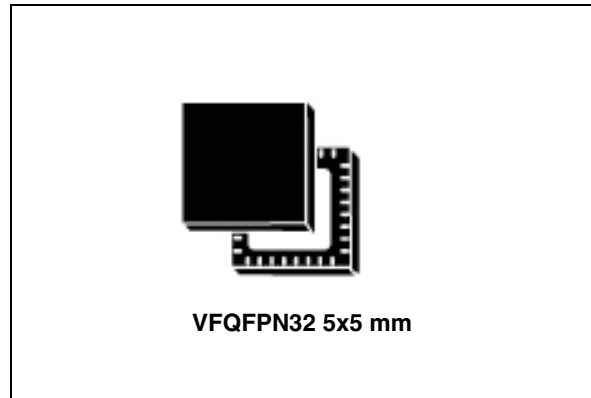


## Near field communication transceiver

Data brief

### Features

- Operating modes supported:
  - Reader/Writer
  - Card Emulation
  - Peer-to-Peer
- Hardware features
  - Dedicated internal frame controller
  - Highly integrated Analog Front End (AFE) for RF communications
  - Transmission and reception modes
- RF communication @13.56 MHz
  - ISO/IEC 14443 Type A and B in Reader and Card Emulation modes
  - ISO/IEC 15693 in Reader mode
  - ISO/IEC 18092 in Reader and Card Emulation modes
- Communication interfaces with a Host Controller
  - Serial peripheral interface (SPI) Slave interface up to 2 Mbps
  - Universal asynchronous receiver/transmitter (UART) up to 2 Mbps
- 32-lead, 5x5 mm, very thin fine pitch quad flat (VFQFPN) ECOPACK® package



### Applications

Typical protocols supported:

- ISO/IEC 14443-3 Type A and B cards and tags
- ISO/IEC 15693 and ISO/IEC 18000-3M1 tags
- NFC Forum tags: Types 1, 2, 3 and 4
- ST Dual Interface EEPROM

Typical STRFNFCA applications include:

- Handheld readers (OTP, PIN pad, POS)
  - E-payment, physical access control, transport, and government
- PC-Link (USB /Serial/PCMCIA)
  - E-payment, security access & authentication, data exchange)
- USB token
  - Security access & authentication, data exchange
- Integrated solution (chipset)
- Keyboard, laptop, set top box, printer, TV, etc.
- E-payment, data exchange, Bluetooth pairing, security access

# 1 Description

The STRFNFCA is an integrated transceiver IC for contactless applications.

The STRFNFCA manages frame coding and decoding in Reader, Card Emulation and Peer-to-Peer modes for standard applications such as near field communication (NFC), proximity and vicinity standards.

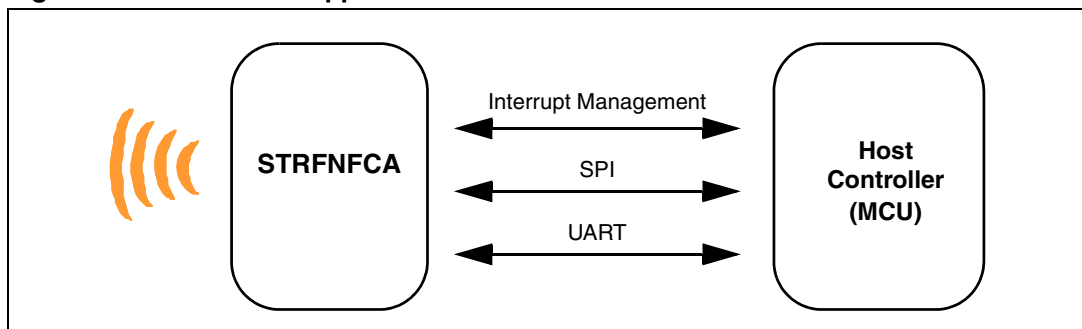
The STRFNFCA embeds an Analog Front End to provide the 13.56 MHz Air Interface.

The STRFNFCA supports ISO/IEC 14443 Type A and B in Reader and Card Emulation modes, ISO/IEC 15693 (single or double subcarrier in Reader mode only) and ISO/IEC 18092 protocols in Reader and Card Emulation modes.

The STRFNFCA also supports the reading of NFC Forum Type 1, 2, 3 and 4 tags.

