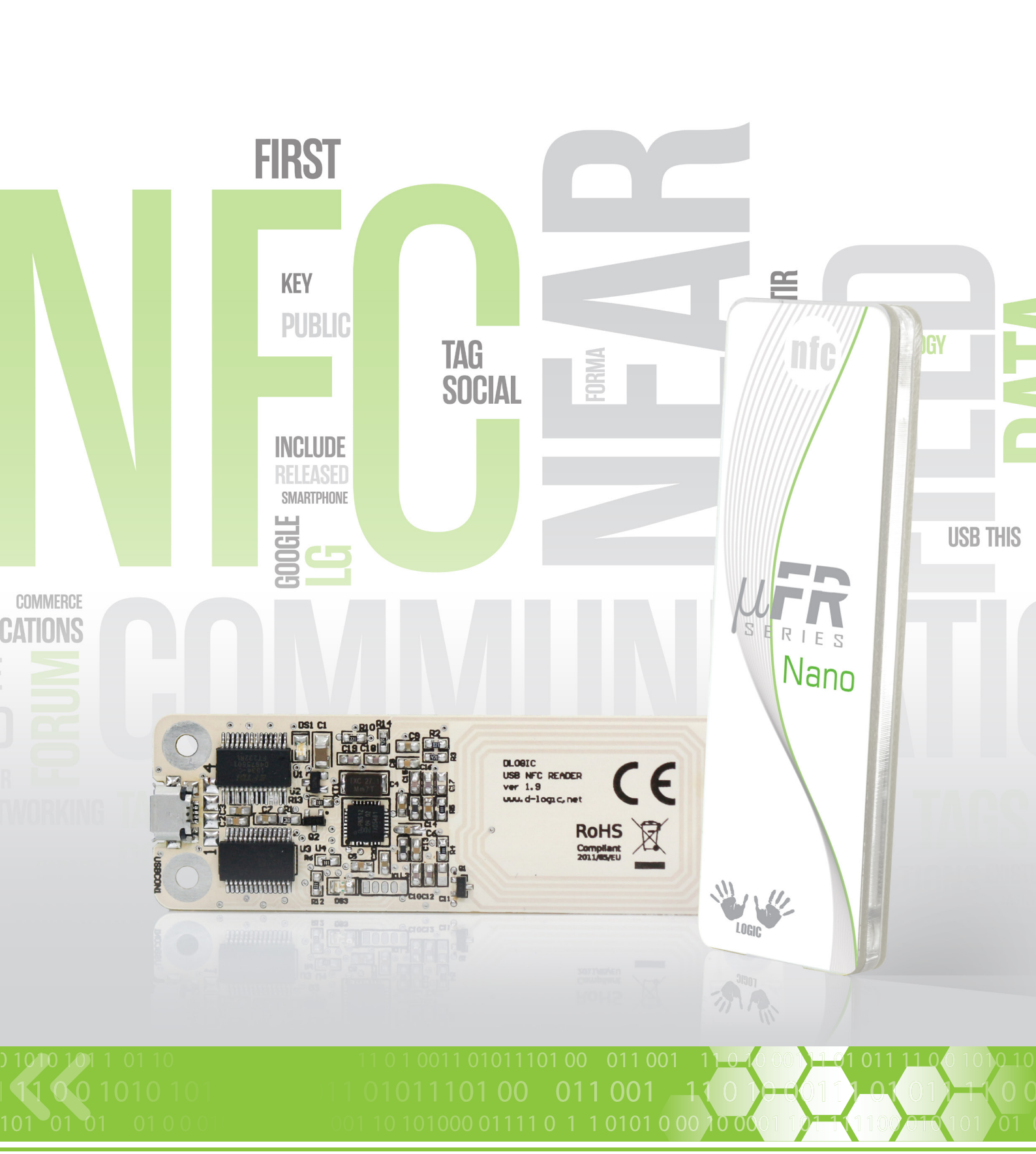


NFC RFID DEVELOPMENT TOOLS

MANUFACTURER'S WEBSITE: HTTP://WWW.D-LOGIC.NET/NFC-RFID-READER-SDK/ · D-LOGIC ONLINE STORE: HTTP://WEBSHOP.D-LOGIC.NET/

NFC RFID READER/WRITER

μFR NANO

ABOUT:

μFR Nano is the latest model in Digital Logic's μFR Series of **NFC RFID** readers writers.

