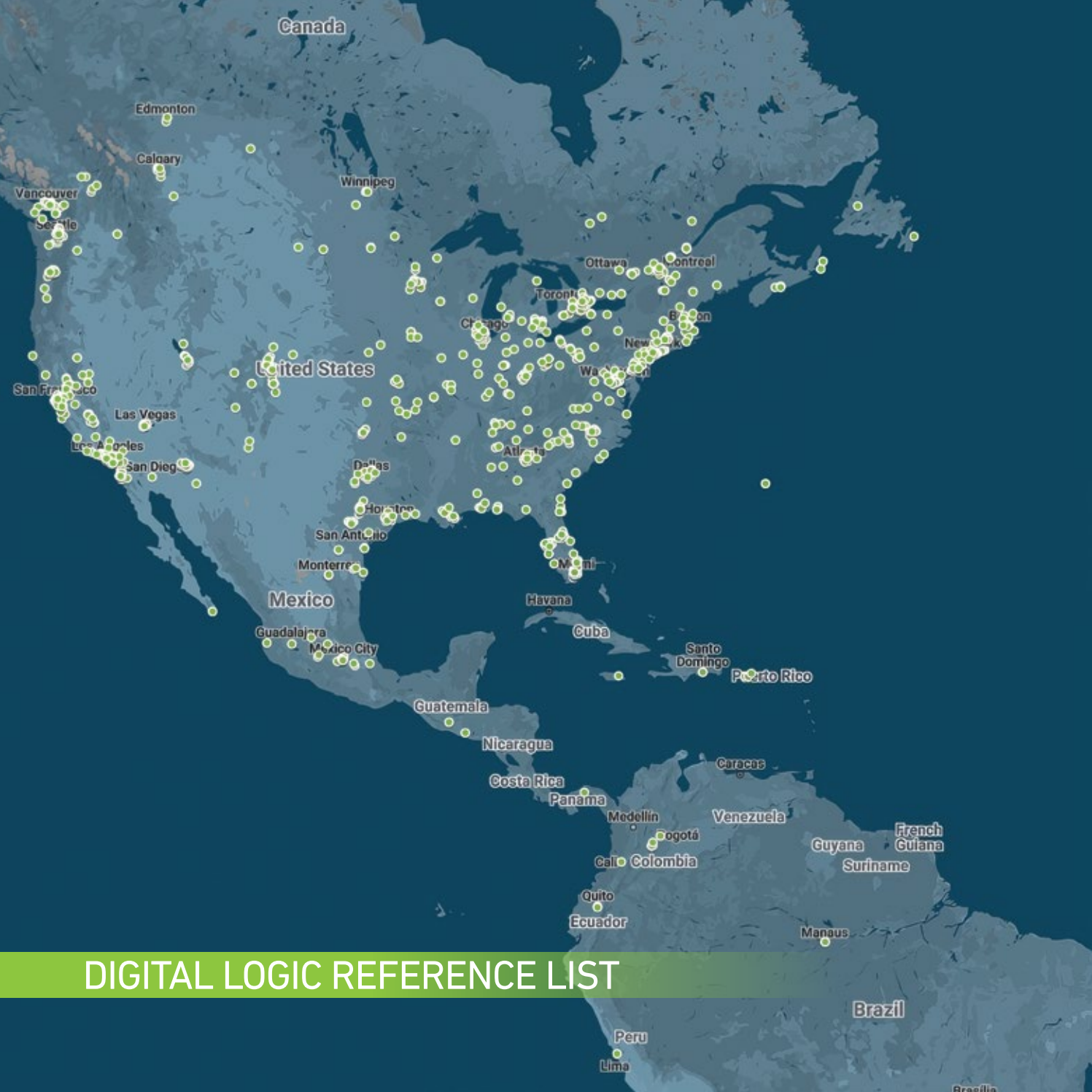


2024 PRODUCT BROCHURE

DIGITAL LOGIC



DIGITAL LOGIC REFERENCE LIST

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DIGITAL LOGIC

2024 PRODUCT BROCHURE

www.d-logic.com

WHO WE ARE

Established in Serbia in 1966, Digital Logic has evolved from a humble electronics repair shop to a leading name in electronics manufacturing, specializing in NFC contactless communication technology and development tools. With over 19 years dedicated to NFC technology, our products power more than 60,000 systems worldwide, enabling advancements in access control, digital signing, cashless payments, automation, and security across various sectors. Our commitment to in-house design, development, and manufacturing ensures each product is crafted with precision, integrating the full development cycle under one roof.

WHAT WE DO

We supply companies worldwide with high-quality RFID NFC Reader modules and free Software Development Kits. Our NFC devices are compatible with all major operating systems and receive constant software updates.

Our dedicated technical support team guides clients through every project phase. This commitment has earned us recognition worldwide, allowing us to export to over 5000 companies in nearly 70 countries.

ORIGIN, DESIGN AND PRODUCTION

We are based in Serbia, the heart of Southeast Europe. From our premises, we meticulously control the full product lifecycle: from initial concept and design through research and development, manufacturing, testing, and quality control.

Our extensive involvement in NFC research resulted in unmatched knowledge and experience.

This makes us the ideal partner for collaborative research and development projects tailored to your specific needs.

Our in-house expertise allows us to confidently offer extended warranties on all products. This commitment to quality is further reinforced by our free, fully-featured SDK and comprehensive technical support.

ADVANTAGES

■ QUALITY

We prioritize exceptional quality and reliability in our devices, exclusively sourcing original manufacturer components to ensure stable performance.

■ KNOWLEDGE BASE

Our NFC devices represent a technological leap forward, incorporating not just standard NFC capabilities but also sophisticated security features such as DES, AES, ECC encryption, and RSA, ECDSA PKI infrastructure for digital signing. We've integrated a robust PKI infrastructure, complete with a proprietary certificate store for digital signing, ensuring unmatched data security. Our devices also feature an RF signal booster, significantly enhancing the reading range and energy transfer to CPU cards like JCOP and payment cards, thereby accelerating data processing. With added SAM modules, our devices offer advanced security measures. Designed for versatility, they support a wide array of platforms, including Windows, Linux, MacOS, Android, iOS, Raspberry Pi, Arduino, Beaglebone, and PLC systems, ensuring seamless integration across various technological environments.

■ FREE SDK

Our SDK is not only comprehensive, covering a wide array of hardware and software environments, but also completely free, including regular updates with new features and languages. This ensures our clients always have the latest tools at their disposal, without the premium costs often associated with such extensive resources.

■ WE SAVE YOUR R&D TIME

A key feature of our SDK is its ability to simplify complex tasks. Sophisticated functions embedded in the device firmware allow for intricate operations to be executed with just a single function call. Our detailed API and COM protocol documentation, paired with our versatile SDK, significantly speed up the development process, saving our clients time and costs. Pre-compiled examples enable immediate application, demonstrating our commitment to user-friendly solutions.

■ FREE TECHNICAL SUPPORT

We provide free remote technical support to all clients. We're committed to timely communication and proactive problem-solving. More than just answering questions, we'll guide you through your project, offering our expertise to ensure a smooth experience.

■ DEDICATED TECHNICAL SUPPORT

Clients needing help with complex integrations can receive tailored support. We offer one-on-one consultations with our senior developers and engineers for focused problem-solving.

■ PRODUCT CUSTOMIZATION

Our in-house design, development, and manufacturing process allows us to offer exceptional customization and flexibility. By managing every stage of production, we maintain strict quality control, tailor our products to meet the client's precise needs, and provide comprehensive customization across hardware, firmware, libraries, and software. This ensures clients save time, reduce integration costs, and receive the ideal solution for their project.

■ WE ARE YOUR RELIABLE LONG-TERM PARTNER

Our family-run business has a strong foundation built over decades, and we envision a future of continued growth. We value our clients as long-term partners, welcoming them into our expanding family for years to come.

■ WE SHARE OUR KNOWLEDGE

Our API and COM protocol are thoroughly documented and publicly accessible. We provide pre-compiled software examples with our SDK, making them easy to use for developers of all levels.

Access all these resources in our comprehensive software repository, which is meticulously maintained and updated regularly.