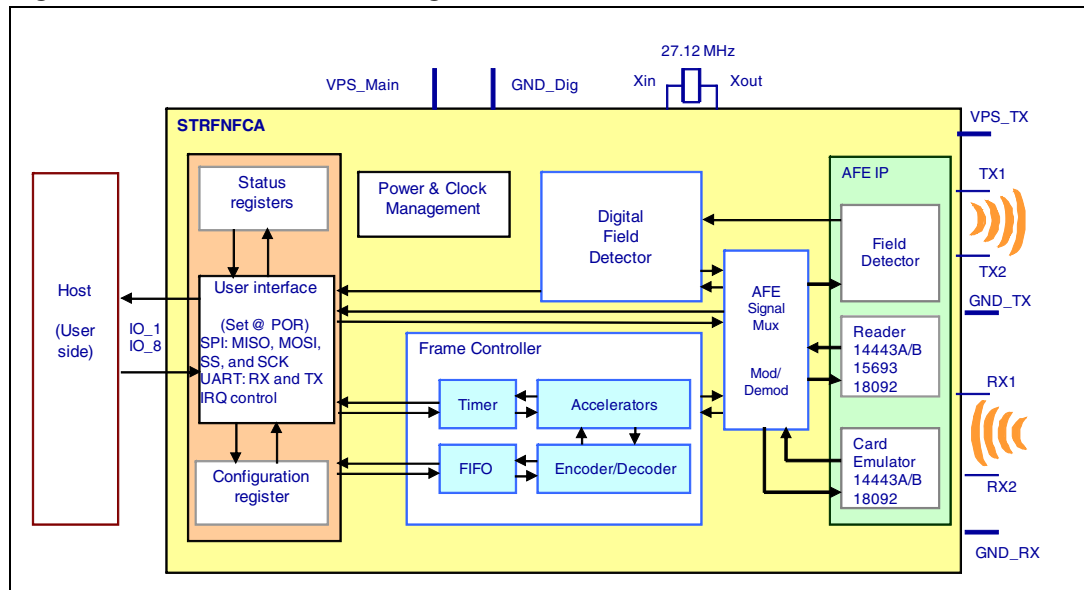
In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK<sup>®</sup> packages, depending on their level of environmental compliance. ECOPACK<sup>®</sup> specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK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

**Figure 1. STRFNFCA application overview**



### 1.1 Block diagram

Figure 2. STRNFCA block diagram



### 1.2 List of terms

Table 1. List of terms

Term	Meaning
DAC	Digital analog converter
GND	Ground
HFO	High frequency oscillator
LFO	Low frequency oscillator
MCU	Microcontroller unit
RFU	Reserved for future use
SPI	Serial peripheral interface
t <sub>L</sub>	Low frequency period
t <sub>REF</sub>	Reference time
UART	Universal asynchronous receiver-transmitter
WFE	Wait for event