It is NFC Forum & RFID compatible contactless reader/writer which successfully implements **ISO14443 A & B** and **ISO18092** standards on HF working frequency of 13.56 MHz.

This device is genuine Digital Logic product, 100% designed, produced and programmed at company premises located in Serbia, Europe.

All models of μFR Series are using the same SDK API and are totally compatible and interoperable in common set of functions.

GOAL:

Device is primarily intended for developing companies and individuals (professionals and hobbyist) for further application and turnkey solutions development. For that reason it comes with fully featured SDK package, which includes firmware, libraries, software examples and documentation for various platforms,

operating systems and developing environments. Regular SDK upgrades (including firmware, libraries and API) are launched often and can be obtained by company's website for FREE. All products has extended **„Three year"** warranty.

All mentioned facts combined with free extensive and fast responsive support give this product an outstanding position in this industry sector.

Hardware

Reader's RF communication is based on **NXP's** powerful, highly integrated reader IC for contactless communication at 13.56 MHz, which supports all protocol layers of the **ISO/IEC 14443 A**, **ISO/IEC 14443 B** and **ISO/IEC 18092** communication standards.

It utilizes an outstanding modulation and demodulation concept completely integrated for different kinds of contactless communication methods and protocols at 13.56 MHz.

All variants of the Mifare® cards family (MIFARE Mini, MIFARE 1K, MIFARE 4K, MIFARE Ultralight, MIFARE DESFire EV1 and MIFARE Plus) RF identification protocols are supported. Additionally, NFC Forum specification for **„Type 2 Tag"** is supported, which adds NTAG2xx chip family to above list.

Reader has possibility to support all NFC Forum Tag Types, but currently implemented is Type 2. Since DESFire can be used as NFC Tag type 4, it will be added soon as capability in firmware. Additional features like other Tag types (1 and 3) and Pear 2 Pear functionality are on R&D roadmap.

Bottom line is that reader's hardware is fully compliant with NFC Forum specification.

Reader has built-in anti-collision mechanism for detecting multiple cards at time.

Built-in well-tuned antenna provides proximity operating distance up to 60 mm (depending on card's antenna geometry) and contactless communication speed at higher baud rates (up to 424 kBd).

Device also has built in **Crypto1®** algorithm and non-volatile internal key memory storage for better security.

Communication with host is provided by using USB 2.0 Full Speed compatible interface. Data transfer rates are limited from 9600 baud to 1 Mbaud, for integrity and security reasons.

Reader can also act as a serial interface device using FTDI's Virtual COM port (VCP) drivers.

Audible (speaker) and 2 LEDs visible indicators are built in and absolutely user controllable.

THIS MODEL IS ALSO AVAILABLE AS OEM PCB BOARD.

OEM board comes in two versions: with standard micro-USB connector or with RS232 pins on TTL levels, with additional cable device for true RS232 voltage levels.

Firmware

Since hardware is based on MCU platform, it runs on company developed custom firmware. Communication between host and reader is provided through high speed direct access FTDI chip features. At core communication level device uses company developed, proprietary communication protocol, which is well documented in SDK API reference.

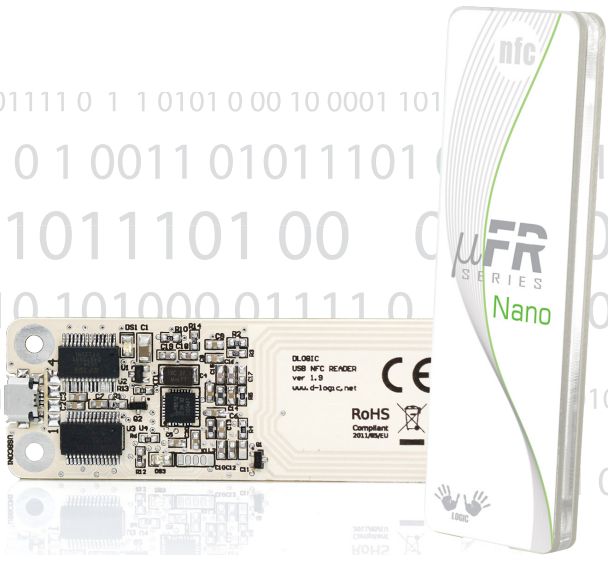
Firmware has a lot of built-in complex functions which can be called via libraries provided in SDK API. Most of functions are written to make **„life easier"**, like:

- Multiple readers on same host support
- Whole set of commands for Mifare card manipulation according to manufacturer's specification
- Different addressing schemes (Block, BlockInSector)
- Key storage manipulation (one way, write only, no reading of stored keys)
- Different key applying modes (by index or scheme)
- Value block manipulation
- Treating whole card memory structure as linear space (very convenient for Mifare Classic cards)
- NFC tags manipulation, NDEF format parsing in firmware
- AES128 "on fly" hardware encryption built-in, which is the most important when working with complex DESFire security keys and cards
- AES128 encryption of files and keys in DESFire cards
- Asynchronous sending of card UID from reader to host COM port when card is present; feature is user programmable
- and many more...

Main point about firmware is that all firmware functions can be called via communication protocol, too. That fact moves usage of this device into other dimension, meaning that this reader can be used on almost any platform which has serial interface, by simply using communication protocol. So it can be freely used on PC, tablet, smart phone, embedded systems, Raspberry Pi, Beagle Board, MIPS boards, PLCs and other platforms.

When using OEM RS232 board, device can be connected on any platform which has "real" serial interface, which is seen as a great benefit.Firmware is regularly updated with new versions which include new features, improvements and bug-fixes, while preserving backward compatibility with older versions.

That means your code is safe, there is no need for changes when new firmware comes out. All firmware upgrades are totally FREE and can be obtained through download section of company's website.



Software Development Kit (SDK) package

Reader comes with fully featured SDK which consist of external libraries, software examples with source codes, documentation about API reference and communication protocol and some useful software tools.

Libraries are cross-compiled for various platforms and regularly supported are Windows x86/x64, Linux x86/x64, Mac OSX x64, ARM and ARM HF. Other platforms can be supported as custom release, on customers demand, depending on existence of project or partnership relation.

Software examples are divided in three stages according to complexity, with some new additions of NFC examples.

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

- Java (and Java Applet example),
- JavaScript (unique feature, convenient for PHP usage),
- Lazarus,
- Borland Delphi,
- C++ Borland Builder,
- Microsoft® Visual .NET family: C++, C#, VB

Other programming languages examples can be obtained on customer demand, , depending on existence of project or partnership relation.

Software package includes set of very useful applications intended for everyday use, like:

- Application for programming and manipulation of NFC compliant cards like NTAG and Mifare Ultralight, with source code included.
- Android NFC phone App - Android NFC phone Application for Mifare card reading. Write a card with uFR, read it with NFC phone!
- Card formatter - application for card/tag formatting and programming
- µFR2FileSystem - keyboard simulation, card data reading, card data parsing into several formats and sending data to MySQL database via HTTP.
- Application for NTAG and Mifare Ultralight card programming and manipulation.
- Application for creating and writing common NDEF messages into NFC tags and cards
- Reader Keys application – for easy manipulation of keys stored in reader
- Application for managing of DESFire cards

Documentation contains fully explained API reference and communication protocol reference with real "hands-on" byte level examples for implementing communication protocol. However, API is much more comfortable and recommended way of implementation. Where not possible, implementation of communication protocol is very good alternative.

All libraries, software examples, tools and documents are regularly updated. They are totally FREE and can be obtained through download section of company's website.

Our support team always provides quick response, usually not more than 24 hours, which also depends of complexity and question itself.

We can also provide custom solutions based on each customer's needs, so please free to contact us for any question or further help regarding your projects and implementation.