■ USAGE · IMAGINATION IS THE LIMIT

The potential for communication technologies continues to expand. New developments and innovative applications emerge constantly. Our products are designed to adapt, as demonstrated by our clients' diverse use cases. Some of the most widespread applications include:

- High-security access control (DES, AES, ECC encryption, RSA and ECDSA PKI infrastructure)
- Digital Signing (RSA, ECDSA), for document, transaction, and cryptocurrency signing
- Hotel systems with room access and power supply management
- Transportation ticketing and fare collection
- Cashless payment
- Industry automation
- Time attendance
- Parking systems
- NFC tag programming
- Customer loyalty systems
- E-kiosks
- Vending machines
- Cafeterias

CONCLUSION

If you are ready to launch a new or enhance your existing NFC project, don't hesitate to reach out.

Our decades of expertise, production capabilities, and dedicated technical support will ensure a fast and efficient project completion.

μ FR Series

What is μ FR series?

μ FR Series is a family of industrial-grade, NFC RFID Readers/Writers, based on high-performing NFC frontends by NXP Semiconductors, a global leader in NFC technology. μ FR devices operate at 13.56MHz frequency and support ISO14443A/B standard.

Who is it for?

μ FR Series is primarily designed as a professional NFC development tool for software development companies, system integrators, hobbyists, and enthusiasts. We ensure seamless NFC software integration by offering free resources and NFC SDK, which includes source code examples, cross-platform libraries, upgradeable firmware, and a thoroughly documented API and communication protocol.

The availability of plug-and-play applications effectively expands the user base to end-users as well.

Software SDK

μ FR Series NFC devices support all major platforms and operating systems such as: Windows, Linux, MacOS, Android, iOS, ESP-IDF, Arduino, PLCs.

NFC Readers/Writers come with a comprehensive Software Development Kit (SDK), which includes software examples, libraries, development tools, and applications for everyday use.

SDK provides a variety of examples with source code written in most popular programming languages, including:

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

SDK examples cover various use case scenarios and operations such as NFC card/tag data manipulation (reading, writing, formatting), changing security keys, direct and indirect page/block/sector access, value increment/decrement, NFC tag emulation, keyboard emulation, and more.

Fast development

A key feature of our SDK is its ability to simplify complex tasks. Sophisticated functions embedded in the device firmware allow for intricate operations to be executed with just a single function call.

This efficiency is a significant advantage over many APDU-based SDKs, where parsing byte streams and managing numerous cases can significantly prolong the development process. By simplifying these tasks, our SDK not only saves you valuable time but also greatly improves the stability of your code.

The addition of well-documented API, software SDK, cross-platform libraries, firmware upgrades, and outstanding technical support, makes μ FR devices an exemplary tool for any RFID NFC project development.



μFR MDK (Mobile Development Kit)

For use on mobile phone's internal NFC

Apart from the free SDK and libraries used with our μFR Series NFC devices, we also offer libraries for Android and iOS that enable the use of our μFR SDK on a mobile phone's internal NFC. For some projects, this is more practical than using an NFC Reader connected to a mobile phone via USB cable, Bluetooth, or Wi-Fi.

Our comprehensive μFR MDK simplifies the use of complex, advanced NFC features.

This approach enables our existing clients to develop programs that seamlessly function across both internal (phone's NFC) and external (μFR series) readers. μFR MDK is designed for rapid project development, enabling users with less NFC experience to quickly achieve working solutions.

Using μFR libraries on third-party devices such as internal NFC readers on mobile phones is subject to licensing. Contact us for more information.

μFR SERIES COMPARISON TABLE

| MODEL | μFR Nano | μFR Classic CS | μFR Classic | μFR Advance | μFR XL |
|-----------------------------------|--|---------------------------|-----------------|-----------------------------|-----------------------------|
| Dimensions (mm) H x W x D | 86.5x27x8 | 86.5x54x8 | 150x83x30 | 150x83x30 | 178x178x5 |
| Reading Range (mm) | 60 | 80 / 120* | | | 180 / 200* |
| Data & Power Connection Interface | USB, UART, RS232 | | USB | | USB, UART, RS232 |
| Signalization | LED, Beeper | RGB LED, Beeper | RGB LED, Beeper | RGB LED, Beeper | RGB LED, Beeper |
| Special Features | Anti-collision | | | Anti-collision, RTC, EEPROM | Anti-collision, RF, Booster |
| Optional Upgrades | / | RF Booster, SAM Card Slot | | | / |
| Operating Frequency (MHz) | 13.56 | | | | |
| Supported Standards | ISO14443, ISO18092 | | | | |
| Communication Speed (kbps) | 106/212/424 | | | | |
| Operating Current (mA) | 100 | 300 | | | |
| Sleep Current (μA) | 50 | 50 | 50 | | |
| Operating Temperature (°C) | -10 to +70 | | | | |
| Encryption | Crypto-1, AES128, DES/3DES | | | | |
| Supported Tag Type | 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, EV3), NXP NTAG® 21x (210, 213, 215, 216, Tag Tamper), NXP NTAG® 4xx DNA (413, 424), NXP JCOP® Java Card (J3A040, J3A081, J3H145, JC30M48CR) | | | | |
| Free SDK Projects | Java, Java Applet, JavaScript, Node JS, React, PHP, Lazarus, Delphi, C, C++, Microsoft® Visual .NET package (C#, C++, VB), Python, Arduino IDE | | | | |
| Supported Platforms | Windows x86/x64, Windows ARM/UWP, Linux x86/x64, Linux ARM/ARM64/ARMHF, macOS x64, iOS x64, Android | | | | |
| Warranty | 2 years + EXTENDED WARRANTY | | | | |
| | * With RF Booster | | | | |
| | All devices are customizable and available as OEM products | | | | |

μ FR Zero

What is μ FR Zero?

μ FR Zero NFC modules represent the latest addition to the μ FR Series and deserve a notable mention and special recognition.

μ FR Zero NFC modules are the result of 19 years of dedicated experience in NFC technology, incorporating valuable feedback from our customers and the latest advancements in NFC controllers. They present a compact, versatile, and modular solution for NFC development.

μ FR Zero devices operate at 13.56MHz frequency and support both ISO14443A/B and ISO15693 standards, ensuring compatibility and flexibility across a wide range of NFC projects and applications.

Connectivity and features

μ FR Zero NFC devices are available with USB (CCID, CDC, and HID), UART (TTL), or RS232 connectivity options. They are NFC compliant and feature Dynamic Power Control as well as Low Power Card Detection, which ensure the best possible card reading distance and functionality even in Low Power mode.

Enhanced Security

One of the significant upgrades compared to the previous generation of devices is the introduction of a **secure element** with an integrated cryptographic co-processor and accelerator. It integrates **ECDH** (Elliptic Curve Diffie Hellman) security protocol along with **ECDSA** (Elliptic Curve Digital Signature Algorithm).

Apart from secure key storage, this cryptographic accelerator provides secure and quick authentication in a wide range of applications such as digital wallets (Apple VAS and Google Smart Tap), contactless payment, IoT, home automation, access control, digital signing, and more.

Common applications:

- Digital Signing
- Cashless payment
- NFC and MIFARE® Card and Tag manipulation
- NFC NDEF record management
- NFC tag emulation
- Time and attendance
- Machine work attendance
- Visitor attendance
- Customer loyalty
- Access control
- Inventory management
- Software login management
- Automatic fare collection
- Authentication and authorization
- Data exchange

Problem solving

Based on customer feedback and the latest technology, we've solved many problems system integrators face.

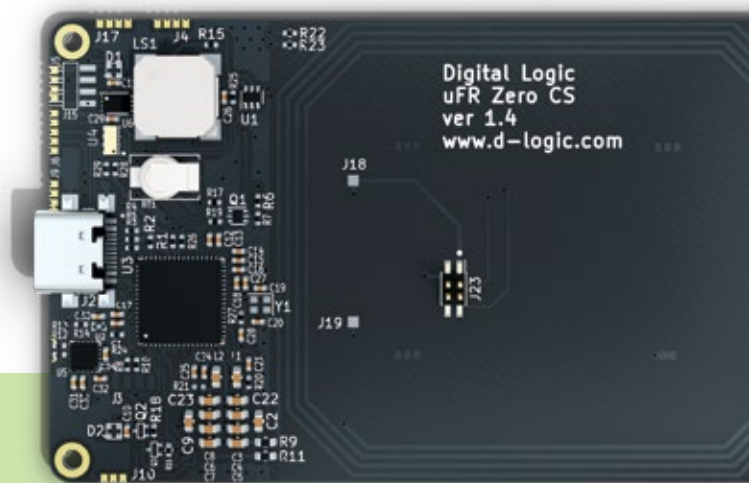
We adopted a modular design, allowing further device upgrades.