## 2 Pin and signal descriptions

Figure 3. Pinout description

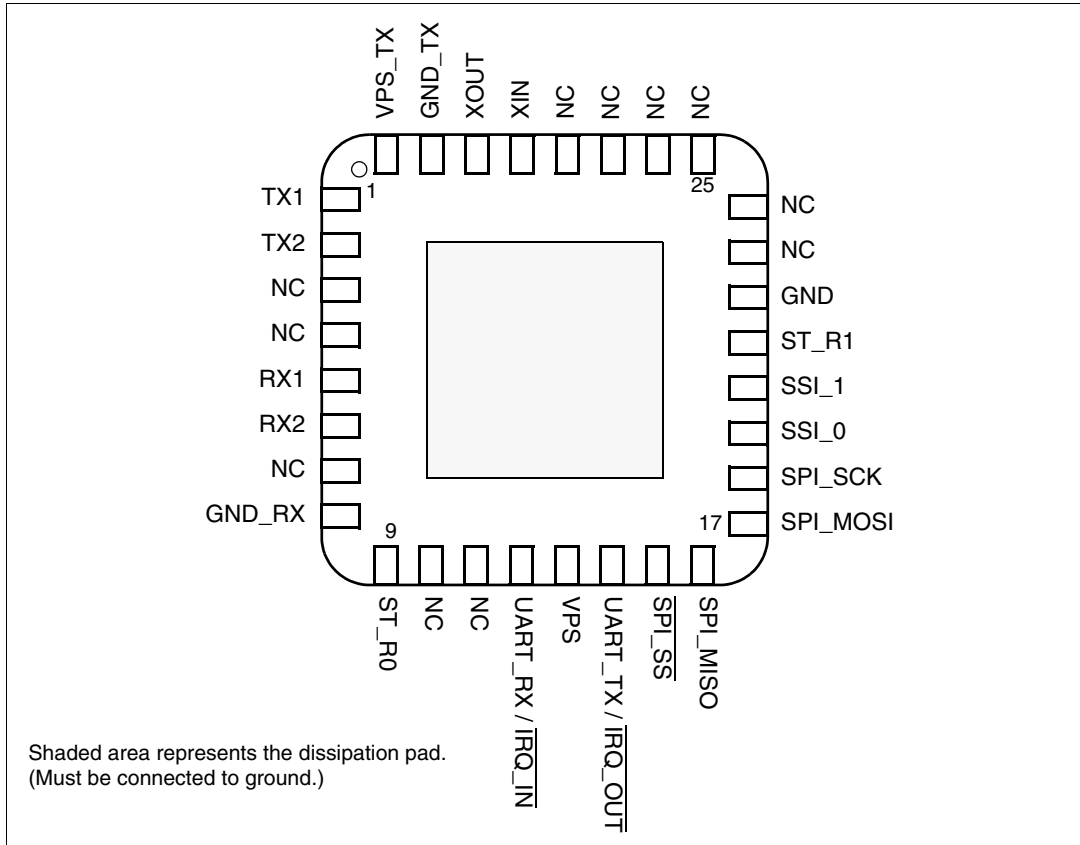


Table 2. Pin descriptions

Pin	Pin name	Type <sup>(1)</sup>	Main function	Alternate function
1	TX1	O	Driver output 1	
2	TX2	O	Driver output 2	
3	NC		Not connected	
4	NC		Not connected	
5	RX1	I	Receiver input 2	
6	RX2	I	Receiver input 1	
7	NC		Not connected	
8	GND_RX	P	Ground (analog)	
9	ST_R0	O	ST Reserved <sup>(2)</sup>	
10	NC		Not connected	
11	NC		Not connected	
12	UART_RX / IRQ_IN <sup>(2)</sup>	I	UART receive pin	Interrupt input
13	VPS	P	Main power supply	

Table 2. Pin descriptions (continued)

Pin	Pin name	Type (1)	Main function	Alternate function
14	UART_TX / $\overline{\text{IRQ\_OUT}}$	O	UART transmit pin	Interrupt output
15	$\overline{\text{SPI\_SS}}$	I	SPI Slave Select (active low)	
16	SPI_MISO	O	SPI Data, Slave Output (3)	
17	SPI_MOSI	I	SPI Data, Slave Input (3)	
18	SPI_SCK	I	SPI serial clock	
19	SSI_0	I	Select serial communication interface	
20	SSI_1	I	Select serial communication interface	
21	ST_R1	I	ST Reserved (4)	
22	GND	P	Ground (digital)	
23	NC		Not connected	
24	NC		Not connected	
25	NC		Not connected	
26	NC		Not connected	
27	NC		Not connected	
28	NC		Not connected	
29	XIN		Crystal oscillator input	
30	XOUT		Crystal oscillator output	
31	GND_TX	P	Ground (RF drivers)	
32	VPS_TX	P	Power supply (RF drivers)	

1. I: Input, O: Output, and P: Power
2. Must add a capacitor to ground.
3. Must not be left floating.
4. Must be connected to  $V_{PS}$ .

## 3 Command summary

### 3.1 Command format

Fields <Cmd>, <RespCode> and <Len> are always 1 byte long. <Data> can be from 0 to 255 bytes.

- Direction: MCU to STRFNFCA  
<CMD><Len><Data>
- Direction: STRFNFCA to MCU  
<RespCode><Len><Data>

### 3.2 List of commands

*Table 3* lists the command set available for standard use.

**Table 3. List of STRFNFCA commands**

Code	Command	Description
01	IDN	Requests short information about STRFNFCA and its firmware version.
02	PROTOCOL SELECT	Select communication protocol and specify some protocol-related parameters.
03	POLL FIELD	Returns the current value of FieldDet flag.
04	SENDRECV	Sends data using previously selected protocol and receive the response of TAG.
05	LISTEN	Listens for the data using previously selected protocol.
06	SEND	Sends data using previously selected protocol.
08	RDREG	Read the Configuration register.
09	WRREG	Writes to the Configuration register.
0A	BAUDRATE	Sets UART baud rate.
0D	AC FILTER	Enables or disables the Anti-collision filter.
55	ECHO	STRFNFCA performs a serial interface ECHO command (reply data 0x55 or stops the Listening state when a listen command has been sent without error).
Other codes		ST Reserved

