ST21NFCA

Near field communication microcontroller

Data brief

Features

ST21NFCA operating modes supported:

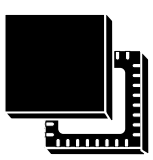
- Card emulation
- Reader/Writer
- Peer-to-peer communication

Hardware features

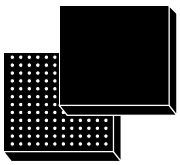
- Enhanced 8/16-bit CPU core
- 112 Kbytes of ROM
- 4 Kbytes of RAM
- 36 Kbytes of EEPROM
- High integrated analog front end (AFE) for RF transmission and reception including automatic card and field detection modes
- Full Power and Low Power modes supported
- Optimized power consumption modes
- SIM and ST21NFCA power management functions
- 3V power supply
- Supports Class B and C for UICC (Universal Integrated Circuit Card)

RF communications

- ISO/IEC 14443 A&B in both PICC (Proximity Card) and PCD (Proximity Coupling Device) modes
- ISO/IEC 15693 in VCD (Vicinity Coupling Device) mode
- ISO/IEC 18092 (NFCIP-1)
- NFC Forum tags types 1 to 4 supported (Topaz®, MIFARE® Ultralight, Jewel®, FeliCa™ Open Tag, ST23YR18/80 with Type 4 applet)



VFQFPN32



VFBGA64

Host communication interfaces

- Single Wire Protocol (SWP) interface with support for contactless tunneling mode (CLT)
- I^2C Slave interface
- SPI Slave interface
- Interrupt mode for SPI and I^2C interfaces

Software features

- Includes all drivers supporting the handling and host protocols for contact and contactless interfaces
- Includes complete firmware driving switch modes between operating modes and host controller interface functions (based on [ETSI TS 102 622 HCI])
- Product configuration/patchability via I^2C and SPI
- Automatic AID (Application Identifier) routing
- Dual Secure Element support

Evaluation kit

- An evaluation board is available to evaluate the advantages of the ST21NFCA router IC and to facilitate the development of NFC, Contactless and RFID applications. Please contact ST sales office for more information.

1 Description

The ST21NFCA is a standalone chip designed for supporting 13.56 MHz contactless communication, including Near Field Communication (NFC) functions in three operating modes: card emulation, reader/writer and peer-to-peer communication.

The ST21NFCA is designed for an optimized integration with the standard communication links for a cell phone.

Figure 1. Mobile phone communication links

The ST21NFCA system-on-chip includes embedded firmware which handles:

- ISO/IEC 14443 A&B and ISO/IEC 18092 (NFCIP-1) in Card Emulation modes as well as Reader modes
- Polling loop for RF card and RF reader detection
- Host Controller Interface functions (HCI based on the ETSI specification)

In addition, the embedded firmware and associated hardware IPs support handling and protocol for the various interfaces:

- Single Wire Protocol (SWP) interface fully compliant with [ETSI_SWP]
- I^2C Slave interface up to 400 kHz fully compliant with [I2C] fast mode
- SPI Slave interface up to 1 MHz

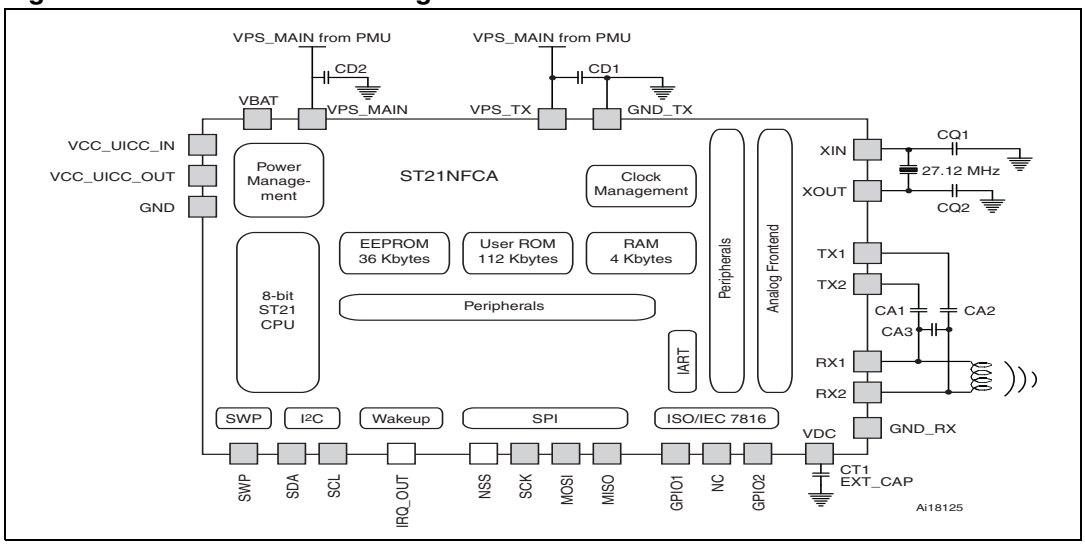
The ST21NFCA is a serial access circuit based on a 8/16-bit CPU core. Operations are synchronized with an internally generated clock issued by the Clock Generator module.