We integrated a shielded real-time clock, immune to electromagnetic interference.

We switched from button cell batteries to micro supercapacitors to keep the design as small as possible

Add-ons and upgrades

Thanks to its modular design, the functionality of the μ FR Zero Series can be further expanded by adding various modules. Available modules include Access Control with integrated solid state relays, SAM card slots, RGB LEDs, OLED displays, PIN pad, Wiegand interface, RS485 interface, and more. Custom development of μ FR Zero modules is also possible on customer request.



μFR ZERO SERIES COMPARISON TABLE

| MODEL | μFR Zero USB dongle | μFR Zero QS | μFR Zero Round | μFR Zero HS | μFR Zero CS | μFR Zero XL |
|--|--|--|--|---|-----------------|-----------------|
| Dimensions (mm) H x W x D | 70x15x5 | 40x24x5,7 | ø50x5mm | 84x25x5 | 84x50x5 | 170x170x5 |
| Reading Range (mm) | 70 | 100 | 120 | 110 | 170 | 300 |
| Data & Power Connection Interface | USB CCID, SPI | USB CCID, UART, SPI | | | | |
| Signalization | RGB LED | RGB LED, Beeper | Int. RGB ring, Beeper | RGB LED, Beeper | RGB LED, Beeper | RGB LED, Beeper |
| Special Features | Dynamic Power Control, Low Power Card Detection, Anti-collision | | | | | |
| Optional Upgrades | SAM Card Slot | Real-Time Clock, Cryptographic Co-Processor/ Accelerator, SAM Card Slot, Access Control Module, RGB Ring, OLED Display | Real-Time Clock, Cryptographic Co-Processor/ Accelerator, SAM Card Slot, Access Control Module, OLED Display | Real-Time Clock, Cryptographic Co-Processor/Accelerator, SAM Card Slot, Access Control Module, RGB Ring, OLED Display | | |
| Operating Frequency (MHz) | 13,56 | | | | | |
| Supported Standards | ISO14443, ISO15693, ISO7816, Extended APDU | | | | | |
| Communication Speed (kbps) | 6.62/26.48/106/212/425 | | | | | |
| Operating Current (mA) | 300 | | | | | |
| Sleep Current (μA) | <30 | | | | | |
| Operating Temperature (°C) | -10 to +70 | | | | | |
| Encryption | Crypto-1, AES128, AES256, AES256, AES-GCM, DES/3DES, ECC, ECDH, ECDSA, RSA | | | | | |
| Supported Tag Type | ICODE® (SLI, SLIX SLIX 2, SLIX-L, SLIX-S, DNA, ILT, ILT-M) 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, EV3), NXP NTAG® 21x (210, 213, 215, 216, Tag Tamper), NXP NTAG® 4xx DNA (413, 424), NXP JCOP® Java Card (J3A040, J3A081, J3H145, JC30M48CR) | | | | | |
| Free SDK Projects | Java, Java Applet, JavaScript, Node JS, React, PHP, Lazarus, Delphi, C, C++, Microsoft® Visual .NET package (C#, C++, VB), Python, Arduino IDE | | | | | |
| Supported Platforms | Windows x86/x64, Windows ARM/UWP, Linux x86/x64, Linux ARM/ARM64/ARMHF, macOS x64, iOS x64, Android | | | | | |
| Warranty | 2 years + EXTENDED WARRANTY | | | | | |
| All devices are customizable and available as OEM products | | | | | | |

μ FR Zero add-ons

μ FR ZERO ACM

Access Control Module (ACM) with integrated Solid State Relays is designed to be universally compatible with all μ FR Zero series NFC readers.

Soldering the ACM to the back of a μ FR Zero device results in a single, uniform NFC reader with integrated access control features.

The ACM's compact design perfectly matches with μ FR Zero QS, creating one of the world's smallest and most versatile NFC access control readers.

ACM specification

- **Dimensions:** 40x24.7x7.3 mm
- RS232TTL IDC connector
- Input Voltage from 5-24V
- 1 x voltage input with optocoupler
- 2 x Solid State Relay with NO and NC pins
- 2 x Out for electronic lock
- 2 x digital input
- 3 x digital out
- RGB Ring support
- Bluetooth connectivity (coming soon)

μ FR ZERO RGB RING

Zero RGB Ring add-on extends the signaling capabilities of μ FR Zero NFC devices. This add-on features 12 individually addressable RGB LEDs arranged in a circular pattern. Our μ FR API enables developers to control these LEDs, creating static displays or dynamic animations.

With these customizable visual elements, NFC systems offer a significantly enhanced user experience.

Zero RGB specification

- **Dimensions:** \varnothing 48mm x 3mm
- **RGB LED chip:** SK6805-EC15
- **Number of LEDs:** 12



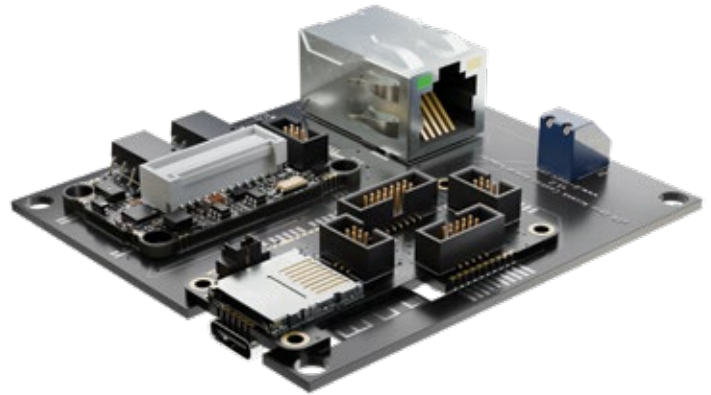
μFR ZERO ONLINE CONTROL EXPANSION BOARD

with Ethernet Port and μFR Zero ACM

μFR Online Control expansion board simplifies integrating the μFR Zero Online Controller with Ethernet and μFR Zero Access Control Module. This creates a powerful access control solution with integrated Solid State Relays, and Wi-Fi, Bluetooth, and Ethernet connectivity.

The device can be used standalone creating BLE or network-controlled access control systems, or it can be further expanded by connecting external μFR Zero NFC readers.

Designed for easy installation, its compact size (77.4 x 67.9 cm) fits seamlessly into most electrical wall boxes.



μFR ZERO OLED DISPLAY

OLED display modules connect seamlessly with μFR Zero series NFC readers, providing a clear visual interface for card information, device status, time (from Zero's RTC), event types, and more. The integrated touch button enables quick and easy navigation between event types. These graphical displays offer flexibility for developers by supporting custom bitmap uploads.

