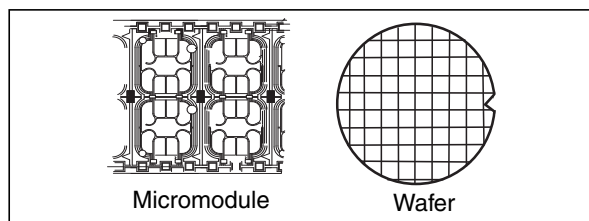


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**Dual contactless smartcard MCU with 48 Kbytes EEPROM, enhanced security, cryptoprocessor and optimized RF performance**

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Data brief

**Features****Hardware features**

- Enhanced 8/16-bit ST23 CPU core with 16 Mbytes linear addressable memory
- 390 Kbytes User ROM
- 6 Kbytes User RAM
- 2 Kbytes NESCRIPT RAM
- 48 Kbytes User EEPROM including 128 bytes User OTP area:
  - 30-year data retention
  - 1 to 64 Bytes Erase or Program in 1.5 ms
- Enhanced NESCRIPT crypto-processor for public key cryptography
- Hardware Security Enhanced DES accelerator
- Three 8-bit timers with watchdog and interrupt capability
- 3V and 5V supply voltage ranges
- External clock frequency up to 10 MHz
- High performance provided by:
  - CPU clock frequency up to 29 MHz
- Power-saving Standby state
- Contact assignment compatible with ISO/IEC 7816-3 standards
- Asynchronous Receiver Transmitter (IART) for high speed serial data support (ISO/IEC 7816-3 and EMV™ compliant)
- ESD protection greater than 5 kV (HBM) for contact pads and 4 kV for contactless pads

**Contactless features**

- Complies with ISO/IEC 14443 type B standards
- 13.56 MHz carrier frequency
- RF frame up to 512 bytes
- RFUART (RF universal asynchronous receiver transmitter) up to 848 Kbits/s
- 0.5 Kbytes dedicated RFUART RAM
- BPSK - NRZ load modulation (card-to-reader)
- 8 to 14% amplitude modulation reception (reader to card) as minimum range
- Enhanced RF performance provided by CPU clock frequency up to 29 MHz coupled with clock frequency divider

**Security features**

- Active shield
- Monitoring of environmental parameters
- Protection mechanisms against faults
- AIS-31 class P2 compliant true random number generator (TRNG)
- ISO 3309 CRC calculation block
- Memory protection unit (MPU)
- Unique serial number on each die

**Development environment**

- Interface with RF readers supported through a library of embedded software functions compatible with ISO/IEC 14443 standards.
- Software development and firmware generation are supported by a comprehensive set of development tools dedicated to software design and validation:
  - C compiler, simulator and emulator

**Applications**

- ST23YR48 major applications include:
  - ePassport, eGovernment and ID

# 1 Description

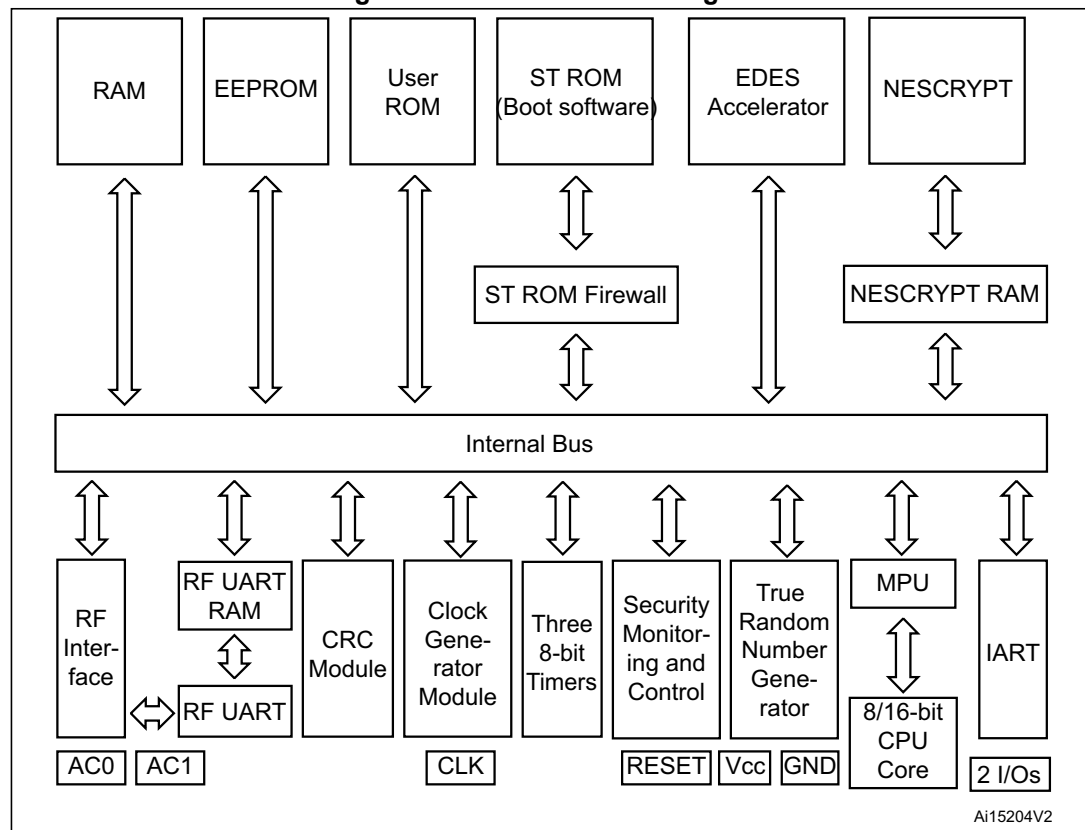
The ST23YR48 product is a serial access microcontroller specially designed for secure smartcard applications.

It is based on an enhanced STMicroelectronics 8/16-bit CPU core offering 16 Mbytes linear addressing space. It is manufactured using an advanced highly reliable ST CMOS EEPROM technology.

An RF Interface including an RF universal asynchronous receiver transmitter (RF UART) enables contactless communication up to 848 Kbits/s compatible with the ISO 14443-B standard.

Moreover, an ISO 7816-3 EMV-compliant asynchronous receiver transmitter (IART) communication peripheral is available.

**Figure 1. ST23YR48 block diagram**



## 1.1 Development environment

Development tools for smartcard products include a complete range of hardware systems and software tools from STMicroelectronics and third-party tool suppliers. The range of tools includes solutions to help you to develop and debug your application and evaluate smartcard products and their peripherals.

An Integrated Development Environment (IDE), the ST Visual Develop (STVD), provides a set of tools for developing embedded applications. This interface manages the project configuration, code edition, code generation and program debugging.

All the information needed to generate the application code and personalization will be collected in a delivery file (.DLV extension). This file is created using the Delivery menu of the STMicroelectronics configuration software tool, SCool.

## 2 Revision history

**Table 1. Document revision history**

| <b>Date</b> | <b>Revision</b> | <b>Changes</b>            |
|-------------|-----------------|---------------------------|
| 18-Sep-2009 | 1               | First release.            |
| 06-Nov-2013 | 2               | Updated Logo information. |

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