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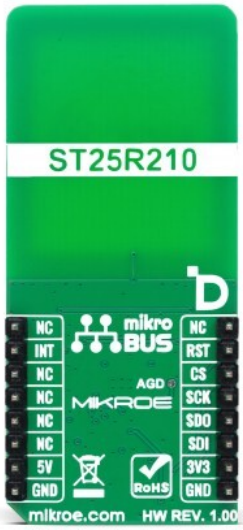
NFC 9 Click



PID: MIKROE-7014

NFC 9 Click is a high-performance NFC interface for implementing 13.56MHz contactless communication in embedded, industrial, and connected electronic systems. It features the ST25R210-ANET NFC universal device from STMicroelectronics, supporting reader/writer operation, passive peer-to-peer communication, NFC initiator and target functionality, card emulation, and NFC-A, NFC-B, NFC-V, and NFC-F protocols. SPI communication with the host MCU enables direct control, while low-power card detection, noise suppression, dynamic power output, an onboard PCB antenna, interrupt signaling, selectable 3.3V or 5V operation, and ClickID simplify integration. It is suitable for access control, authentication, contactless identification, device pairing, data exchange, and general-purpose NFC applications.

For more information about **NFC 9 Click** visit the official product page.

How does it work?

NFC 9 Click is based on the ST25R210-ANET, a highly integrated NFC universal device from STMicroelectronics designed for contactless communication at 13.56MHz. The device supports reader/writer operation, passive peer-to-peer communication, NFC initiator and target functionality, and card emulation. In reader/writer mode, it supports NFC-A and NFC-B communication at data rates up to 848kbit/s, NFC-V/ISO/IEC 15693 at up to 212kbit/s, and NFC-F/FeliCa™ at up to 424kbit/s. Card emulation is available for NFC-A and NFC-F protocols, while low-level operating modes allow the implementation of MIFARE Classic®-compliant and other custom protocols.

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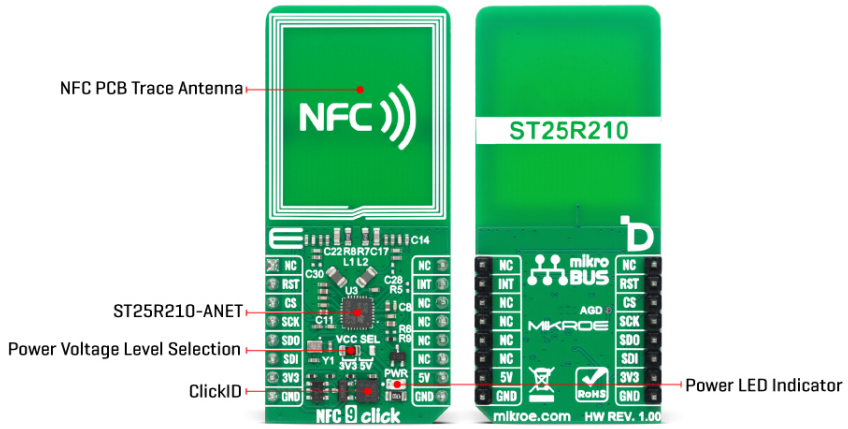

The ST25R210 integrates an advanced analog front end, a high-power RF driver capable of delivering up to 1.6W, automatic frame coding and decoding, protocol timers, and a 256-byte FIFO for transmitted and received data. Its noise suppression receiver improves communication reliability in electrically noisy environments, while active wave shaping reduces RF signal overshoots and undershoots. Software-controlled dynamic power output helps maintain the generated field within configured limits. Improved low-power card detection monitors changes in the antenna's I and Q channels to detect the approach or removal of tags. An internal RC oscillator and programmable wake-up timer allow the device to scan periodically for cards, smartphones, smartwatches, and other NFC-enabled devices while reducing overall power consumption.

NFC 9 Click communicates with the host MCU through a standard 4-wire SPI interface using the SCK, SDO, SDI, and CS lines of the mikroBUS™ socket, with SPI clock frequencies of up to 6MHz according to the board specification. The interface operates with a clock polarity of zero and a clock phase of one, transfers data most significant bit first, and uses an active-low chip-select signal. The RST pin resets the ST25R210 and also participates in ClickID selection, while the INT pin provides an interrupt output for events such as completed transmissions or receptions, detected cards, FIFO conditions, errors, and oscillator status changes. The CS pin additionally serves as the ClickID communication line when the identification circuit is selected.

