NFC TAG 4 CLICK PID: MIKROE-3659 Weight: 19 g

NFC Tag 4 Click is NFC tag device, offering 16 Kbit of electrically erasable programmable memory (EEPROM). This Click Board™ offer two communication interfaces. The first one is an I2C serial link and can be operated from a DC power supply. The second one is a RF link activated when Click Board™ act as a contactless memory powered by the received carrier electromagnetic wave. It is perfectly suited for using in wide variety of applications, such as NFC enabled business cards, stickers, wristbands, key fobs, pens, movie passes, hang tags, medication bottles, and many more.

NFC Tag 4 click is supported by a mikroSDK compliant library, which includes functions that simplify software development. This Click board™ comes as a fully tested product, ready to be used on a system equipped with the mikroBUS™ socket.

NFC Tag 4 click is NFC tag device, featuring ST25DV16K - the compact NFC tag IC from STMicroelectronics. This IC includes a full set of features, like Fast data transfer between I2C and RF interfaces, half-duplex 256-byte dedicated buffer, energy harvesting, data protection features, and more. NFC Tag 4 click also features the onboard trace antenna, ensuring that no external components are required in order to use this Click Board™.

HOW DOES IT WORK?

The active NFC tag component on NFC Tag 4 click is the ST25DV16K - the compact NFC tag IC from STMicroelectronics. The Click board™ itself has a reasonably small number of components because most of the interface and EEPROM memory circuitry is already integrated on the ST25DV16K IC. The I2C / SMBus compatible serial interface lines, along with the GPO pin, which also works in the open drain configuration, are pulled up by the onboard resistors. The 2-Wire lines are routed to the respective I2C lines of the mikroBUS™ (SCK and SDA), while the GPO pin of the main IC is routed to the INT pin of the mikroBUS™
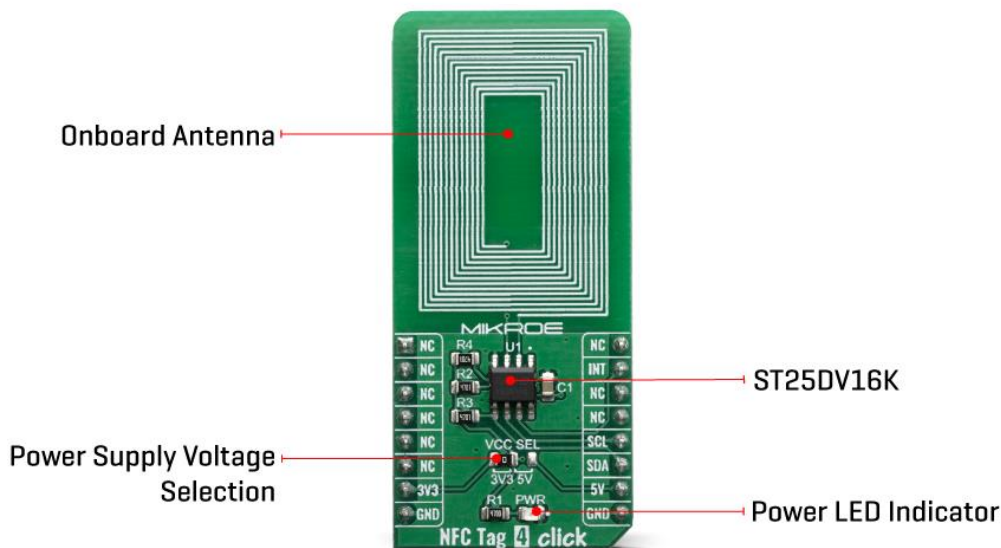
The ST25DV16K uses the I2C/SMBus compatible communication interface, offering a fast transfer mode (FTM), to achieve a fast link between RF and contact worlds, via a 256 byte buffer called Mailbox. This mailbox dynamic buffer of 256 byte can be filled or emptied via either RF or I2C.

There is also the INT pin available, which indicates incoming event to the contact side, like RF Field changes, RF activity in progress, RF writing completion or Mailbox message availability. The built in energy harvesting element can deliver µW of power when external conditions make it possible. The integrated RF management allows the NFC Tag 4 click to ignore RF requests.

All these features can be programmed by setting static and/or dynamic registers of the ST25DV16K. ST25DVxxx can be partially customized using configuration registers located in the E2 system area. More information about all the registers can be found in the ST25DV16K datasheet. However, provided library contains functions that simplify the use of the NFC Tag 4 click. The included application example demonstrates their functionality and it can be used as a reference for custom design.

