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## Features

### General

- 0.35µ Process Technology
- Industry-standard M68HC05 Instruction Set, including: 8 x 8 bits Unsigned Multiply Instruction, True Bit Manipulation, Memory-mapped I/O
- Operating Voltage: 3.0V ± 10% or 5.0V ± 10%
- Meets GSM 11.11 & 11.12 Specifications
- 5.0 MHz Maximum Internal Bus Frequency at 3.0V and 5.0V
- ESD Protection to ± 4000V
- Bond Pad Layout Conforming to ISO Standard ISO 7816/2
- External Maskable Interrupt on ISO Standard I/O Port (PA0)
- Power-saving WAIT and Very Low Power STOP Modes
- Power-up Detection
- Available as Sawn or Unsawn Wafers or in Industry-standard Packages and Modules

### EEPROM

- 4032 Bytes of On-chip User EEPROM, plus 64 Security Bytes
- 1 to 64-byte Write/Program/Erase
- 1 ms Program Time, 1 ms Erase Time
- 10 Years Data Retention
- Typically more than 1,000,000 Write/Erase Cycles
- On-chip Charge Pump for EEPROM Programming Driven by an Internal Oscillator

### RAM and ROM

- 16368 Bytes of On-chip User ROM plus 16 Bytes Reserved for Vectors
- 512 Bytes of On-chip RAM with Security Wipe on Selected Areas

### Peripherals

- Single Bidirectional I/O Line (1-bit ISO 7816/3 Standard I/O Port)
- Time Base Circuitry (with Preset and Maskable Interrupt Capabilities)
- Watchdog Capability
- CRC Module (allowing generation of Checksums (ISO/IEC 3309))
- Random Number Generator

### Security

- Dedicated Hardware to Resist Power Analysis Attacks
- Featureless ROM
- Low and High Voltage Monitors
- Low and High Temperature Monitors
- Low Frequency Monitor
- High Frequency Filter/Monitor
- Advanced Physical Barrier to Enhance Tamper Resistance
- Illegal Address Reset
- Illegal Opcode Reset
- Memory Partitioning with Address Lockout Reset
- Scrambling Logic
- Tamper Monitor
- Physical Removal of Test Mode when Testing is Complete

### Development Tools

- Hardware Emulation Module (for the Motorola MMDS05 Development System)
- Software Simulator based on HIWARE's HI-WAVE Products



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## 8-bit Secure Microcontroller with 4K EEPROM and Advanced Security Features

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**AT05SC1604R**

**Preliminary**

**Summary**

Rev. 1522BS-04/00



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

## Description

The AT05SC1604R is a new member of Atmel's AT05SC family of single chip microcontrollers. Designed specifically for embedded conditional access systems and other security conscious systems, these devices are based on the industry-standard M68HC05 low-power core and its instruction set, and are manufactured in Atmel's standard 0.35µ process technology.

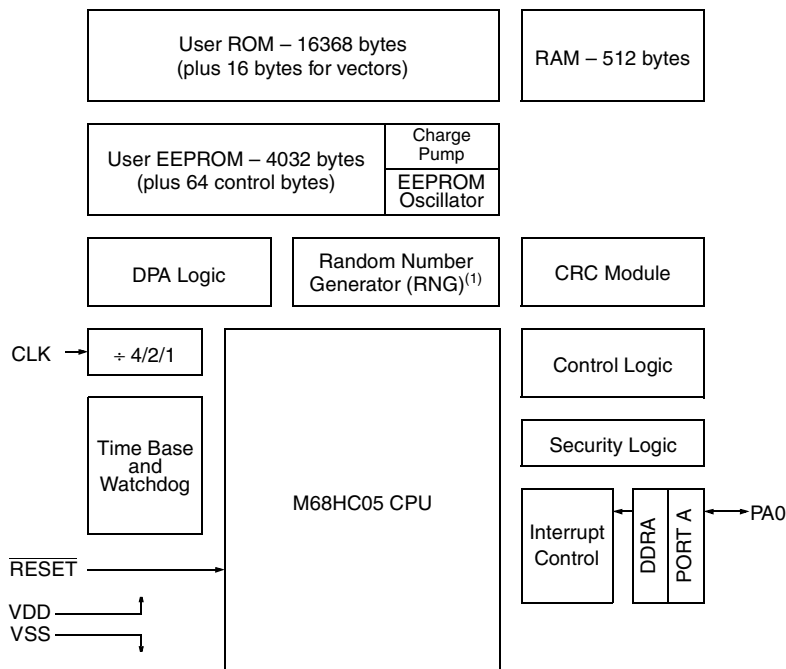
The AT05SC1604R is designed to give a high level of protection against physical and power analysis attacks, and includes hardware features to assist in protecting against SPA and DPA attacks. On-board CRC and RNG modules

are provided to assist in the design of high-security applications.

On-board memory comprises 16K bytes of ROM, 512 bytes of RAM and 4K bytes of EEPROM. The EEPROM features 64-byte write, 1 ms program time, 1 ms erase time, typically more than 1,000,000 write/erase cycles, and greater than 10 years data retention.

Application areas for the AT05SC1604R include Health, Social Security & Benefit Cards, Finance and Payment Systems, Driving Licences and ID cards.

## Block Diagram



Note: 1. A sampling/smoothing algorithm MUST be used in conjunction with the RNG to obtain statistically random results across all operating conditions.



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1522BS-04/00/xM