The RF section includes a differential antenna-matching network connected to a large antenna etched directly onto the PCB, eliminating the need for an external antenna in typical NFC applications. A 27.12MHz crystal provides the reference clock from which the ST25R210 generates the 13.56MHz RF carrier. The board also features a green PWR LED that indicates the presence of the selected supply voltage, a VCC SEL jumper for choosing between 3.3V and 5V operation, and ClickID circuitry that allows a compatible host system to identify the board automatically.

This Click board™ can operate from either the 3.3V or 5V mikroBUS™ power rail, selected through the VCC SEL jumper, with the selected voltage also defining the SPI and GPIO logic levels. This allows NFC 9 Click to work with both 3.3V and 5V-capable host MCUs. The board comes with a library containing easy-to-use functions and a ready-to-use code example that can be downloaded and used as a reference for further development.

Specifications

Type	RFID/NFC

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Applications	Ideal for applications such as access control systems, contactless authentication, identification terminals, device pairing, NFC data exchange, and general-purpose NFC reader/writer designs
On-board modules	ST25R210-ANET - NFC universal device with reader/writer, passive P2P, and card emulation support from STMicroelectronics
Key Features	13.56MHz reader/writer and card emulation operation, NFC-A/B/V/F protocol support, passive peer-to-peer communication, up to 1.6W RF output power, low-power card detection, noise suppression, dynamic power output, active wave shaping, onboard PCB antenna, SPI control, selectable 3.3V/5V operation, and more
Interface	GPIO,SPI
Feature	ClickID
Compatibility	mikroBUS™
Click board size	L (57.15 x 25.4 mm)
Input Voltage	3.3V or 5V

Pinout diagram

This table shows how the pinout on NFC 9 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin	mikroBUS				Pin	Notes
	NC	1	AN	PWM	16	NC	
Reset / ID SEL	**RST**	2	RST	INT	15	**INT**	Interrupt
SPI CS / ID COMM	**CS**	3	CS	RX	14	NC	
SPI SCK	**SCK**	4	SCK	TX	13	NC	
SPI SDO	**SDO**	5	MISO	SCL	12	NC	
SPI SDI	**SDI**	6	MOSI	SDA	11	NC	
Power Supply	**3.3V**	7	3.3V	5V	10	**5V**	Power Supply
Ground	**GND**	8	GND	GND	9	**GND**	Ground

Onboard settings and indicators

Label	Name	Default	Description
LD1	PWR	-	Power LED indicator showing the presence of the selected board supply
JP1	VCC SEL	Left	Power/logic voltage level selection 3.3V/5V: left position 3.3V, right position 5V

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NFC 9 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
Operating Temperature	-40	-	105	°C
RF Frequency	-	13.56	-	MHz
SPI Frequency	-	-	6	MHz

Software Support

NFC 9 Click demo application is developed using the NECTO Studio, ensuring compatibility with mikroSDK's open-source libraries and tools. Designed for plug-and-play implementation and testing, the demo is fully compatible with all development, starter, and mikromedia boards featuring a mikroBUS™ socket.

Example Description

This example demonstrates the use of NFC 9 Click board by reading ISO14443-A type tags UID, ATQA, and SAK values.

Key Functions

- nfc9_cfg_setup This function initializes Click configuration structure to initial values.
- nfc9_init This function initializes all necessary pins and peripherals used for this Click board.
- nfc9_default_cfg This function executes a default configuration of NFC 9 Click board.
- nfc9_read_tag This function reads NFC-A basic tag information such as ATQA, SAK and UID.

Application Init

Initializes the driver and logger, performs the Click default configuration.

Application Task

Continuously checks for an NFC tag, reads its UID and related data, and logs the results.

Application Output

This Click board can be interfaced and monitored in two ways:

- Application Output - Use the "Application Output" window in Debug mode for real-time data monitoring. Set it up properly by following this tutorial.
- UART Terminal - Monitor data via the UART Terminal using a USB to UART converter. For detailed instructions, check out this tutorial.

Additional Notes and Information

The complete application code and a ready-to-use project are available through the NECTO Studio Package Manager for direct installation in the NECTO Studio. The application code can also be found on the MIKROE GitHub account.

Resources

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mikroBUS™

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Downloads

NFC 9 Click example package

NFC 9 Click 2D and 3D files v100

NFC 9 Click schematic v100

ST25R210 datasheet