The CPU includes the Arithmetic Logic Unit (ALU), the control logic and registers controlled by the ST21NFCA firmware. The CPU interfaces with the on-chip RAM, ROM and EEPROM memories via a 24-bit internal bus offering 16 MBytes of linear addressing space.

This device also includes a True Random Number Generator (TRNG), three 8-bit fully programmable timers, a Cyclic Redundancy Check (CRC3309) module, and a Data Encryption Standard (DES) accelerator.

Thanks to an enhanced power switch system, the ST21NFCA is able to support several power supply sources (Full and Low Power modes) which manage the power management of the device and its associated UICC.

Figure 2. ST21NFCA block diagram



1.1 Firmware overview

ST21NFCA embedded firmware manages NFC operating functions and provides an interface for communication with different hosts (Application Processor, USIM, eSE, etc.).

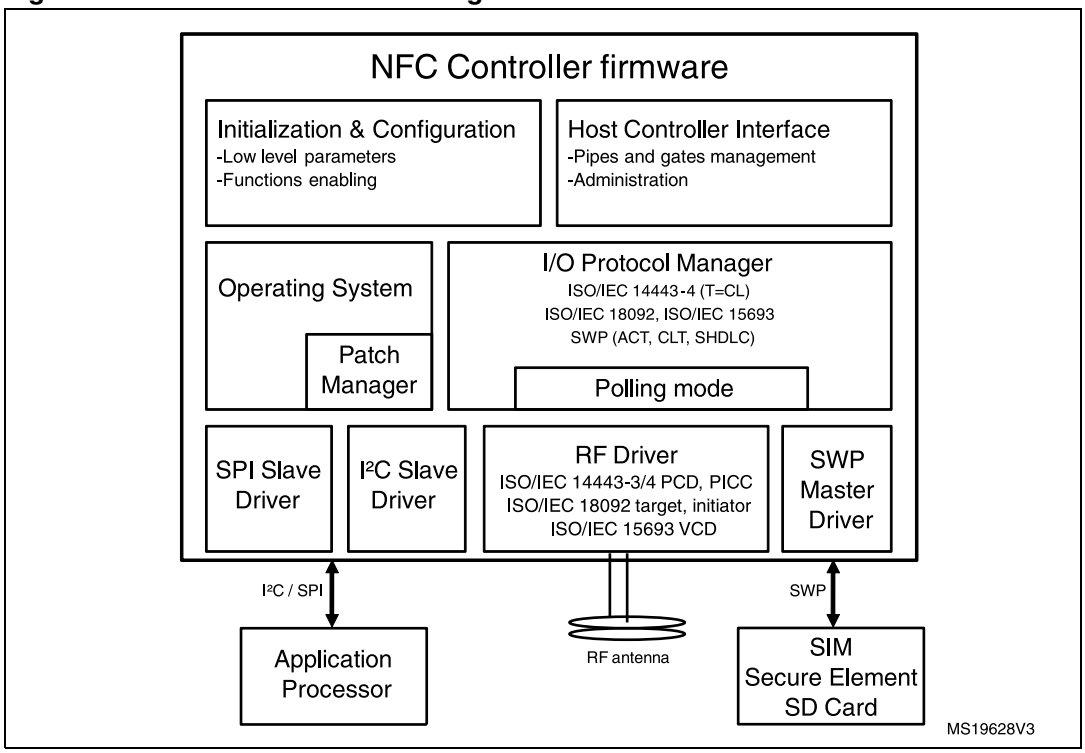
This firmware includes:

- RF drivers for vicinity and proximity standards in Card Emulation and Reader/Writer modes.
- Host Controller Interface (HCI), an interface protocol module that manages communication channels between all devices integrated inside mobile phone, and defined in the [ETSI HCI] specification.

This interface uses HCP over SHDLC stack protocol:

- Over I^2C or SPI (CLF in Slave mode) for communication with a host processor).
- Over SWP (CLF in Master mode) for communication with the SIM (UICC).

Figure 3. Host controller block diagram



2 Revision history

Table 1. Document revision history

Date	Revision	Changes
8-Feb-2008	1	Initial release.
27-Jan-2012	2	Modified *Features*, *Section 1.1: Firmware overview*, *Figure 1*, *Figure 2*, and *Figure 3*.
21-Feb-2012	3	Updated evaluation kit information.

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