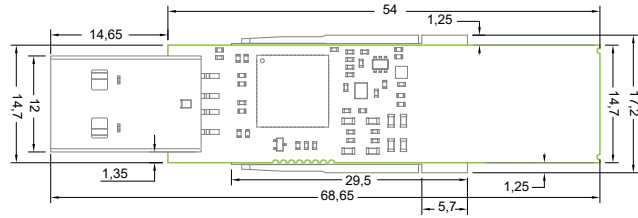
OLED display specification

- **Display size:** 0.96"
- **Resolution:** 128x64 pixels
- Touch button

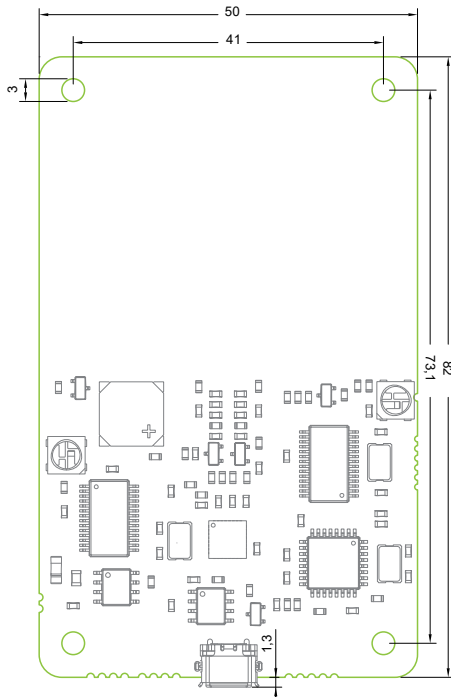
Firmware SDK supports:

- Autonomic communication with μFR Zero NFC readers
- Integration with μFR Zero's RTC
- 1 font, 2 sizes
- Font X, Y positioning
- Receive and show bitmap
- Clear, partial clear

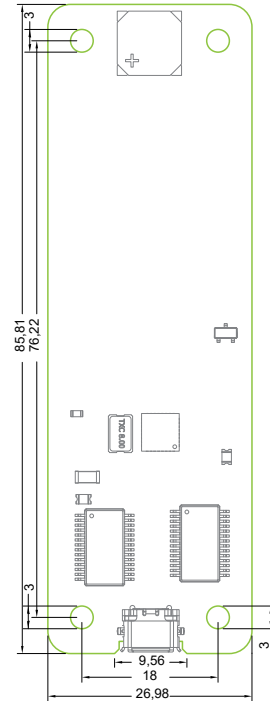




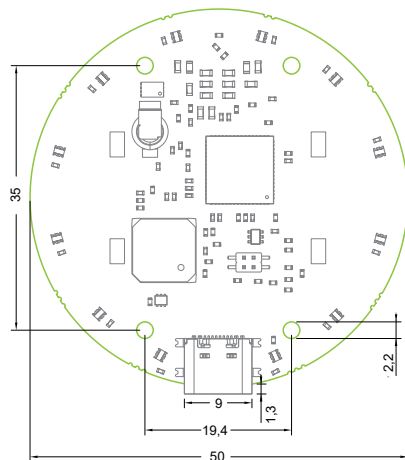
μFR Zero USB dongle



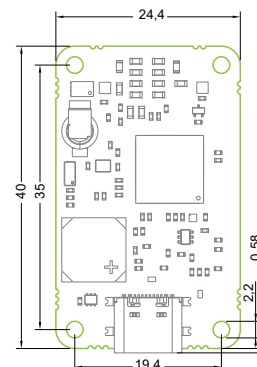
μFR Classic CS



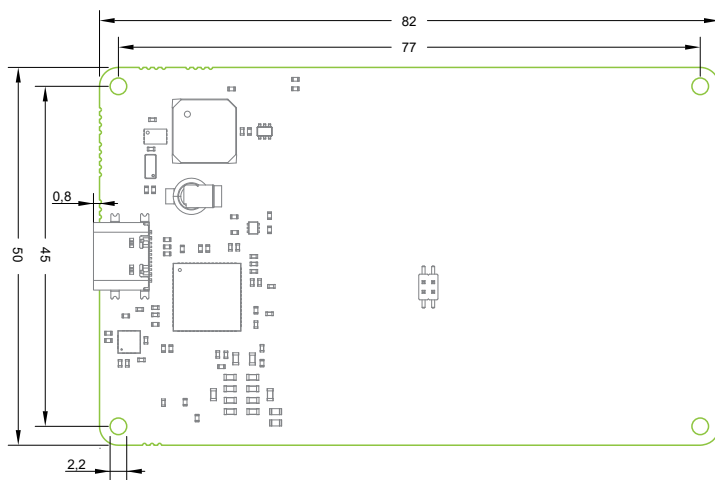
μFR Nano



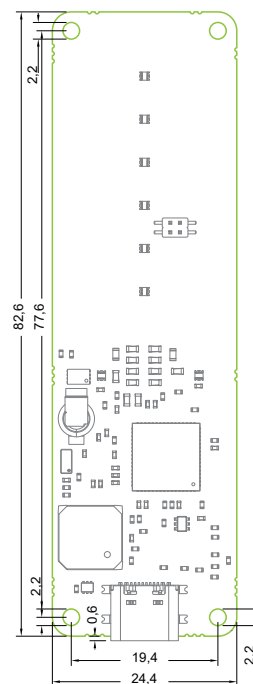
μFR Zero Round



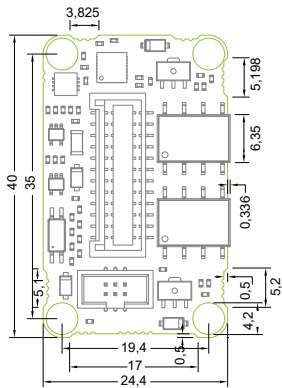
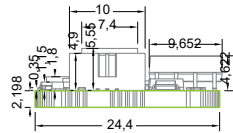
μFR Zero QS



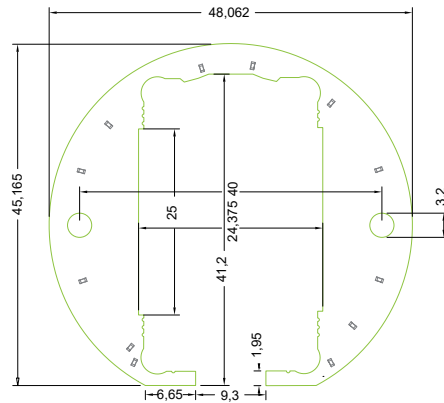
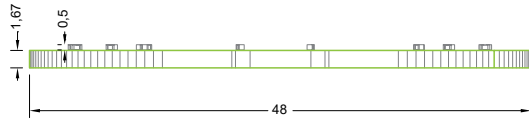
μFR Zero CS



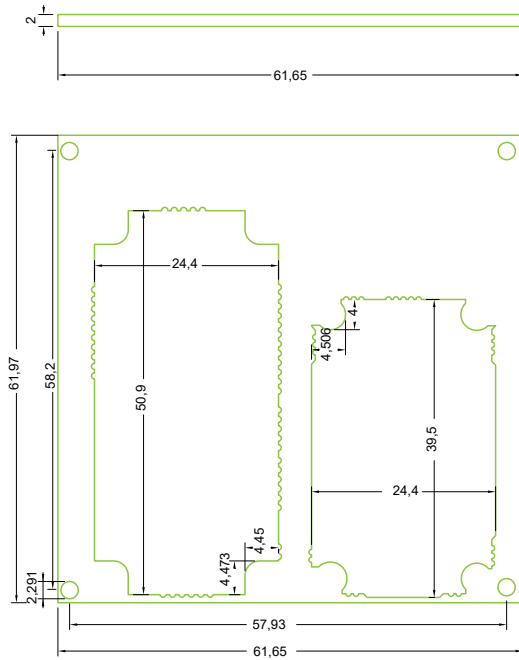
μFR Zero HS



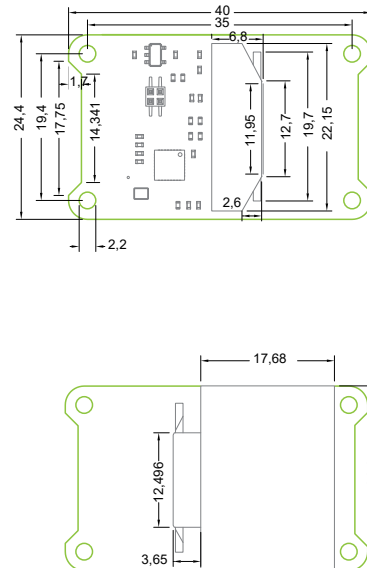
μFR Zero ACM



μFR Zero RGB Ring



μFR Zero Online Control expansion board



μFR Zero OLED Display

μ FR Online

What is μ FR Online?

μ FR Online is a series of advanced smart devices, that combine the functionality of our feature-rich NFC devices with well-known and powerful ESP32 microcontrollers.

They feature a wide range of connectivity options including WiFi, Bluetooth, Ethernet, USB, UART, GPIO, ensuring seamless integration into any environment.