In order to make sure that no external components are required in order to use it, this Click Board™ contains the integrated trace antenna on the PCB. The antenna coil is correctly tuned and can be used to power and access the device using the ISO/IEC 15693 and ISO 18000-3 mode 1 protocols. Power is transferred to the ST25DV16K by radio frequency at 13.56 MHz via coupling antennas of the NFC Tag 4 click and the NFC Reader being used. The ISO 15693 standard defines the carrier frequency (fC) of the operating field as 13.56 MHz ±7 kHz.

The Click board™ can be supplied and interfaced with both 3.3V and 5V without the need for any external components. The onboard SMD jumper labeled as VCC SEL allows voltage selection for interfacing with both 3.3V and 5V MCUs.

SPECIFICATIONS

Type	NFC
Applications	NFC enabled business cards, stickers, wristbands, key fobs, pens, movie passes, hang tags, medication bottles, and many more.
On-board modules	ST25DV16K - the compact NFC tag IC from STMicroelectronics
Key Features	Fast data transfer between I2C and RF interfaces, half-duplex 256-byte dedicated buffer, energy harvesting, data protection features, integrated antenna onboard
Interface	I2C
Input Voltage	3.3V or 5V
Compatibility	mikroBUS

Click board size	L (57.15 x 25.4 mm)

PINOUT DIAGRAM

This table shows how the pinout on NFC Tag 4 click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin	mikro™ BUS				Pin	Notes
	NC	1	AN	PWM	16	NC	
	NC	2	RST	INT	15	**INT**	Interrupt output
	NC	3	CS	RX	14	NC	
	NC	4	SCK	TX	13	NC	
	NC	5	MISO	SCL	12	**SCL**	I2C Clock
	NC	6	MOSI	SDA	11	**SDA**	I2C Data
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
JP1	VCC SEL	Left	Power supply voltage selection: left position 3V3, right position 5V

LD1	PWR	-	Power LED indicator

SOFTWARE SUPPORT

We provide a library for the NFC Tag 4 click on our LibStock page, as well as a demo application (example), developed using MikroElektronika compilers. The demo can run on all the main MikroElektronika development boards.

Library Description
Library contains function for getting INT pin state Library contains function for setting CS pin state Library contains function for getting register values Library contains function for setting register values Library contains function for device initialization Library contains function for getting temperature value Library contains function for getting axes values Library contains function for software reset Library contains functions for setting power mode and full scale range

Key functions:

- `uint8_t nfctag4_password_present( uint8_t * password_bytes )` - presents password to device in order to open I2C security session.
- `uint8_t nfctag4_init( void )` - initializes the device.
- `uint8_t nfctag4_enable_mailbox( uint8_t enable_mailbox )` - enables or disables mailbox functionality.

Examples description
The application is composed of three sections :

- System Initialization - Initializes GPIO pins, I2C and LOG modules.

- Application Initialization - Initializes I2C driver, presents password to the device and initializes the device.

- Application Task - Checks if RF placed a message to mailbox and if it did, checks message length and logs message bytes.

```
void applicationTask( )
{
    nfctag4_wait_for_int( );
    nfctag4_i2c_get( _NFCTAG4_MEMORY_DYNAMIC, _NFCTAG4_DYNAMIC_REG_MB_CTRL, &aux_buffer[0], 1
);

    if (( aux_buffer[0] & 0x04 ) == ( 0x04 ))
    {
```

```
        nfctag4_wait_for_int( );

        nfctag4_i2c_get( _NFCTAG4_MEMORY_DYNAMIC, _NFCTAG4_DYNAMIC_REG_MB_LEN, &aux_buffer[0],
    1 );

        message_length = aux_buffer[0];

        message_length++;

        nfctag4_wait_for_int( );

        nfctag4_i2c_get( _NFCTAG4_MEMORY_MAILBOX, _NFCTAG4_MAILBOX_REG_BYTE_0, &aux_buffer[0],
    message_length );


        mikrobus_logWrite( " ", _LOG_LINE );

        mikrobus_logWrite( "> ********* MESSAGE ********* <", _LOG_LINE );


        ByteToStr( message_length, text );

        mikrobus_logWrite( "> Message length : ", _LOG_TEXT );

        mikrobus_logWrite( text, _LOG_TEXT );

        mikrobus_logWrite( " [Bytes]", _LOG_LINE );


        for (i = 0; i < message_length; i ++)

        {

            ByteToStr( i, text );

            mikrobus_logWrite( text, _LOG_TEXT );

            mikrobus_logWrite( " : ", _LOG_TEXT );


            ByteToHex( aux_buffer[ i ], text );

            mikrobus_logWrite( "0x", _LOG_TEXT );

            mikrobus_logWrite( text, _LOG_LINE );

        }


        mikrobus_logWrite( "> *********** END *********** <", _LOG_LINE );

    }

}
```

Additional Functions :

- nfctag4_wait_for_int( ) - waits for INT pin to go LOW and than HIGH for time period of 300ms.

