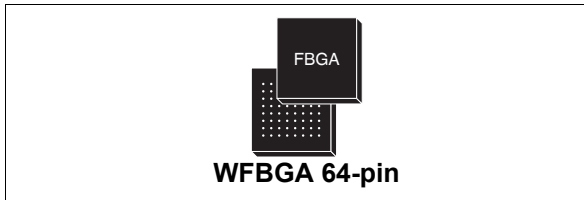

Near field communication controller

Data brief

**Features**

NFC operating modes supported:

- Card emulation
- Reader / Writer
- Peer-to-peer communication

Hardware features

- 36 Kbytes of EEPROM
- High integrated analog front end (AFE) for RF transmission and reception including automatic card and field detection modes
- Battery Off and Switched Off modes supported in Card Emulation mode
- Optimized power consumption modes
- Battery voltage monitoring
- Support for up to 3 external Secure Elements
- System clock
 - FracN PLL input range from 12 to 52 MHz

- 27.12 MHz external crystal oscillator
- Enhanced testability
- ECOPACK[®]2 package
 - BGA 4x4x0.8

RF communications

- ISO/IEC 14443 Types A and B
- ISO/IEC 15693
- ISO/IEC 18000-3 Mod1
- ECMA 340 (NFCIP-1)
- Supports FeliCa[™] cards as described in ECMA 340 specification
- All RF communications are available in Card Emulation, Peer To Peer and Reader/Writer modes

Communication interfaces

- Three SWP interfaces
- I²C Slave interface up to 1 Mbit/s
- SPI Slave interface up to 4 Mbit/s

Electrical characteristics

- Battery voltage support from 0V to 5V
- Supports Class B and C operating conditions for UICC

1 Description

The ST21NFCB is a single chip designed for supporting 13.56 MHz contactless communication, including Near Field Communication (NFC) functions in the three operating modes: Card emulation, Reader/Writer and Peer-to-peer communication.

This product is based on an advanced Smartcard ST21 microcontroller with 36 Kbytes of EEPROM. It includes an integrated RF Analog Front End (AFE) supporting all the contactless proximity (ISO/IEC 14443, ECMA 340 (NFCIP-1), and vicinity (ISO/IEC 15693, ISO/IEC 18000-3 Mod1) standards.

The ST21NFCB is a serial access circuit based on a 8/16-bit CPU core. Operations are synchronized with an internally generated clock issued by the Clock Generator module.

Thanks to an enhanced power switch system, the ST21NFCB is able to support several power supply sources (Switched On, Switched Off and Battery Off modes) and manages the power management of the device and its associated Secure Elements.

1.1 Overview

The ST21NFCB system-on-chip combines a complete hardware capability for 13.56 MHz contactless communication with an embedded firmware which handles:

- ISO/IEC 14443 Types A and B, ECMA 340 (NFCIP-1), ISO/IEC 15693, ISO/IEC 18000-3 Mod1 in Reader mode
- ISO/IEC 14443 Types A and B, ECMA 340 (NFCIP-1), in Card Emulation mode
- Switching between operating modes and RF modes
- Host Controller Interface functions (HCI based on the ETSI specification)
- NCI functions for Device Host link

In addition, the embedded firmware and associated macrocells support the handling and protocols for the various interfaces:

- 3 Single Wire Protocol (SWP) interfaces fully compliant with ETSI TS 102 613 specifications
- I²C Slave interface up to 1 MHz fully compliant with NXP specifications
- SPI Slave interface up to 4 Mbit/s fully compliant with Freescale specifications

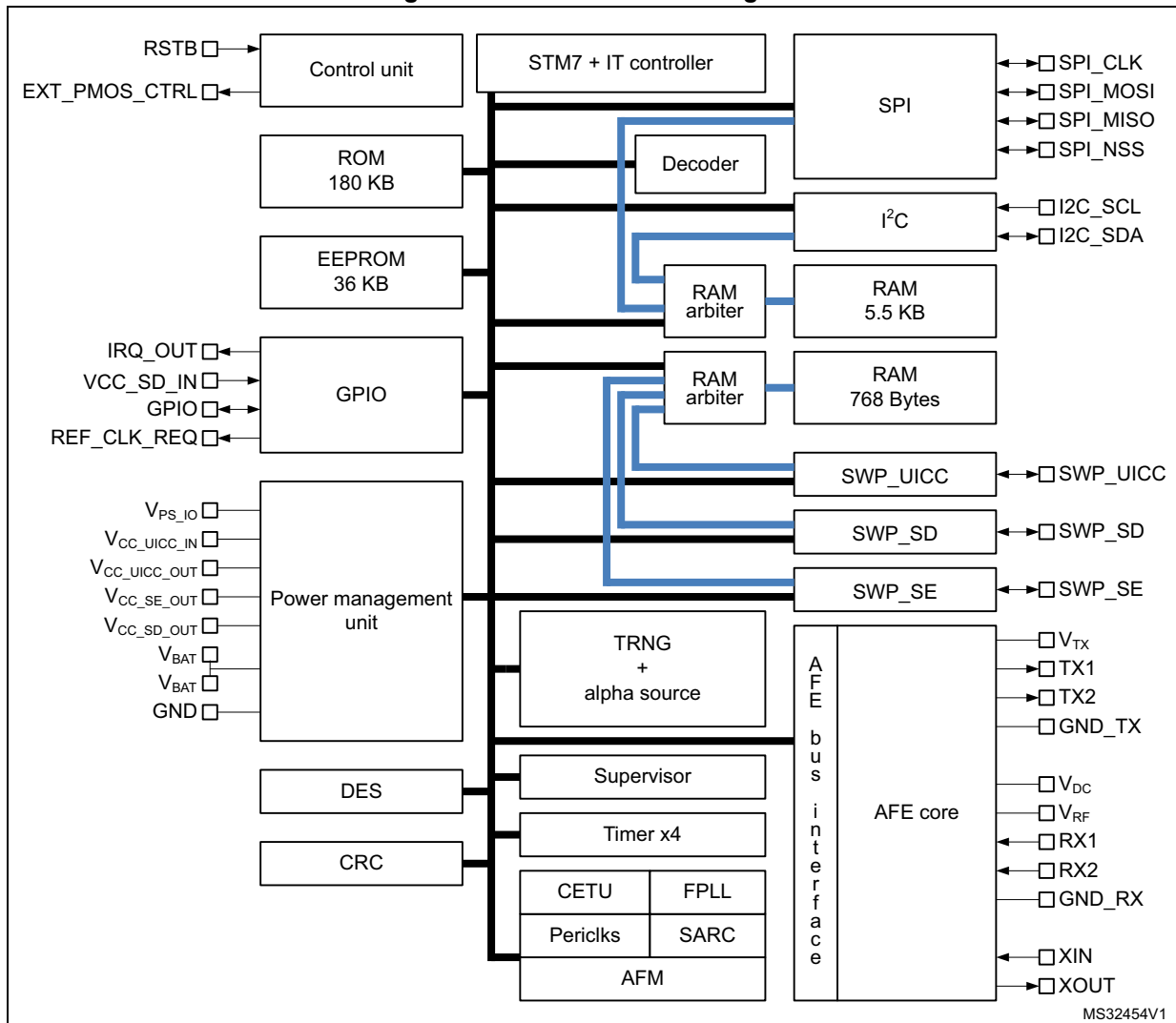
The ST21NFCB is designed for an optimized integration on a mobile phone with the communication interfaces shown in [Figure 1](#).