These devices are a great choice for anyone looking to deploy advanced technology in smart homes, industrial settings, or any project needing robust and reliable smart solutions.

The idea behind it

Most NFC readers on the market support only USB or a serial interface. To create end-user products with other connectivity options, system integrators often have to use additional devices such as Raspberry Pi, Arduino, or BeagleBone. This incurs additional hardware costs and prolongs project implementation time.

We recognized this requirement and developed an NFC solution with integrated Wi-Fi, BLE, and Ethernet connectivity options, providing system integrators with a single, powerful device for all of their projects.

The addition of Secure Element on some μ FR Online models allows hardware-accelerated encryption/decryption, enabling high-security authentication services used in Apple VAS and Google Smart Tap.

Who is it for?

μ FR Online is primarily intended for development companies and system integrators for further applications and turnkey solutions development. It finds its place in projects that require Ethernet, WiFi, and other 2.4GHz wireless communication, and where there is a need for direct interaction with other electronic devices (sensors, relay boards, etc.).

μ FR Software SDK and API

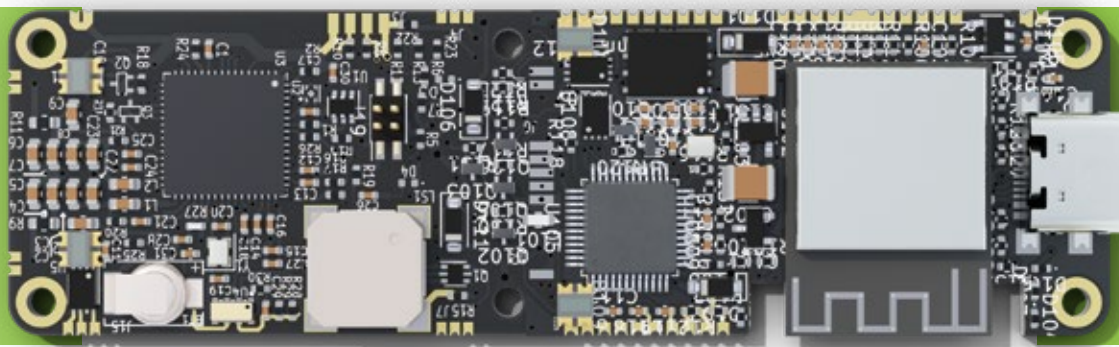
μ FR Online supports the same cross-platform software SDK and thoroughly documented API written for μ FR Series NFC readers. This way, we ensured an easy transition from μ FR hardware to μ FR Online NFC devices, eliminating the need to modify existing code. In addition, the new set of network connectivity APIs is designed to be highly intuitive and easy to implement.

ESP32 features

The integration of the ESP32 module into μ FR Online devices adds enhanced functionality. This includes the ability to connect external NFC readers, control peripheral devices through GPIO pins, store event logs, set various operation modes, and many more.

ESP32 module also introduces additional connectivity options such as WiFi, BLE, and Ethernet. Supported network protocols include UDP, TCP, HTTP, HTTPS, WS, WSS and MQTT.

Developers have the possibility to further personalize their μ FR Online devices by writing their own device firmware using either ESP-IDF or Arduino environment.





μFR Online Modes

MASTER MODE

A standalone mode where the device autonomously sends all scanned card information to a predefined server address via HTTP POST, eliminating the need for a host device.

SLAVE MODE

A standard operation mode for communicating with a host (PC, mobile...) via Wi-Fi, BLE, or Ethernet.

BLE HID MODE

A mode where the device performs keyboard emulation function, sending the card UID to a paired device's text input field, similar to a barcode reader.

LOG MODE

A mode that features an Event Log for recording card events while the device is offline. Log is automatically transmitted to the server once the device reconnects to the internet.

ACCESS CONTROL MODE

A mode which introduces enhanced security through whitelist/blacklist configuration options.

OEM UNLOCK MODE

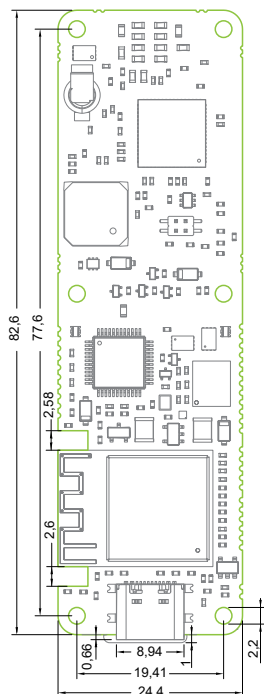
Developers have the possibility to further personalize their μFR Online devices by writing their own device firmware using either ESP-IDF or Arduino environment.



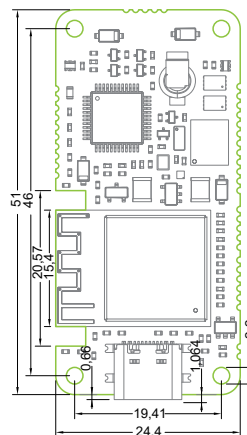
TYPICAL USE CASES

- Smart Cities
- Access Control and Time Attendance
- Enterprise Systems Accessories (Business Intelligence, Retail, Resources Planning)
- Electronic Point of Sale
- Asset Tracking
- Control of factory machines
- Remote authentication

| μFR ONLINE COMPARISON TABLE | | | |
|-----------------------------------|--|--|--|
| MODEL | μFR Nano Online | μFR Zero Online | μFR Zero Online Controller |
| Dimensions (mm) H x W x D | 86x27x9 | 84x 25x8 | 50x25x8 |
| Reading Range (mm) | 60 | 100 | / |
| Data & Power Connection Interface | USB, UART, Wi-Fi,BLE, Ethernet, GPIO | | |
| Signalization | RGB LED, Beeper | | RGB LED |
| Special Features | Anti-collision | Anti-collision, Dynamic Power Control, Low Power Card Detection, Battery Charger | |
| Optional Upgrades | RTC, EEPROM | RTC, EEPROM, SAM Card Slot, Access Control Module, Cryptographic Co-Processor/Accelerator, RGB LED Ring Display, OLED Display, Touch Button, Micro SD Card Slot | RTC, EEPROM, Access Control Module, Micro SD Card Slot |
| Operating Frequency (MHz) | 13.56 | | |
| Supported Standards | ISO14443 A&B | ISO14443 A&B, ISO15693, ISO7816, Extended APDU | |
| Communication Speed (kbps) | 106/212/425 | 6.62/26.48/106/212/425 | |
| Operating Current (mA) | 180-500 | | |
| Sleep Current (μA) | 12000 | <50 | <50 |
| Operating Temperature (°C) | -10 to +70 | | |
| Encryption | Crypto-1, AES128, DES/3DES | Crypto-1, AES128, AES256, AES-GCM, DES/3DES, ECC, ECDH, ECDSA, RSA | |
| ESP32 S3 Built-in functions | | Cryptographic hardware acceleration: AES128/256 (FIPS PUB 197), Hash (FIPS PUB 180-4), RSA, Random Number Generator (RNG), HMAC, Digital signature | |
| Supported Tag Type | 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, EV3), NXP NTAG® 21x (210, 213, 215, 216, Tag Tamper), NXP NTAG® 4xx DNA (413, 424), NXP JCOP® Java Card (J3A040, J3A081, J3H145, JC30M48CR). | ICODE® (SLI, SLIX SLIX 2, SLIX-L, SLIX-S, DNA, ILT, ILT-M),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, EV3), NXP NTAG® 21x (210, 213, 215, 216, Tag Tamper), NXP NTAG® 4xx DNA (413, 424), NXP JCOP® Java Card (J3A040, J3A081, J3H145, JC30M48CR). | |
| Free SDK Projects | Java, Java Applet, JavaScript, Node JS, React, PHP, Lazarus, Delphi, C, C++, Microsoft® Visual .NET package (C#, C++, VB), Python, Arduino IDEzarus, Delphi, C, C++, Microsoft® Visual .NET package (C#, C++, VB), Python, Arduino IDE | Java, Java Applet, JavaScript, Node JS, React, PHP, Lazarus, Delphi, C, C++, Microsoft® Visual .NET package (C#, C++, VB), Python, Arduino IDEzarus, Delphi, C, C++, Microsoft® Visual .NET package (C#, C++, VB), Python, Arduino IDE | Java, Java Applet, JavaScript, Node JS, React, PHP, Lazarus, Delphi, C, C++, Microsoft® Visual .NET package (C#, C++, VB), Python, Arduino IDE |
| Supported Platforms | Windows x86/x64, Windows ARM/UWP, Linux x86/x64, Linux ARM/ARM64/ARMHF, macOS x64, iOS x64, Android, ESP32, Raspberry Pi, BagleBoard, Arduino, MIPS boards, PLCs | | |
| Warranty | 2 years + EXTENDED WARRANTY | | |



μFR Zero Online



μFR Zero Online Controller

DL533N

DL533N is a series of NFC Readers/Writers, powered by the NXP's high-performing PN533 NFC transceiver. This ensures full compatibility with all NFC Forum specifications and standards, making it a versatile tool for developers and technology enthusiasts interested in exploring NFC technology.

Open Source

DL533N is built on the LibNFC open-source library, making it a prime choice for a diverse community of tech enthusiasts, bio-hackers, and pentesters. This open-source foundation signifies the DL533N's adaptability and highlights its appeal to those who value community-supported development.

Main advantages:

- Cross-platform
- Open-source software



| DEVICE SERIES | DL533N |
|-------------------------|---|
| Models (Dimensions) | DL533N USB dongle (75 x 20 x 9 mm) DL533N CS (86 x 54 x 8 mm) DL533N CS IP54 (95 x 63 x 11 mm) DL533N XL (17.3 x 17.3 x 5 mm) |
| Operating frequency | 13.56 MHz |
| Software / Protocol | LibNFC, NfcPy |
| Supported ISO | ISO14443 A/B |
| Communication Interface | USB 2.0 |
| Supported cards | MIFARE Mini®, MIFARE Classic® (1K, 4K, EV1), MIFARE Ultralight®, MIFARE Ultralight C®, MIFARE Plus® (2K, 4K, S, X, EV1), MIFARE DES-Fire® (Light, 2K, 4K, 8K, EV1, EV2, EV3), NXP NTAG® 21x (210, 213, 215, 216, Tag Tamper), NXP NTAG® 4xx DNA (413, 424), NXP JCOP® Java Card (J3A040, J3A081, J3H145, JC30M48CR) |
| Optional Upgrades | <ul style="list-style-type: none"> • RF booster / amplifier • SAM slot |

PC/SC Zero

PC/SC Zero is a contactless smart card reader series, supporting 13.56MHz frequency and adhering to ISO7816, ISO14443A/B, and ISO15693 standards. It features a USB CCID interface that enables a true plug-and-play operation without any driver installation, across various platforms and operating systems.

PC/SC Zero operates using an **extended APDU** command data set for communication with smart cards. This feature is beneficial for applications requiring the transfer of large volumes of data, such as digital signature verification, biometrics verification, secure transactions, and more.

Unlike most PC/SC card readers, our PC/SC Zero offers built-in key storage capabilities for MIFARE® Classic keys. This feature will soon be expanded to include secure storage of AES security keys for ISO14443-4 cards.

Its most common application areas include integrating PCs with NFC RFID peripherals, online payment and e-curricula, electronic identity (eID) applications, identity validation, vending machines, e-kiosks, and so on.



| DEVICE SERIES | PC/SC Zero |
|-------------------------------|--|
| Models (Dimensions) H x W x D | PC/SC Zero USB dongle (70 x 15 x 5 mm) PC/SC Zero QS (41 x 25 x 5 mm) PC/SC Zero Round (ø50 x 5 mm) PC/SC Zero HS (84 x 25 x 5mm) PC/SC Zero CS (84 x 50 x 5 mm) PC/SC Zero XL (170 x 170 x 5 mm) |
| Operating frequency | 13.56 MHz |
| Software / Protocol | PC/SC, APDU |
| Supported ISO | ISO7861, ISO14443 A/B, and ISO15693 |
| Communication Interface | USB type C |
| Supported cards | ICODE® family: (SLI, SLIX SLIX 2, SLIX-L, SLIX-S, DNA, ILT, ILT-M) MIFARE® family: 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, EV3) NTAG® family: NXP NTAG® 2xx Type 2 (210, 213, 215, 216 Tag Tamper), NXP NTAG® 4xx DNA Type 4 (413, 424) SmartMX® family: NXP JCOP® Java Card (J3A040, J3A081, J3H145, JC30M48CR) |
| Special features | Dynamic Power Control, internal key storage |

JustID

JustID is a series of NFC Readers specifically designed to perform **keyboard emulation** function.

Keyboard emulation is a seamless way to integrate NFC technology into existing systems without the need for specialized software development to process the scanned data, as the data input comes in the form of a standard keyboard input.

Hardware

Although performing a simple task, JustID hardware is based on one of the latest NFC controllers by NXP, a leading NFC technology provider. JustID supports reading all NFC tags based on ISO14443A/B and ISO15693 standards.

JustID supports both **HID** (Human Interface Device) and **CDC ACM** (USB communications device class – Virtual COM Port) interface, meaning it can be used without any installed software or drivers, on all platforms.

Firmware

JustID NFC reader firmware is available in the following versions:

- **JustID Lite:** Reading ISO14443 A/B UID only
- **JustID Standard:** Reading ISO14443 A/B and ISO15693 UID
- **JustID Plus:** Enables DES/AES authentication for DESFire, MIFARE Plus, and NTAG 424 DNA tags
- **JustID VAS:** Enables reading NFC passes from iOS phones using Apple VAS (Apple Value Added Services)

Note: All µFR Zero series NFC readers can also be updated with JustID firmware.

* coming soon

Software

JustID comes with a configuration tool that allows users to personalize their device functions:

- **USB class:** HID, CDC ACM or combined HID + CDC ACM
- **UID format:** Hexadecimal, decimal, inverted, prefix, suffix
- RGB LED and sound configuration

| DEVICE SERIES | JustID |
|-------------------------|--|
| Models (Dimensions) | <p>JustID USB dongle (70 x 15 x 5 mm)</p> <p>JustID QS (41 x 25 x 5 mm)</p> <p>JustID Round IP54 (ø 50 x 5 mm)</p> <p>JustID HS (84 x 25 x 5 mm)</p> <p>JustID CS (84x50x5)</p> <p>JustID XL (170x170x5)</p> |
| Operating frequency | 13.56 MHz |
| Supported Standards | ISO14443 A/B, ISO15693 |
| Communication Interface | USB (HID, CDC ACM) |
| Signalization | RGB LED, Beeper |
| Supported cards | <p>ICODE® family: (SLI, SLIX SLIX 2, SLIX-L, SLIX-S, DNA, ILT, ILT-M)</p> <p>MIFARE® family: 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)</p> <p>NTAG® family: NXP NTAG® 2xx Type 2 (210, 213, 215, 216 Tag Tamper), NXP NTAG® 4xx DNA Type 4 (413, 424)</p> <p>SmartMX® family: NXP JCOP® Java Card (J3A040, J3A081, J3H145, JC30M48CR)</p> |



NFC Integrino

NFC module based on Arduino®

NFC Integrino is an advanced and compact NFC module based on **Arduino®** technology, designed to be pin-to-pin compatible with Arduino Nano.

Powered by the authentic **NXP's PN512** NFC frontend chip and **ATmega32U MCU**, this single-board NFC module ensures reliable performance and serves as a seamless upgrade for the standard Arduino and NFC Shield approach.

Hardware

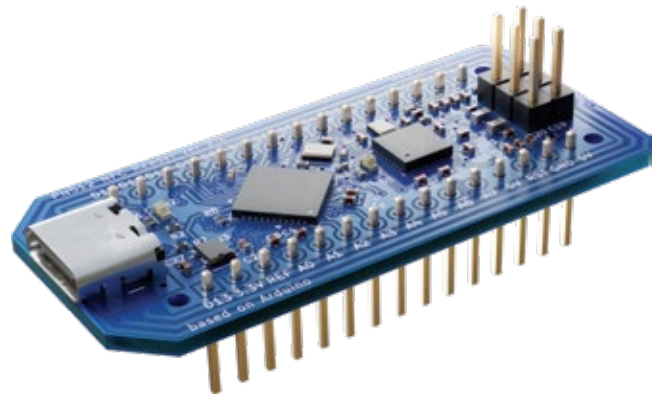
Featuring a USB interface and integrating both MCU (ATmega32U) and NFC IC (PN512) on a single board, the NFC Integrino module sets itself apart from other Arduino-based solutions by eliminating the need for an external NFC reader shield. Its seamless compatibility with Arduino code allows users to harness NFC functionalities within an Arduino-centric environment.

