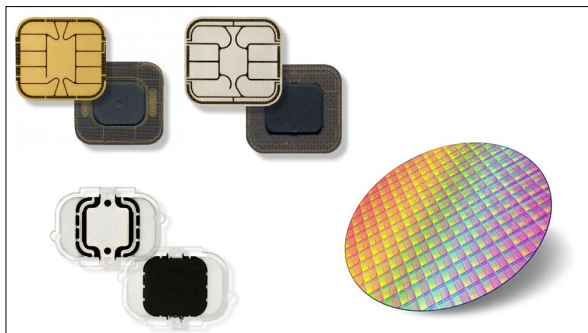# ST31G480 ST31G384 ST31G320 ST31G256

Secure dual interface microcontroller with enhanced security and up to 480 Kbytes of Flash memory

Data brief

Features

Hardware features

- ARM® SecurCore® SC000™ 32-bit RISC core
- 12 Kbytes of User RAM
- Up to 480 Kbytes of secure User high-density Flash memory including 128 bytes of User OTP area:
  - 30-year data retention
  - 500 000 Erase/Write cycle endurance
- Operating temperature: –25 °C to +85 ° C
- Three 16-bit timers with interrupt
- Watchdog timer
- 21. V to 5.5 V supply voltages
- External clock frequency up to 10 MHz
- CPU clock frequency up to 28 MHz
- Power-saving Standby state
- Contact assignment compatible with ISO/IEC 7816-3 standards
- Asynchronous receiver transmitter (IART) with RAM buffer for high speed serial data support (ISO/IEC 7816-3 T=0/T=1 and EMV® compliant)
- ESD protection greater than 6 kV (HBM)
- CCEAL6+ and EMVCo certification target

Contactless features

- Complies with ISO/IEC 14443 Type A, B and B', PayPass™ and ISO/IEC 18092 passive mode standards
- Two tuning capacitor values: 20 pF and 68 pF
- Automatic CPU frequency adaptation for optimum power consumption
- Automatic RF communication type detection
- 13.56 MHz carrier frequency
- RFUART (RF universal asynchronous receiver transmitter) up to 848 Kbps
- Very high bitrate (ASK VHBR) up to 3.4 Mbps in reception and 6.8 Mbps in transmission
- Simultaneous mode (contact and contactless)
- 4-Kbyte RF frame buffer in dedicated RFUART RAM
- MIFARE Plus® and MIFARE® DESFire® EV1 hardware and software implementation
- MIFARE® Classic available as part of MIFARE Plus®

Security features

- Active shield
- Monitoring of environmental parameters
- Three-key Triple DES accelerator
- AES accelerator
- AIS-31 Class PTG2 compliant true random number generator (TRNG)
- NESCRYPT coprocessor for public key cryptography algorithm
- ISO/IEC 13239 CRC calculation block
- Unique serial number on each die
- Protection against multiple attacks

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1 Description

Designed for secure ID and banking applications, the ST31G480, ST31G384, ST31G320 and ST31G256 are serial access microcontrollers that incorporate the most recent generation of ARM processors for embedded secure systems. Their SecurCore® SC000™ 32-bit RISC core is built on the Cortex® M0 core with additional security features to help to protect against advanced forms of attacks.

Cadenced at 28 MHz, the SC000™ core brings great performance and excellent code density thanks to the Thumb®-2 instruction set.

Some devices implement the MIFARE® DESFire® EV1 or MIFARE Plus® (including MIFARE® Classic) technology. MIFARE, MIFARE DESFire, MIFARE Plus and MIFARE Classic are registered trademarks of NXP B.V. and are used under license.

An RF interface including an RF universal asynchronous receiver (RFUART) enables contactless communication up to 848 Kbps compatible with ISO/IEC 14443 Types A, B and B' as well as ISO/IEC 18092 standards.

Very-high bitrates (ASK VHBR) up to 3.4 Mbps in reception and 6.8 Mbps in transmission are possible.

A Simultaneous mode where contactless communication can be enabled while the device is in Contact mode is also available.

The devices also offer a serial communication interface fully compatible with the ISO/IEC 7816-3 standard (T=0, T=1).

Three 16-bit general-purpose timers with interrupt capability are available as well as a watchdog timer.

The devices feature hardware accelerators for advanced cryptographic functions. The AES accelerator provides a high-performance implementation of the AES-128, AES-192 and AES-256 algorithms. The 3-key Triple DES accelerator (EDES+) peripheral enables Cipher Block Chaining (CBC) mode, fast DES and triple DES computation based on three key registers and one data register, while the NESCRYPT cryptoprocessor efficiently supports the public key algorithm with native operations up to 4096 bits long.

The devices operate in the –25 to +85 °C temperature range, at 2.1 V, 3 V and 5 V supply voltage ranges in Contact mode, and complies with the ISO/IEC 14443 and ISO/IEC18092 specification limits. A comprehensive range of power-saving modes enables the design of efficient low-power and contactless applications.

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: *www.st.com*. ECOPACK® is an ST trademark.

2 Software development tool description

Dedicated SecurCore® SC000™ 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 SecurCore® SC000™ CPU.

3 Ordering code

Example:
ST31 G 480 M R XX A xxx

Platform type

ST31 = ARM® SecurCore™ SC000 platform

Product family

Dual interface device in 80 nm technology

Memory size (Flash memory)

480 = 480 Kbytes   384 = 384 Kbytes
320 = 320 Kbytes   256 = 256 Kbytes

Specific software features

S = No additional software
M = MIFARE Plus™ or MIFARE DESFire™ EV1

Specific hardware features

B = Contact only, no NESCRYPT
C = Contact only
F = Contactless only, no NESCRYPT
G = Contactless only
Q = Dual, no NESCRYPT
R = Dual

Delivery form

XX

Product external revision

A = Revision 1
B = Revision 2

Chameleon code

xxx

Not all combinations are necessarily available. For a list of available options (speed, package, etc.) or for further information on any aspect of these devices, please contact your nearest STMicroelectronics Sales Office.

4 Revision history

Table 1. Document revision history

Date	Revision	Changes
17-Jun-2014	1	Initial release.
13-Apr-2016	2	Added the ST31G384, ST31G320 and ST31G256 part numbers. Updated cover page features. Added ECOPACK text. Replaced *Device and feature summary of derivative devices* by *Section 3: Ordering code*.

Please Read Carefully: