

## Enhanced security smartcard MCU with AES accelerator, 160-Kbyte EEPROM and dual or contact-only interface

Data brief

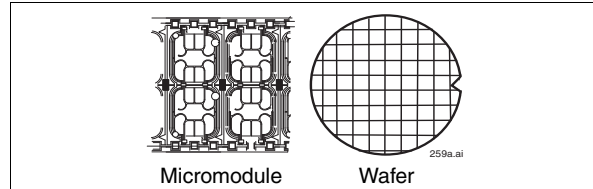
### Features

#### Hardware features

- Enhanced 8/16-bit ST23 CPU core with 16 Mbytes linear addressable memory
- 390 Kbytes of User ROM
- 6 Kbytes of User RAM
- 2 Kbytes of NESCRIPT RAM
- 160 Kbytes of User EEPROM including 128 bytes of User OTP area:
  - 30-year data retention at 25° C
  - 500,000 erase/write cycles at 25° C
  - 1 to 64 bytes Erase or Program in 1.5 ms
- Operating temperature: –25° to +85° C
- Enhanced NESCRIPT crypto-processor for public key cryptography
- FIPS PUB 197 -compliant AES accelerator
- Three 8-bit timers with watchdog and interrupt capability
- 3 V and 5 V 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 6 kV (HBM) for contact pads and 4 kV for contactless pads

#### Contactless features

- Complies with ISO/IEC 14443 type B and type B' standards
- 13.56 MHz carrier frequency
- 512-byte RF frame buffer in dedicated RFUART RAM
- RFUART (RF universal asynchronous receiver transmitter) up to 848 Kbps



- 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
- 1.5 to 7.5 A/m field strength minimum ranging.
- Anti-collision method (according to ISO/IEC 14443-3) based on 2<sup>64</sup> CID value for simultaneous management of multiple cards
- Enhanced RF performance provided by CPU clock frequency up to 29 MHz coupled with clock frequency divider

#### Security features

- Active shield
- Hardware security enhanced DES accelerator
- Monitoring of environmental parameters
- Protection mechanisms against faults
- EAL6+ security certification according to Common Criteria 3.1 methodology
- DPA, SPA and DFA resistant
- 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

### Applications

ST23R160 major applications include:

- ePassport, eGovernment and ID applications including driving licenses
- ICAO LDS file system compliant
- IAS-ECC standard compliant

# 1 Description

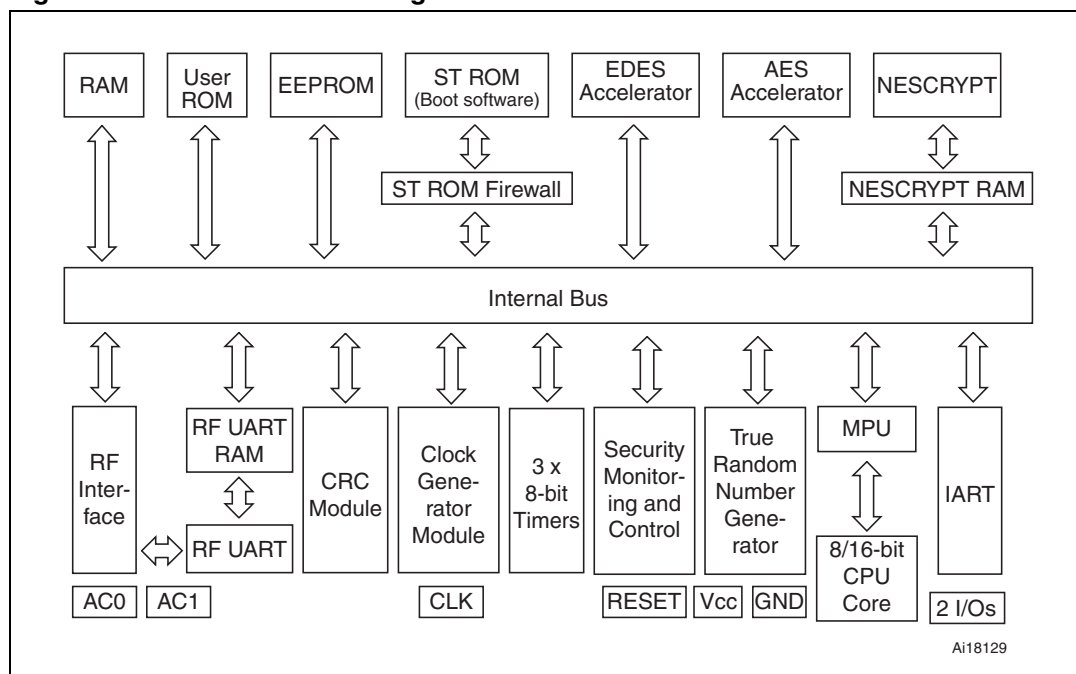
ST23R160 devices are serial access microcontrollers custom-designed for secure smartcard applications.

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

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

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

**Figure 1. ST23R160 block diagram**



*Note:* Certain interfaces are not available on some devices.



## 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. List of modifications**

Date	Revision	Changes
13-Jun-2012	1	First release.

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