Standards

Operating on HF 13.56 MHz, the NFC Integrino module supports a wide array of cards, labels, wristbands, and tags compliant with ISO/IEC 14443 A, ISO/IEC 14443 B, and ISO/IEC 18092 standards.

Benefits

NFC Integrino module offers cost-effective and simplified procurement by combining multiple functionalities into one piece of hardware. With its all-in-one design, users save on expenses and streamline the sourcing process.



| DEVICE MODEL | NFC Integrino N512 |
|---------------------------|---|
| Dimensions (mm) H x W x D | 52 x 24 x 11mm |
| Operating frequency | 13.56 MHz |
| Supported Standards | ISO/IEC 14443 A/B, ISO/IEC 18092 |
| Communication interface | USB Type C |
| Signalization | LED |
| Software | Arduino IDE |
| Supported cards | <p>MIFARE® family: 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)</p> <p>NTAG® family: NXP NTAG® 2xx Type 2 (210, 213, 215, 216 Tag Tamper), NXP NTAG® 4xx DNA Type 4 (413, 424)</p> <p>SmartMX® family: NXP JCOP® Java Card (J3A040, J3A081, J3H145, JC30M48CR)</p> <p>Jewel and FeliCa</p> |

RF Range Booster

RF Range Booster upgrade for D-Logic NFC Readers provides better card reading range and more homogenous RF field. Depending on the card type and antenna size, RF Booster provides up to 50% increase in reading range.

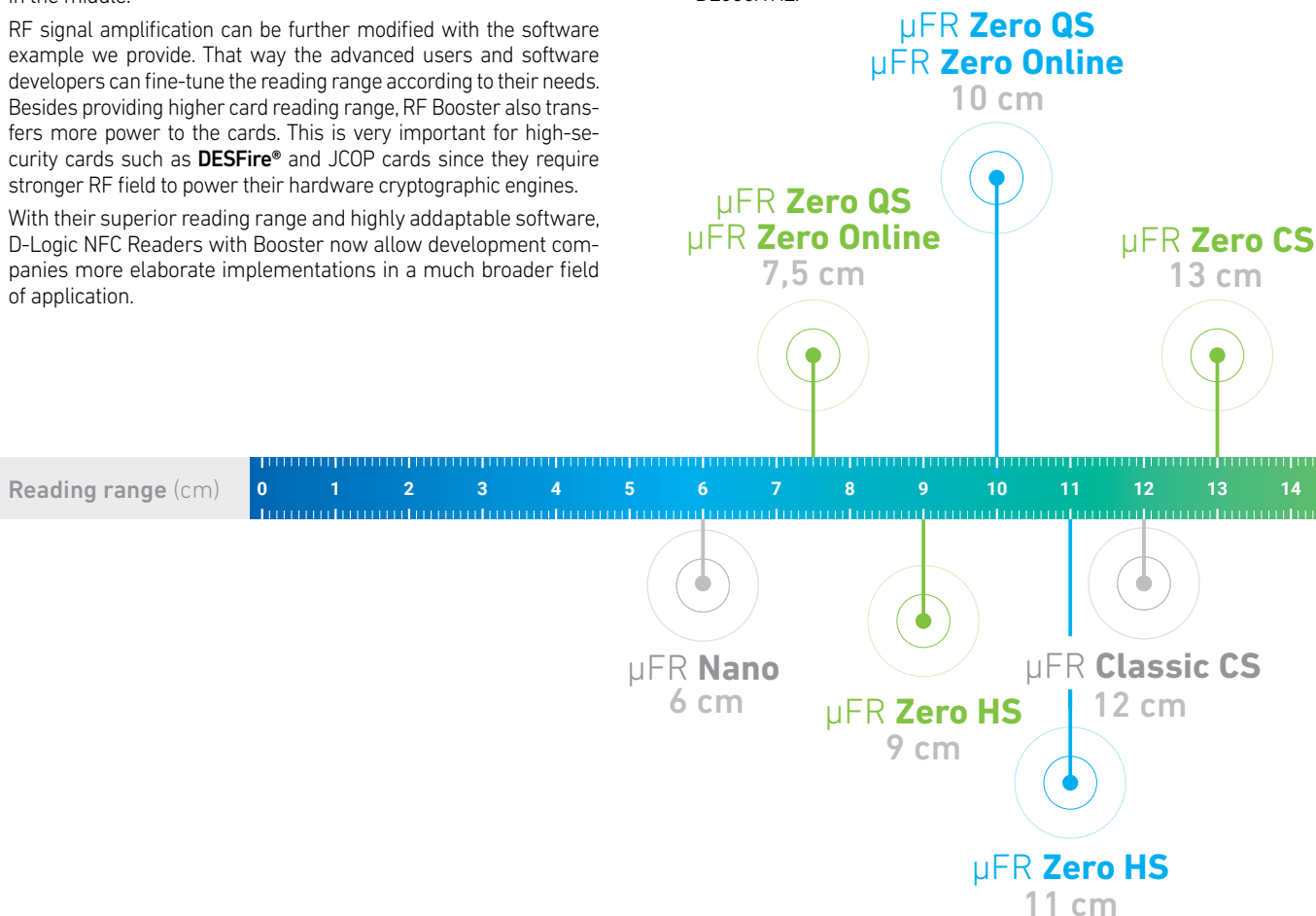
Homogenous RF field means that the **RF signal** is more evenly distributed over the whole antenna, instead of being concentrated in the middle.

RF signal amplification can be further modified with the software example we provide. That way the advanced users and software developers can fine-tune the reading range according to their needs. Besides providing higher card reading range, RF Booster also transfers more power to the cards. This is very important for high-security cards such as **DESFire®** and JCOP cards since they require stronger RF field to power their hardware cryptographic engines.

With their superior reading range and highly adaptable software, D-Logic NFC Readers with Booster now allow development companies more elaborate implementations in a much broader field of application.

D-Logic devices which can be upgraded with the RF Booster are:

- μFR Classic,
- μFR Classic CS,
- μFR Advance,
- DL533X CS and
- DL533X XL.