Figure 1. Mobile phone communication interfaces



1.2 Block diagram

Figure 2. ST21NFCB block diagram



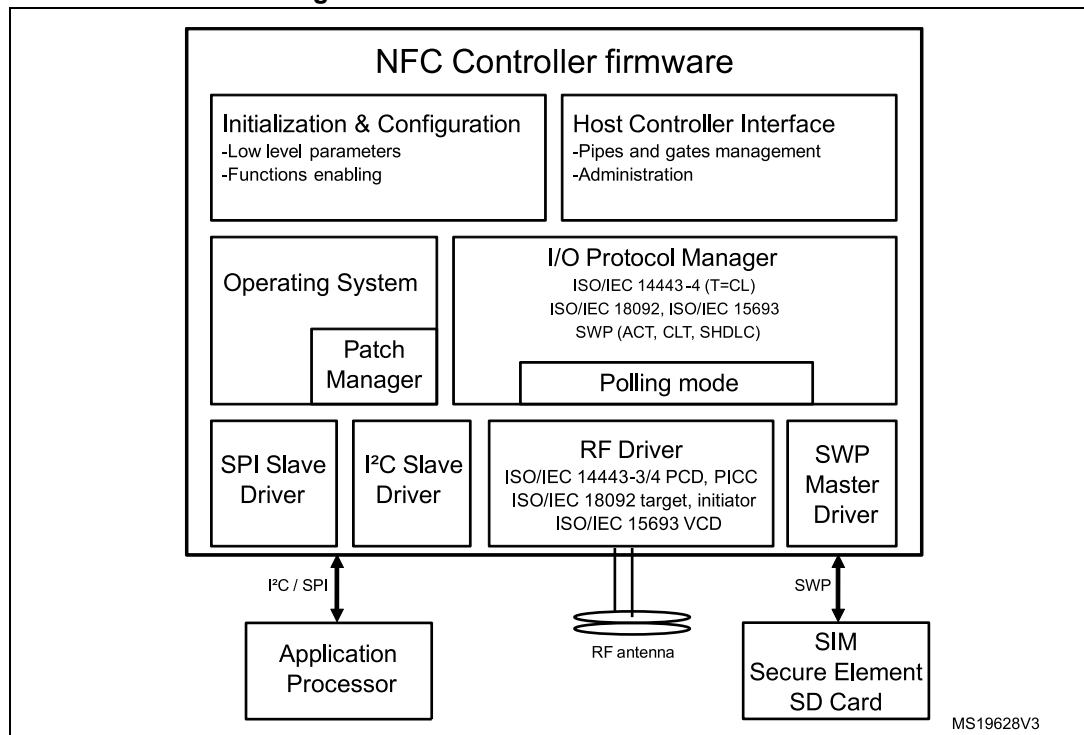
1.3 Firmware description

The ST21NFCB is a system-on-chip solution able to be compliant with an NFC communication system embedded in a mobile phone.

The firmware is developed in several modules:

- NFC Controller Interface (NCI) based on NFC Forum specification managing communication protocol with the device Host
- Host Controller Interface based on the ETSI specification managing the gates related to the different protocols, the pipe between gates, the power management system, etc.
- The Operating System (OS) is the core of the system responsible for dispatching commands to Card Initialization Manager and Host Controller Interface depending on the ST21NFCB life cycle.
- Contactless tunneling mode (CLT) protocol
- Simplified High-Level Data Link Control (SHDLC)
- Low level drivers including:
 - SPI in Slave mode
 - I²C in Slave mode
 - SWP in Master mode
 - RF drivers for all vicinity and proximity standards in Card Emulation and Reader modes

Figure 3. Firmware architecture overview



1.4 Evaluation environment

Development tools include a complete range of hardware systems and software tools from STMicroelectronics and third-party tool suppliers. The range of tools includes solutions to evaluate the product.

2 Revision history

Table 1. Document revision history

Date	Revision	Changes
17-Feb-2014	1	Initial release.

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