



ST32F416

Smartcard MCU with 32-bit ARM Cortex™ M3 CPU and 416 Kbytes high density Flash memory

Data Brief

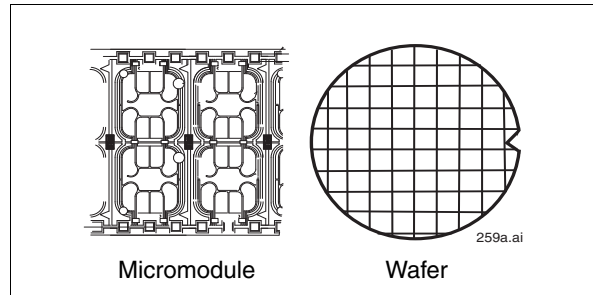
Features

ST32F416 major applications include:

- Mobile communications (GSM, 3G and CDMA)
- Java Card™ applications

Hardware features

- ARM Cortex™-M3 32-bit RISC core
- 12 Kbytes User RAM
- 416 Kbytes User Flash memory with OTP area:
 - 10-year data retention
 - 100,000 Erase/Write cycles
 - Page granularity of 128 Bytes
 - Block granularity: 1 Kbyte
 - 128 Bytes of OTP for User
 - Page Erase time 3 ms
 - Block Erase 1 Kbyte in 15 ms
 - Programming performance up to 10µs/byte
 - Flash Erase / Write Protection software programmable on 64 Kbyte Sectors
- Asynchronous Receiver Transmitter supporting ISO 7816-3 T=0 and T=1 protocols
- Two 16-bit timers with interrupt capability
- 1.8V, 3V and 5V supply voltage ranges
- External clock frequency from 1 up to 7.5 MHz
- High performance provided by:
 - CPU clock frequency up to 20 MHz
 - External clock multiplier (2x, 3x, and 4x)
- Current consumption compatible with GSM and ETSI specifications
- Power-saving Standby state
- Contact assignment compatible ISO 7816-2
- ESD protection greater than 4 kV (HBM)



Security features

- Monitoring of environmental parameters
- Protection against faults
- ISO 3309 CRC calculation block
- True Random Number Generator
- Unique serial number on each die
- Hardware DES accelerator

Software features

- Flash Loader
- Flash drivers

Development environment

Software development and firmware generation are supported by a comprehensive set of development tools dedicated to software design and validation:

- C Compiler
- Simulator
- Emulator

1 Description

1.1 Hardware description

The ST32F416 is a serial access microcontroller designed for secure mobile applications that incorporates the most recent generation of ARM processors for embedded systems. Its Cortex™-M3 32-bit RISC core operating at a 20-MHz frequency brings great performance and excellent code compacity to the application thanks to the Thumb®-2 instruction set.

The high-speed embedded Flash 416 Kbyte memory introduces more flexibility to the system.

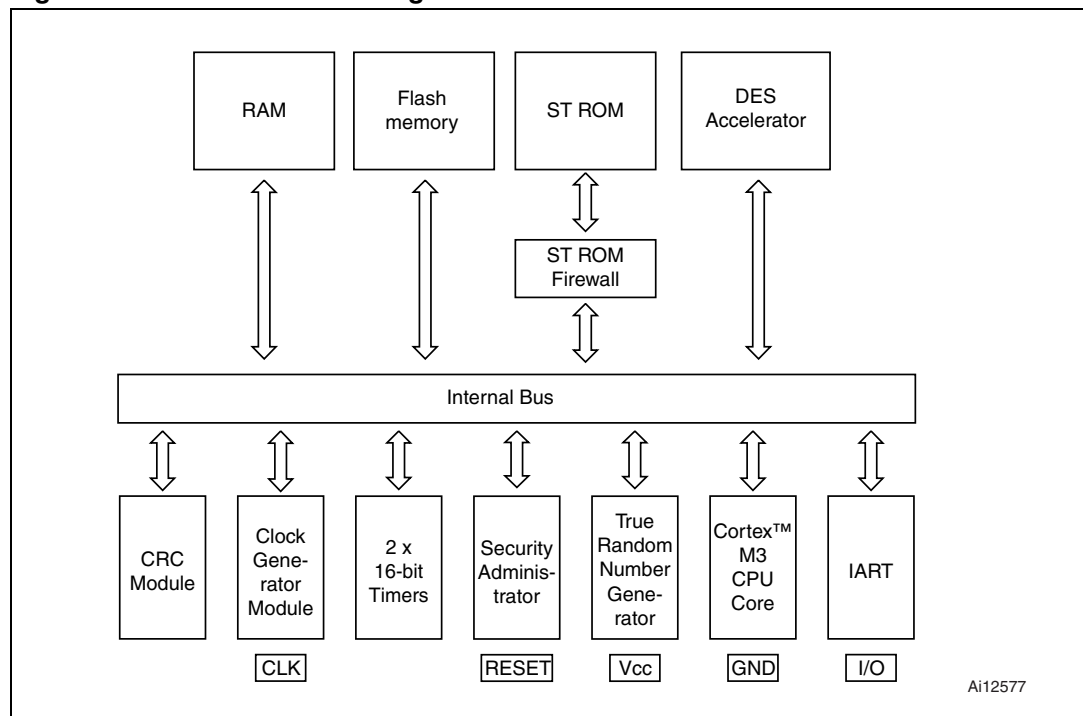
The ST32F416 also offers a serial communication interface fully compatible with the ISO 7816-3 standard (T=0, T=1) for smartcard applications.

Two general purpose 16-bit timers are available.

A hardware Data Encryption Standard (DES) accelerator can be used to the user to optimize the application performance. A software library is provided for Advanced Encryption Standard (AES) implementation.

The ST32F family operates in the -25 to $+85^{\circ}\text{C}$ temperature range and 1.8V, 3V and 5V supply voltage ranges. A comprehensive range of power-saving modes enables the design of efficient low-power applications.

Figure 1. ST32F416 block diagram



1.2 Software development tools description

Dedicated Cortex™-M3 software development tools are provided by ARM and Keil. This includes the Instruction Set Simulator (ISS) and C compiler. The documentation is available on the ARM and Keil web sites.

Moreover, STMicroelectronics provides:

- A time-accurate hardware emulator controlled by the Keil debugger and the ST development environment.
- A complete product simulator based on Keil's ISS simulator for the Cortex™-M3 CPU.
- A ROMed Flash Loader with very high-speed software downloading capabilities.

2 Revision history

Table 1. Document revision history

Date	Revision	Changes
19-Sep-2008	1	Initial release.

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