RFID NFC Reader Writer - *µFR Nano*

ISO14443 Type A & B, ISO18092 Card Programmer

RFID NFC contactless reader/writer – **µFR Nano** is an advanced development tool based on NFC and RFID technology. It operates at a frequency of 13.56 MHz, compliant with ISO14443 A&B and ISO18092 standards.

This NFC module is primarily designed as a professional tool for IT companies and individuals engaged in RFID NFC solution development.   It comes with free SDK source code examples, cross-platform libraries, upgradeable firmware, and well-documented API and communication protocol.
We also provide plug-and-play apps that make µFR Nano and an excellent choice for end-users, as well.

This small but powerful device is fully featured and fully NFC compatible. It is available with USB, UART (TTL) or RS232 connectivity options. Followed by well-documented API, software SDK, cross-platform libraries, firmware upgrades, and excellent technical support, it's a No 1 tool for any RFID NFC custom project development.

In addition to the final product in an attractively designed and customizable case, µFR Nano RFID NFC reader/writer is also available as an OEM NFC module with a connector of the customers' choice.

Who is it for?

µFR Nano RFID NFC Reader/Writer is primarily intended for development companies and individuals (professionals and hobbyists) for further applications and turnkey solutions development. For this reason, it comes with a fully-featured Software Development Kit, including firmware, libraries, source code examples, and documentation for various platforms, operating systems, and development environments. We launch upgrades frequently (including firmware, libraries, and API), all available to download at our official website for FREE.
In addition to the facts mentioned above, our free, extensive, and fast-responsive support brings RFID NFC Reader Writer – µFR Nano to an outstanding position in this industry sector.

Hardware

This RFID NFC readers' RF communication is based on its robust, highly integrated NXP IC interface. The device operates on HF 13.56 MHz and successfully communicates with cards, labels, wristbands, and tags of ISO/IEC 14443 A, ISO/IEC 14443 B, and ISO/IEC 18092 standard.

With outstanding modulation and demodulation concepts, and many integrated 13.56 MHz contactless communication protocols, this device implementation becomes reliable and simple to every RFID NFC solution developer.

Both hardware and software, are fully developed, tested, and successfully implemented with MIFARE®, NTAG21x, NTAG 4xx DNA, and JCOP family cards/tags:

- MIFARE Mini®,
- MIFARE Classic® (1K, 4K, EV1),
- MIFARE Ultralight®,
- MIFARE Ultralight C®,
- MIFARE Plus® (2K, 4K, S, X, EV1),
- MIFARE DESFire® (Light, 2K, 4K, 8K, EV1, EV2),
- NXP NTAG® 21x (210, 213, 215, 216, Tag Tamper),
- NXP NTAG® 4xx DNA (413, 424),
- NXP JCOP® Java Card (J3A040, J3A081, J3H145, JC30M48CR).

Besides, this tool supports all other tags compatible with the listed above.

Even though the supported technologies list is already wide, our development team constantly works on product improvements and upgrades, staying in line with this technology global trends.

THIS RFID MODEL IS ALSO AVAILABLE AS OEM NFC MODULE.

The OEM board is available in three versions:

- USB – with standard micro-USB connector
- UART TTL – with the 5-pin male header connector
- RS-232 – via an adapter with a DB9 connector.

Firmware

Digital Logic proprietary interoperable firmware runs on all MCU platform based μFR Series hardware. The reader and the host establish communication through the high-speed FTDI chip direct access.

At the core, on the communication level, the device uses a Digital Logic unique proprietary **communication protocol**.
μFR Series firmware contains many complex built-in functions that can be called via libraries explained in API docs.

Most of the functions are developed to make „ life easier" for developers and integrators by decreasing their development time, such as:

- Support for multiple RFID NFC readers on a single host.
- The whole set of commands for MIFARE Classic® manipulation according to the manufacturer's specification
- Various addressing schemes (Block, BlockInSector)
- The key storage handling(one way, write only, no reading of stored keys)
- Various key applying modes (by index or scheme)
- Value block manipulation
- Using entire memory structure as linear space (convenient for most card types)
- NFC tags handling, NDEF format parsing in firmware
- AES128 "on the fly" built-in hardware encryption, which is extremely important for working with complex DESFire security keys
- AES128 encryption of files and keys in DESFire cards
- MIFARE Plus support
- MIFARE Ultralight C support
- APDU command structure support, where applicable (ISO 14443-4 layer)
- Asynchronous UID sending from reader to host COM port when a card is present – the feature is user-programmable.

The μFR Firmware key feature is the ability to call all its functions using our communication protocol.
Therefore, the μFR device implementation is possible on almost any platform with a serial interface by using the communication protocol.

Supported platforms include:

- **PC**
- **Tablet**
- **Smartphone**
- **Embedded systems**
- **Raspberry Pi and other compatible Single Board Computers**
- **Beagleboard**
- **MIPS boards**
- **PLCs**
- **Arduino.**

Frequent firmware updates include new features, improvements, and bug-fixes while preserving backward compatibility with the previous versions.
Accordingly, project code and developed software are safe, so there is no need for any changes after a firmware upgrade.

All firmware updates and upgrades are FREE and available at the Digital Logic official **GitLab repository**.

Software Development Kit

This RFID NFC reader comes with a fully-featured Software Development Kit with external libraries, examples with source codes, documentation about API reference, communication protocol, and many useful software tools.

 Libraries are cross-compiled for various platforms and so far support:

- **Windows x86/x64**
- **Windows ARM/UWP**
- **Linux x86/x64**
- **Linux ARM/ARM64/ARMHF**
- **macOS x64**
- **iOS x64**
- **Android**
- **Arduino .**

Our team is ready to develop additional libraries on client request. The request realization speed depends on our current project plans and eventual partnership agreement.

All examples are written for all major developing platforms and languages, such as:

- Java
- Java Applet
- JavaScript (egg. NFC Reader Browser Extension)
- Node JS
- PHP
- Lazarus
- Borland Delphi
- C
- C++ Borland Builder
- C++ WxWidgets
- Microsoft® Visual .NET family: C++.NET, C#.NET,VB.NET
- Python
- Arduino IDE examples.

Our team is ready to develop additional   SDK examples in other programming languages on client request. The request realization speed depends on our current project plans and eventual partnership agreement.

Package includes a set of very useful SDK source code software and executable apps. Some of these are:

- MIFARE Classic® (1k, 4k, EV1) cards and tags programming software
- MIFARE® DESFire® (Light, 2k, 4k, 8k, EV1, EV2) cards and tags programming software
- MIFARE PLUS® (2k, 4k) cards and tags programming software
- MIFARE Ultralight® (EV1) cards and tags programming software
- MIFARE Ultralight® C cards and tags programming software
- NTAG® (2xx, DNA, Tag Tamper) cards and tags programming software
- Application for common NDEF messages creating and writing into NFC tags
- Credit cards reding app (public data only)
- Formatter – software tool for card/tag formatting and programming

- uFR2FileSystem and uFR2File Lite – Keyboard simulation app, with a data reading, data parsing into several formats, and sending data to MySQL database via HTTP
- uFR Shell – Shell-like environment for easy testing and automation
- Browser extensions (add-ons) for Chrome, Firefox, and Opera
- Application for reading ePassports (Machine Readable Travel Documents)
- Digital Signing app
- APDU commands sending software
- JCOP cards programming software.