TYPICAL APPLICATIONS

- Electronic payment systems
- Identification systems
- Access control systems
- Subscriber services
- Banking systems
- Digital content systems
- Customer loyalty
- Vending machines
- Time & attendance
- Machine work attendance
- NFC cards and tags programming
- NFC NDEF record management
- Network access control
- Inventory management
- Software login management
- Automatic fare collection
- Public transportation terminals
- Cashless payment
- Parking lot systems
- Reception desks
- Visitor attendance
- Authentication and authorization
- Libraries, museums, stadium events

FEATURES

- Identity verification, data exchange & contactless transaction
- Useful for binding device to software license
- Supporting multiple OS (Win, Linux, Android)
- USB compliant interface
- Operating Frequency: 13.56MHz
- Proximity read/write speed up to 424 kbps
- Built-in antenna for contactless tag access, with card reading distance of up to 80 mm
- Supports Mifare and other ISO 14443 Type A/B cards and tags
- Supports ISO18092 NFC tags
- Built-in anti-collision feature
- Built in AES128 hardware encryption
- Reader locking by passwords and keys
- Application Programming Interface:
- Virtual COM through FTDI
- User controllable LEDs
- Three years warranty

SOFTWARE FEATURES

- Operating frequency
- NFC NDEF record writing like MIME types, URI types, vCard, SMS, Phone, URL
- Card formatt ing
- Linear card space emulation
- Direct card block access
- Indirect card sector and block access
- Card keys and access bits management
- Block values management (increment/decrement)
- Asynchronously sending card UID to COM port (feature programmable)
- DES and 3DES software encryption

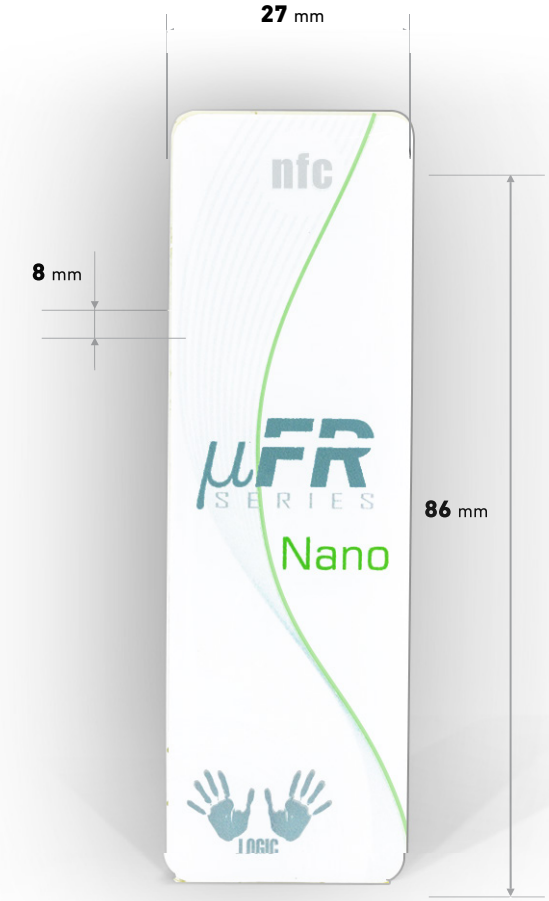
Specification brief

HARDWARE FEATURES	
Operating frequency	13.56 MHz
Reading range	Depending on antenna geometry and reader configuration, operating distance is 2-8cm (0,78"-3,15")
Read/Write speed	Up to 424 kbps
Supply current	150mA (operating)
Supply voltage	5V
Supported cards and tags	Type A (Hardware + Software), Type B (Hardware) Supported cards** : Mifare Mini, Mifare Classic 1K/4K, Mifare Ultralight/ Ultralight C *** , NTAG2xx, DESFire/EV1, Mifare Plus
NFC support	Yes *, full NFC Forum compliant
Anti-collision	YES, Hardware
Encryption	AES128 (hardware, by reader's firmware), DES/3DES (software, by library)
Connection and power supply	USB 2.0 port, power supplied through USB port R232 and TTL (USB or serial, depending on model)
Software	With Java, Java Applet, JavaScript, Lazarus, Delphi, C + + Builder, Microsoft® Visual C++ .NET, Microsoft® Visual C #, Microsoft® Visual Basic .NET
Supported Operating Systems	Microsoft® Windows™, Linux®, OS X, Android ****
Standards	ISO/IEC 14443A & B, ISO/IEC 18092
Related equipment	USB cable, Free software download
Optional equipment	-
Weight	0.10kg nett
Dimensions	86.5 mm (L) x 27 mm (W) x 10 mm (H)
Operation temperature	-10 +50° C
Accessories	Cards, keyfobs or tags

