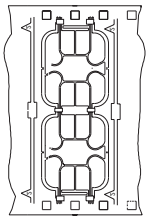
ST19KF16

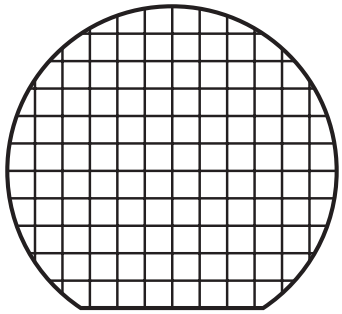
Smartcard MCU
With 1088 Bits Modular Arithmetic Processor

DATA BRIEFING

- 8 BIT ARCHITECTURE CPU
- 32 KBytes of USER ROM WITH PARTITIONING
- SYSTEM ROM FOR LIBRARIES
- 1984 Bytes of RAM WITH PARTITIONING
- 16 KBytes of EEPROM WITH PARTITIONING
  - Highly reliable CMOS EEPROM technology
  - 10 year data retention
  - 100,000 Erase/Write cycle endurance
  - Separate Write and Erase cycles for fast “1” programming
  - 1 to 64 bytes Erase or Program in 1 ms
- 1088 BITS MODULAR ARITHMETIC PROCESSOR
  - Fast modular multiplication and squaring using Montgomery method
  - Software Crypto Libraries in separate ROM area for efficient algorithm coding using a set of advanced functions
  - Software selectable operand length up to 2176 bits
- SECURITY FIREWALLS FOR MAP AND MEMORIES
- VERY HIGH SECURITY FEATURES INCLUDING EEPROM FLASH PROGRAM AND RAM FLASH CLEAR
- 8 BIT TIMER
- SERIAL ACCESS, ISO 7816-3 COMPATIBLE
- 3V ± 10% or 5V ± 10% SUPPLY VOLTAGE
- POWER SAVING STANDBY MODE
- UP TO 10 MHz INTERNAL OPERATING FREQUENCY
- CONTACT ASSIGNMENT COMPATIBLE ISO 7816-2
- ESD PROTECTION GREATER THAN 5000V
- FAST CRYPTOGRAPHIC FUNCTIONS PROCESSING (5V ± 10%, 5MHz)



Micromodule (D4)



Wafer

Function	Speed
RSA 512 bits signature with CRT *	20 ms
RSA 512 bits signature without CRT	60 ms
RSA 512 bits verification (e=$10001)	2 ms
RSA 1024 bits signature with CRT	110 ms
RSA 1024 bits signature without CRT	380 ms
RSA 1024 bits verification (e=$10001)	5 ms
RSA 2048 bits signature with CRT	800 ms
RSA 2048 bits verification (e=$10001)	100 ms
EC 160 bits signature	250 ms
EC 160 bits verification	500 ms

*CRT: Chinese Remainder Theorem

This is Brief Data from STMicroelectronics. Details are subject to change without notice. For complete data, please contact your nearest Sales Office or SmartCard Products Divison, Rousset, France. Fax: (+33) 4 42 25 87 29

HARDWARE DESCRIPTION

The ST19KF16, a member of the ST19 device family, is a serial access microcontroller especially designed for very large volume and cost competitive secure portable objects, where high performance Public Key Algorithms will be implemented, to cut down initialization and communication costs and to increase security.

Its internal Modular Arithmetic Processor is designed to speed up cryptographic calculations using Public Key Algorithms. Based on a 1088 bit architecture, it processes modular multiplication and squaring up to 2176 bit operands.

The ST19KF16 is based on a STMicroelectronics 8 bit CPU core including on-chip memories: 1984 Bytes of RAM, 32 KBytes of USER ROM and 16 KBytes of EEPROM.

RAM, ROM and EEPROM memories can be configured into partitions. Access rules from any memory partition to another partition are setup by the user defined Memory Access Control Logic.

It is manufactured using the highly reliable ST CMOS EEPROM technology.

As all other ST19 family members, it is fully compatible with the ISO standards for Smartcard applications.

SOFTWARE SUPPORT

SOFTWARE DEVELOPMENT

Software development and firmware (ROM code/ options) generation are completed by the ST16-19 HDS development system.

CRYPTO LIBRARIES

For an easy and efficient use of the Modular Arithmetic Processor (MAP), ST proposes a complete set of firmware subroutines. This library is located in a specific ROM area, leaving 32 KBytes in the User ROM for the application software. This library saves the operating system designer from coding first layer functions and allows the designer to concentrate on algorithms and Public Key Cryptographic (PKC) protocol implementation.

This library contains firmware functions for:

– loading and unloading parameters and results to or from the MAP
– calculating Montgomery constants
– basic mathematics including modular squaring and multiplication for various lengths
– modular exponentiation using or not the Chinese Remainder Theorem (CRT),
– more elaborate functions such as RSA signatures and authentications for any modulo length up to 2176 bits long or DSA signature and verification and elliptic curves.
– full internal key generation for signatures/authentications. This guarantees that the secret key will never be known outside the chip and contributes to overall system security.
– long random number generation
– sha-1

Figure 1. Block Diagram