   The full application code, and ready to use projects can be found on our LibStock page.
   Other mikroE Libraries used in the example:

- I2C
- UART
- Conversions

Additional notes and informations
Depending on the development board you are using, you may need USB UART click, USB UART 2 click or RS232 click to connect to your PC, for development systems with no UART to USB interface available on the board. The terminal available in all MikroElektronika compilers, or any other terminal application of your choice, can be used to read the message.

MIKROSDK

This Click board™ is supported with mikroSDK - MikroElektronika Software Development Kit. To ensure proper operation of mikroSDK compliant Click board™ demo applications, mikroSDK should be downloaded from the LibStock and installed for the compiler you are using.

For more information about mikroSDK, visit the official page.

DOWNLOADS

mikroBUS™ Standard specification
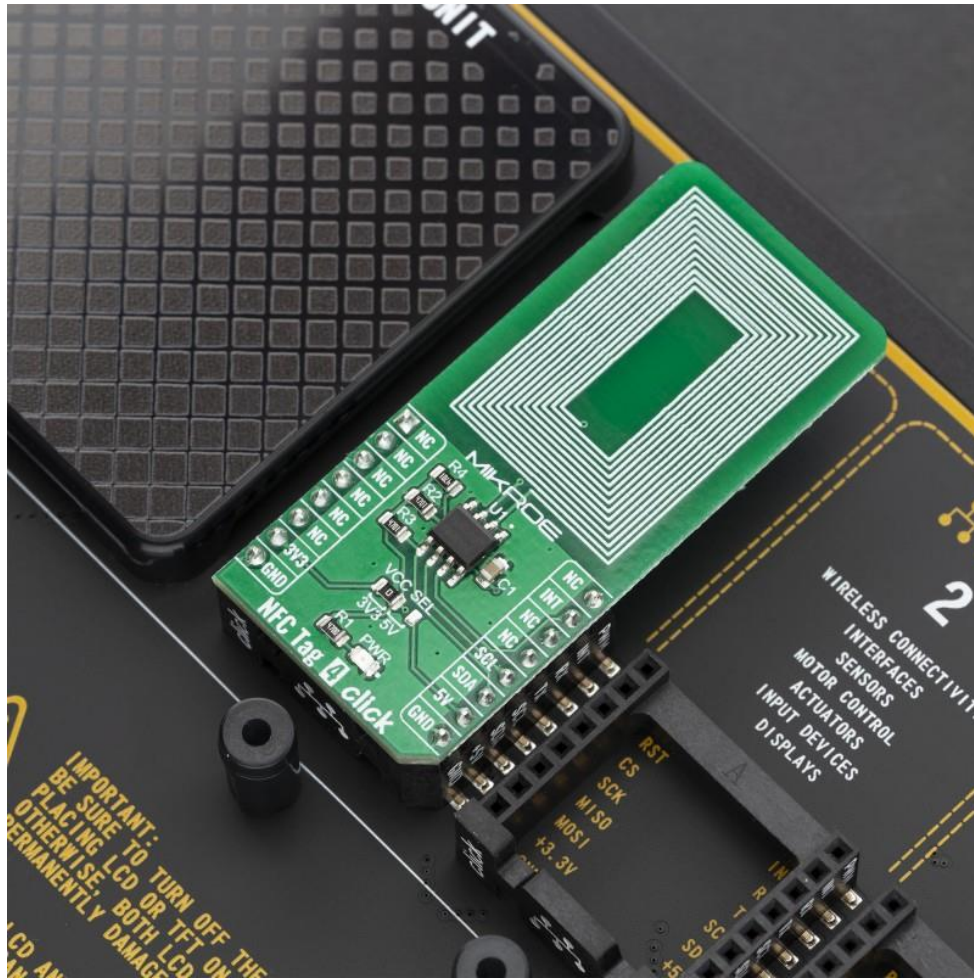
LibStock: mikroSDK

Click board catalog

NFC Tag 4 click example on Libstock

NFC Tag 4 click 2D and 3D files

NFC Tag 4 click schematic

ST25DV16K datahseet

https://www.mikroe.com/nfc-tag-4-click/7-16-19