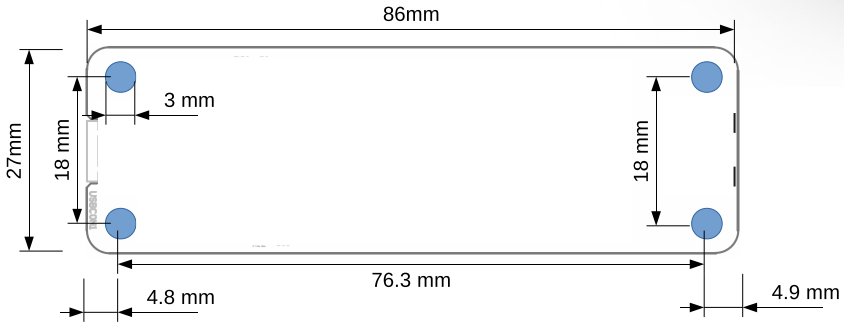
WARRANTY: 36 MONTHS

IMPORTANT NOTICE:

* P2P in not yet supported in this version of the reader.
** Other ISO14443A/B cards than Mifare Classic, Ultralight, DESFire and NTAG are not fully supported through SDK, only card S/N can be read
*** Mifare Ultralight C is currently supported only for NON Secure mode (Ultralight compatible).
**** Reader works with mentioned platforms and is visible as serial device. However, serial protocol must be implemented separately and is not part of SDK


27 mm
8 mm
86 mm
nfc
μFR
SERIES
Nano

Inside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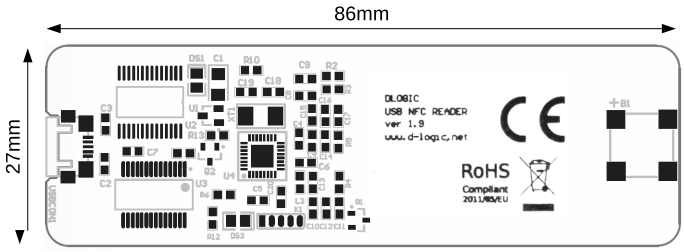
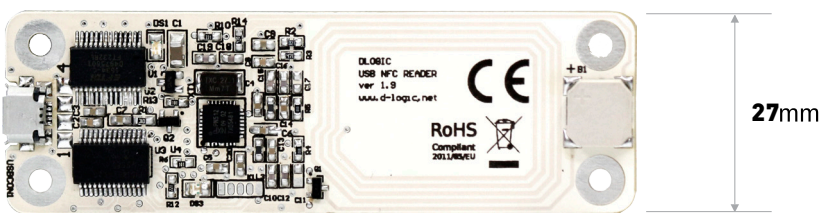

