS is a low-power, high-performance, 8-/16-bit microcontroller, based on the secure AVR RISC architecture, with Flash program memory, EEPROM data memory and a crypto-coprocessor. By executing powerful instructions in a single clock cycle, the AT90SC3232CS achieves throughputs close to 1 MIPS per MHz. Its Harvard architecture includes 32 general-purpose working registers directly connected to the ALU, allowing two independent registers to be accessed in one single instruction executed in one clock cycle.

The AT90SC3232CS uses a new secure AVR CPU that allows the linear addressing of up to 8M bytes of code and up to 16M bytes of data, and also provides a number of new functional and security features.

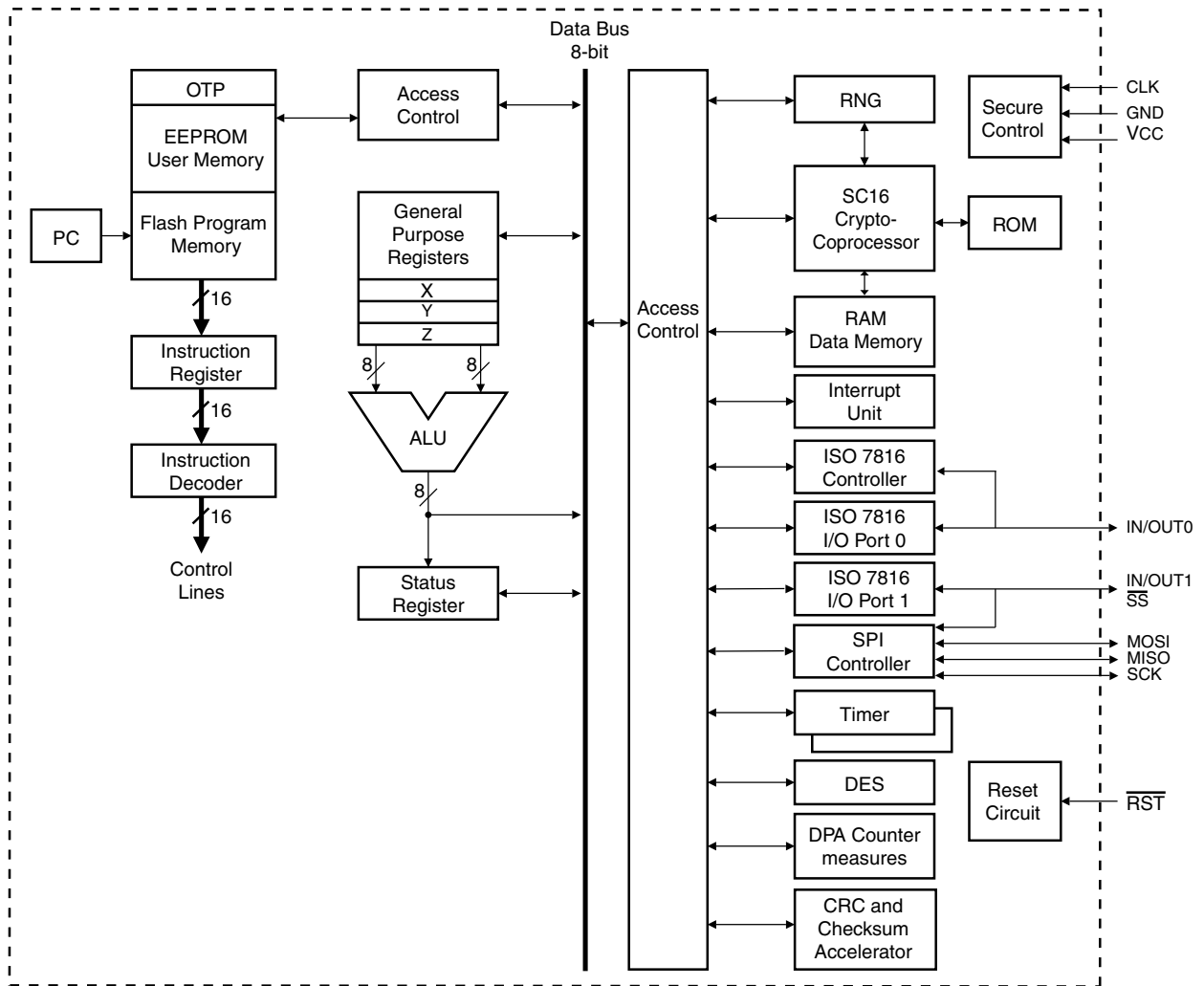
The AT90SC3232CS includes 64K bytes of Atmel's high density, non volatile memory. The on-chip Flash allows the program memory to be reprogrammed in-system and locked securely. This technology combined with the versatile CPU on a monolithic chip provides a highly flexible and cost-effective solution to many smart card applications.

The crypto engine featured in the AT90SC series is the SC16, a 16-bit processor dedicated to performing fast encryption and authentication functions.

Additional security features include power, frequency and temperature protection logic, logical scrambling on program data and addresses, power analysis countermeasures, and memory accesses controlled by a supervisor mode.

A block diagram of the AT90SC3232CS is shown in Figure 1.

**Figure 1.** The AT90SC3232CS AVR RISC Architecture





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