



# Secure Microcontroller AT90SC12818RCU Summary

## Features

### General

- High-performance, Low-power 8-/16-bit Enhanced RISC Architecture Microcontroller
  - 135 Powerful Instructions (Most Executed in a Single Clock Cycle)
- Low Power Idle and Power-Down Modes
- Internal Variable Frequency Oscillator up to 33 Mhz
- Bond Pad Locations Conforming to ISO 7816-2
- ESD Protection up to  $\pm 4000V$
- Operating Range: 1.62V to 5.5V
- Operating Temperature:  $-40^{\circ}C$  to  $+100^{\circ}C$
- Available in Wafers, Modules and standard ROHS packages:
  - 20-QFN (RoHS compliant) 4mm x 4mm
  - 8-SOIC (RoHS compliant) 5mm x 5mm

### Memory

- 128K Bytes of ROM Program Memory including 32K Bytes of Crypto ROM
- 18K Bytes of EEPROM, including 128 OTP Bytes and 384 Bit-addressable Bytes
  - 1 to 128-byte Program / Erase
  - 1 ms Program / 1 ms Erase
  - Typically 500,000 Write / Erase Cycles at a Temperature of  $25^{\circ}C$
  - Typically 100,000 Write / Erase Cycles over the Temperature of  $-40^{\circ}C$  to  $+100^{\circ}C$
  - 10 Years Data Retention
- 6K Bytes of RAM Memory (4K Bytes of RISC CPU RAM, 2K Bytes of Cryptographic Accelerator RAM, shared with the RISC CPU core)

### Communication

- One ISO 7816 Controller
  - Up to 625 kbps at 5 MHz
  - Compliant with T = 0 and T = 1 Protocols
- Master / Slave SPI Serial Interface

### Other Peripherals

- Seven I/O Ports
  - I/O 0 and I/O 1 reserved for ISO 7816, SPI and I<sup>2</sup>C communication
  - 5 General Purpose I/Os
- Programmable Internal Oscillator (Up to 33 MHz for CPU and Crypto Accelerator)
- Two 16-bit Timers
- Random Number Generator (RNG)
- 2-level Interrupt Controller
- Hardware DES/TDES Engine DPA/DEMA Resistant
- Checksum Accelerator
- CRC 16 & 32 Engine (Compliant with ISO / IEC 3309)
- 32-bit Cryptographic Accelerator (Ad-X™ for Public Key Operations)
  - RSA, DSA, ECC, Diffie-Hellman (thanks to Crypto Toolbox Library)

### Security

- Dedicated Hardware for Protection Against SPA/DPA/SEMA/DEMA Attacks
- Advanced Protection Against Physical Attack, including Active Shield
- Environmental Protection Systems

- Voltage Monitor
- Frequency Monitor
- Temperature Monitor
- Light Protection
- Secure Memory Management/Access Protection (Supervisor Mode)

## Development Tools

- Voyager Emulation Platform (ATV4) to Support Software Development
- IAR Embedded Workbench® V5.40 Debugger or Above
- Software Libraries and Application Notes

## Certifications / Standards

- CC EAL4+

## Description

The AT90SC12818RCU is a low-power, high-performance, 8-/16-bit microcontroller with ROM program memory, EEPROM memory, based on RISC architecture microcontroller.

By executing powerful instructions in a single clock cycle, the AT90SC12818RCU 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.

In addition to the 128K Bytes of embedded ROM, the AT90SC12818RCU includes 18K Bytes of high density EEPROM.

The ability to map the EEPROM in the code space allows parts of the program memory to be reprogrammed in-system. This technology combined with the versatile 8/16-bit CPU on a monolithic chip provides a highly flexible and cost-effective solution to many applications.

The AT90SC12818RCU includes a SPI controller that can be configured as Master or Slave. This controller features three sources of interrupt (Byte Transmitted, Time-out and Reception Overflow) and inter-bytes (guardtime) delays.