86mm
27mm
DLOGIC
USB NFC READER
ver 1.9
www.d-logic.net
RoHS
Compliant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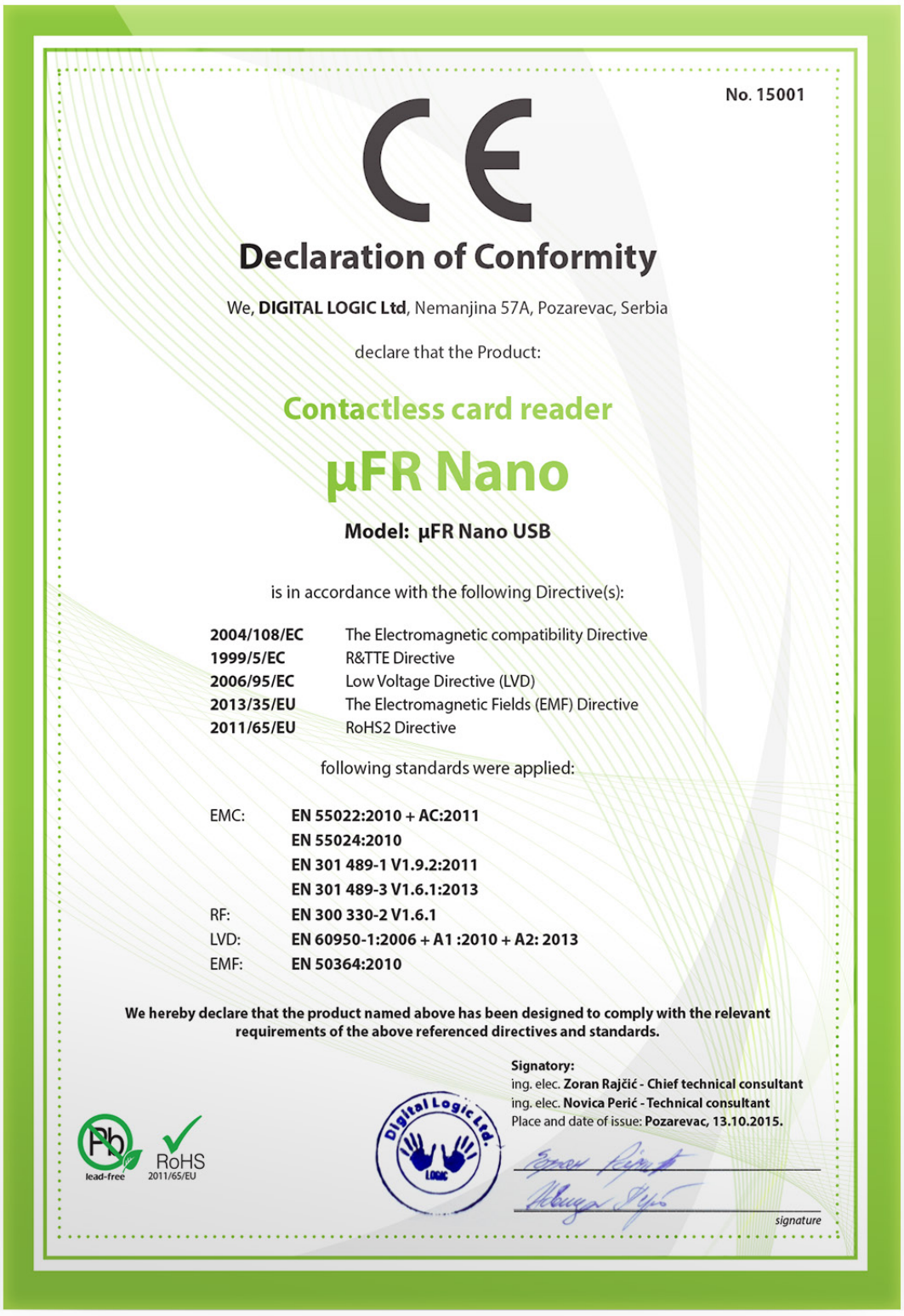
www.d-logic.net
RoHS
Compliant
27mm



No. 15001

CE

Declaration of Conformity

We, **DIGITAL LOGIC Ltd**, Nemanjina 57A, Pozarevac, Serbia

declare that the Product:

Contactless card reader

µFR Nano

Model: µFR Nano USB

is in accordance with the following Directive(s):

2004/108/EC	The Electromagnetic compatibility Directive
1999/5/EC	R&TTE Directive
2006/95/EC	Low Voltage Directive (LVD)
2013/35/EU	The Electromagnetic Fields (EMF) Directive
2011/65/EU	RoHS2 Directive

following standards were applied:

EMC:	**EN 55022:2010 + AC:2011**
	EN 55024:2010
	EN 301 489-1 V1.9.2:2011
	EN 301 489-3 V1.6.1:2013
RF:	**EN 300 330-2 V1.6.1**
LVD:	**EN 60950-1:2006 + A1 :2010 + A2: 2013**
EMF:	**EN 50364:2010**

We hereby declare that the product named above has been designed to comply with the relevant requirements of the above referenced directives and standards.

Pb lead-free RoHS 2011/65/EU

Digital Logic Ltd. LOGIC

Signatory:
ing. elec. **Zoran Rajčić - Chief technical consultant**
ing. elec. **Novica Perić - Technical consultant**
Place and date of issue: **Pozarevac, 13.10.2015.**

signature