## 4 Electrical characteristics

### 4.1 Absolute maximum ratings

**Table 4. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
VPS_Main	Supply voltage	-0.3 to 7.0	V
VPS_TX	Supply voltage (RF drivers)	-0.3 to 7.0	V
V <sub>IO</sub>	Input or output voltage relative to ground	-0.3 to VPS_Main +0.3	V
V <sub>MaxCarrier</sub>	Maximum input voltage (pins RX1 and RX2)	±14.0	V
T <sub>A</sub>	Ambient operating temperature	-25 to +85	°C
	Ambient operating temperature (RF mode)	0 to +50	
T <sub>STG</sub>	Storage temperature (Please also refer to package specification).	-65 to +150	°C
V <sub>ESD</sub>	Electrostatic discharge voltage according to JESD22-A114, Human Body Model	2000	V
P <sub>TOT</sub> <sup>(1)</sup>	Total power dissipation per package	1	W

1. Depending on the thermal resistance of package.

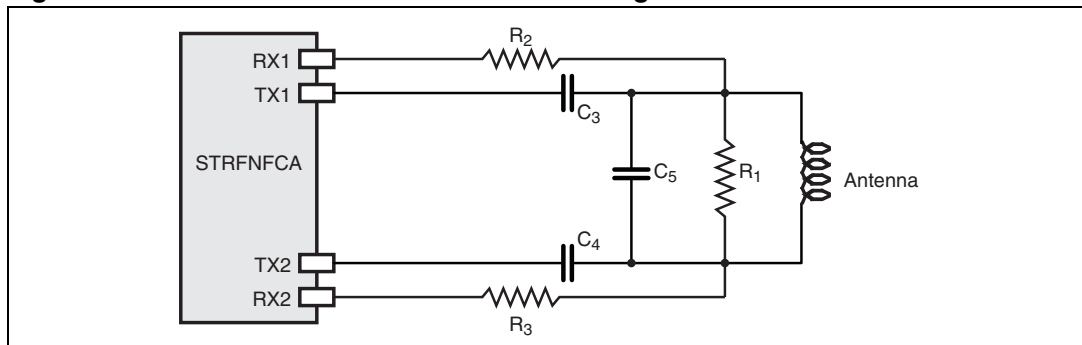
**Note:** *Stresses listed above may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of the specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.*

## 5 Evaluation kit environment

The Evaluation kit includes a complete range of hardware and software components from STMicroelectronics and third-party suppliers to demonstrate the efficiency of the STRFNFCA transceiver and help you to develop and debug your applications and evaluate STMicroelectronics RFID products.

- Tools and design kit
- An evaluation board including an example code
- A set of complete documentation including user manual and antenna recommendations

**Figure 4. Reader and Card mode schematic diagram**





## 6 Revision history

**Table 5. Document revision history**

Date	Revision	Changes
28-Jul-2010	1	Initial release.
15-Sep-2010	2	Removed pin descriptions and command summary.
14-Jun-2011	3	Updated communication interface frequencies.
01-Jul-2011	4	Removed Restricted Distribution document classification.
30-Aug-2011	5	Assigned document publication information.
16-Dec-2011	6	Modified <i>Features</i> . Updated <i>Table 3: List of STRNFCA commands</i> and <i>Table 4: Absolute maximum ratings</i> . Added <i>Section 2: Pin and signal descriptions</i> .

**Please Read Carefully:**

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST's terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

**UNLESS OTHERWISE SET FORTH IN ST'S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.**

**UNLESS EXPRESSLY APPROVED IN WRITING BY TWO AUTHORIZED ST REPRESENTATIVES, ST PRODUCTS ARE NOT RECOMMENDED, AUTHORIZED OR WARRANTED FOR USE IN MILITARY, AIR CRAFT, SPACE, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS, NOR IN PRODUCTS OR SYSTEMS WHERE FAILURE OR MALFUNCTION MAY RESULT IN PERSONAL INJURY, DEATH, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE. ST PRODUCTS WHICH ARE NOT SPECIFIED AS "AUTOMOTIVE GRADE" MAY ONLY BE USED IN AUTOMOTIVE APPLICATIONS AT USER'S OWN RISK.**

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.

© 2011 STMicroelectronics - All rights reserved

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Philippines - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

[www.st.com](http://www.st.com)