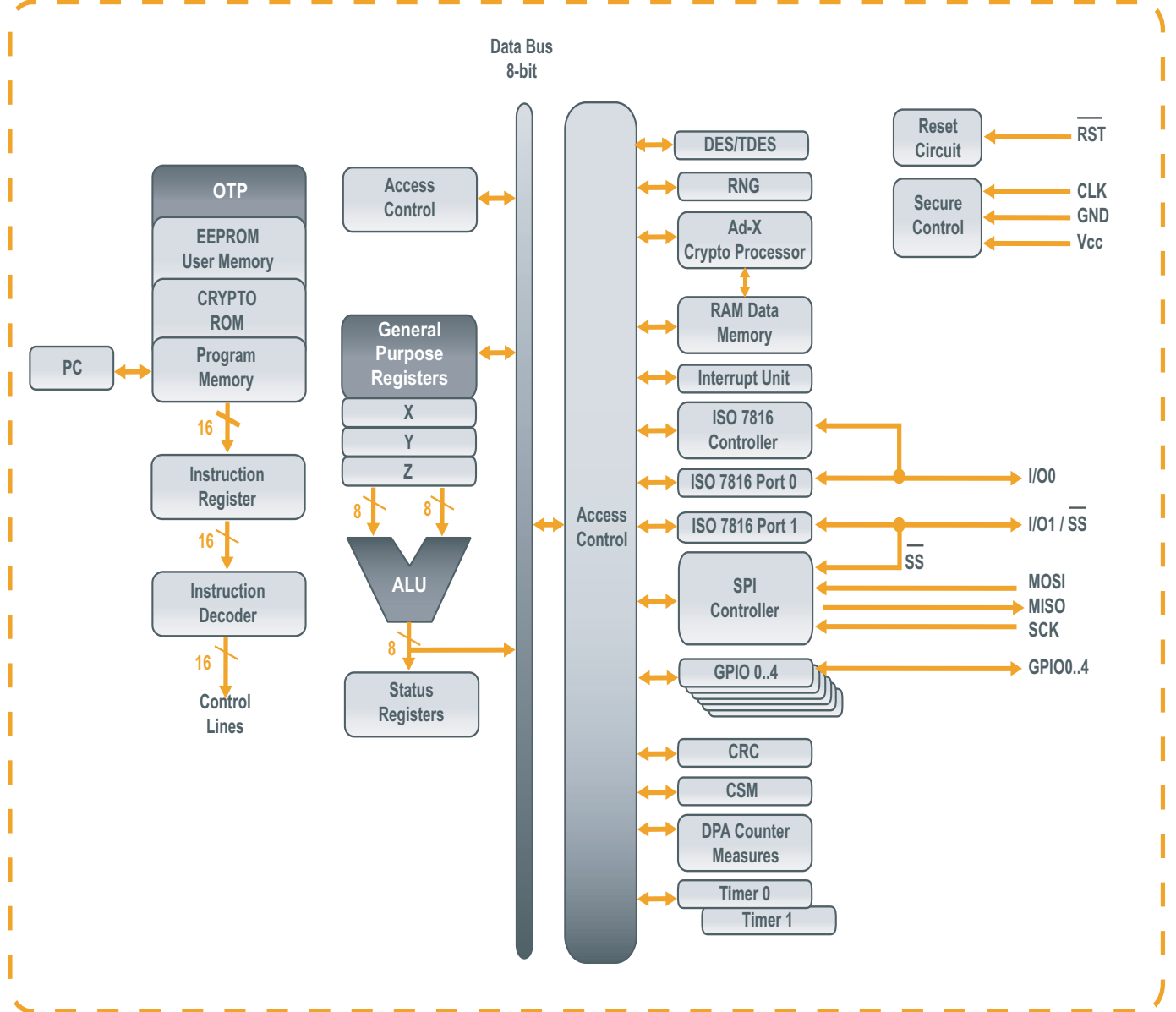
## Ordering information

Reference	Description
AT90xx12818RCU-P	<b>xx</b> : Chip Personalization Number* <b>P</b> = Z : QFN20 Package <b>R</b> : SOIC8 Package

\* For more details about the Chip Personalization Number, please contact your local INSIDE Secure sales office.

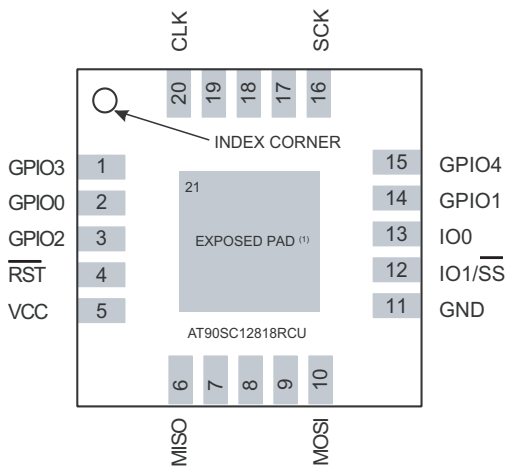
# Architecture

Figure 1 AT90SC12818RCU RISC CPU Core Architecture

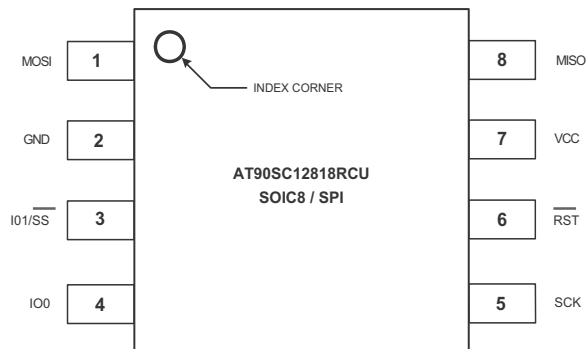


# Pinouts & Packages

**Figure 2** AT90SC12818RCU pinout - QFN20 package



**Figure 3** AT90SC12818RCU pinout - SOIC8 package - SPI Configuration



<sup>(1)</sup>The exposed pad is internally connected to the ground. It must be connected to GND.