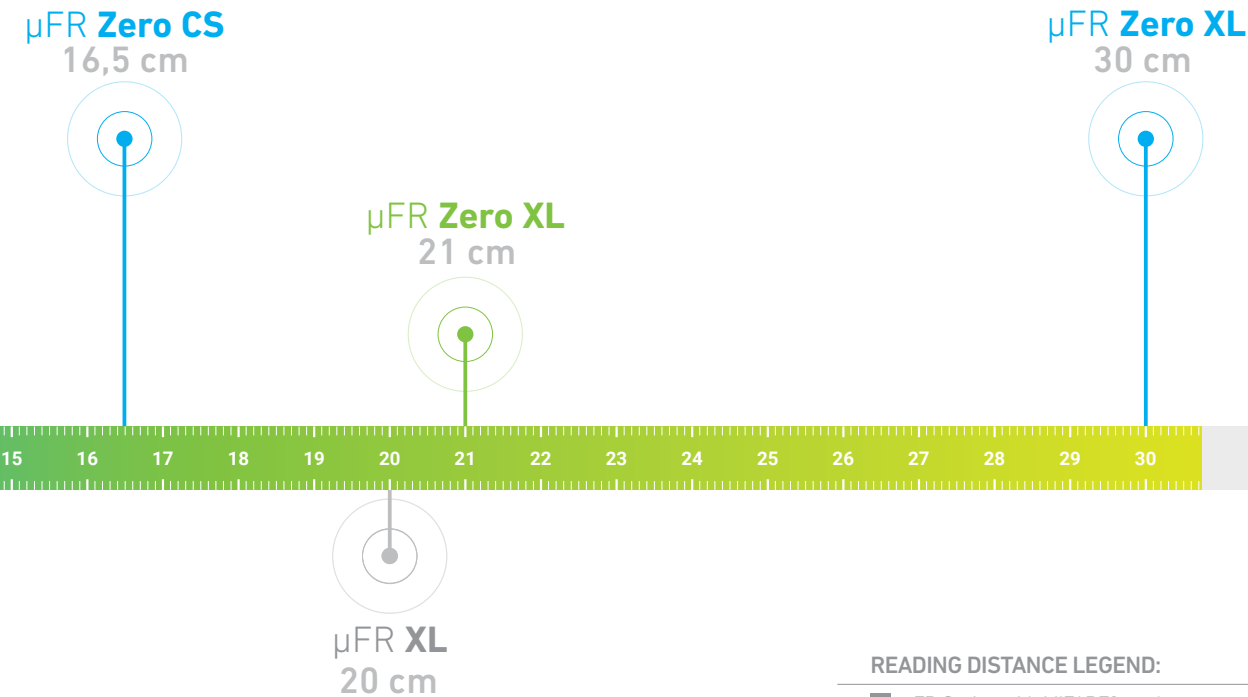
Dynamic Power Control

All **μFR Zero NFC Readers** are equipped with an exclusive feature called **Dynamic Power Control (DPC)**, which performs automatic antenna optimization and maximizes RF performance and efficiency of NFC readers.

DPC constantly tracks the NFC antenna parameters and adjusts the power output to maintain a consistent RF field.

This feature offers advantages such as:

- Improved read range
- Optimized power consumption
- Reduced sensitivity to interference
- Regulatory requirements for RF field strength are easily achieved
- Compact device design without loss performance loss



READING DISTANCE LEGEND:

- μFR Series with MIFARE® cards
- μFR Zero Series with MIFARE® cards
- μFR Zero Series with ICODE® cards

Reading distance measured using original MIFARE® Classic and ICODE® SLIX Cards manufactured by NXP Semiconductors.

Digital Signing

Using our μ FR Series NFC Readers combined with JCOP NFC Smart Cards, you can easily integrate signing of your documents or data with your digital signature.

What is a Digital Signature?

Digital signature is an advanced and secure form of an electronic signature. It is used to validate the signer's identity and authenticity of the signed document or file.

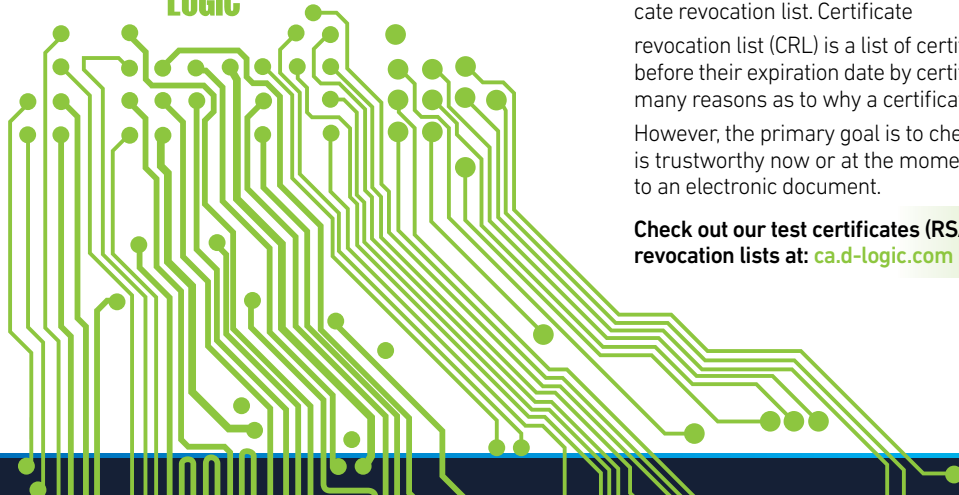
The common way of creating a digital signature is by using Public Key Cryptography (PKC). Systems using PKC are also called Public Key Infrastructures (PKI).

PKI is a proven technology and is a most widely used technique for providing digital verification of electronic data, like documents or transactions.

An asymmetric key pair comprised of one Secret key and one Public key is used in this technique. Secret key which is used for signing is always kept safe and could be known only to an entity who is signing the document or data. Public key which is used for verification can be (and usually is) published online. In general, to check if Digital signature is properly signed by someone, all that is needed is a Public key.



LOGIC



How to easily get a hold of a digital certificate?

Until now, getting your own digital certificate proved to be very difficult. Main reasons are low reliable information on the market, mostly incomprehensible terminology and cryptic performance of digital security experts.

To make it easier for our customers to get a hold of their own digital certificate and start developing as quickly as possible, we decided to launch our own Public Key Infrastructure (PKI) system.

Digital Logic as Certification Authority

Certification Authority (CA) is the key part of the Public Key Infrastructure and represents an entity which issues digital certificates. A digital certificate is an electronic document used to prove the ownership of a public key by the named subject of the certificate. Our main goal was to provide a central location where clients can get their certificates without any difficulties. Moreover, clients can further rely on a chain of trust whose starting point is our Certification Authority (CA).

Secure, reliable and simplified

We developed software tools which simplify preparation of our security devices for protection of digital content and identity proving. The starting point is to generate cryptographic keys that remain secure in our devices. Secondly, a Certificate Signing Request (CSR) for issuance of a certificate is sent to our web portal, which in turn issues a digital certificate in accordance with the clients specification.

The integral part of the Public Key Infrastructure (PKI) is a certificate revocation list. Certificate

revocation list (CRL) is a list of certificates that have been revoked before their expiration date by certificate authorities. There can be many reasons as to why a certificate could be revoked.

However, the primary goal is to check whether or not a certificate is trustworthy now or at the moment of applying digital signature to an electronic document.

Check out our test certificates (RSA and ECC) and our certificate revocation lists at: ca.d-logic.com





WHAT IS DIFFERENT WITH μ FR SERIES?

Common PKI and DS scenario is to use smart cards with contact interface. Contact interface is a decades old technology which has many flaws. The biggest ones being: contact pads are prone to physical damage and should be changed frequently; process of inserting cards into a contact reader takes a long time; users often leave their contact card inside the reader because it is both-ersome to insert it every time.

We are using only the Contactless interface of smart cards. This makes digital signing process much quicker, simply by tapping a card on reader.

We provide complete API and SDK examples with source codes for easy and quick integration of our products into your PKI and Digital Signing scheme.

Using our software examples you can easily sign any data and check that signature later.

Most common cases use RSA as encryption algorithm. In addition to RSA, we also implemented ECDSA (Elliptic Curve Digital Signature Algorithm), which is the next generation of Digital Signatures. It's much lighter, faster and more secure. Almost all NIST (National Institute of Standards and Technology) approved curves are supported at this moment.

Furthermore, we provide PKCS module for integration into Adobe Acrobat Reader, so you can easily sign your PDF documents with few clicks using our μ FR Series devices.

DIGITAL SIGNATURE PROVIDES THREE BASIC FACTS:

- 01 Authentication** • Proof of origin, who actually signed the document. Digital signatures are linking the user's signature to an actual entity or person, which can be surely identified.
- 02 Integrity** • It is always prime interest to keep the data safe and unchanged in transit. Sender and receiver of a message have a crucial need for confidence that the data has not been altered during transmission. Since Digital Signature is comprised of the hash calculated from the data (document or file) signed by the user's

03 Secret key, if any bit of the signed document is changed the Digital Signature becomes invalid. This makes Digital Signature a 100% reliable proof of integrity.

03 Non-repudiation • A confident proof that someone signed a particular data or document which cannot be denied. Furthermore, entity who has signed it, cannot deny that action at a later time. Simple possession of secret key at safe uncompromised place is enough proof of signing origin.

Android NFC Reader

Android NFC reader, powered by Quectel's SC668S smart module and Qualcomm processors, delivers robust performance and extensive features including 4G, Wi-Fi, Bluetooth, and support for multiple displays and cameras. A touchscreen display is offered in two main sizes: 4+ inch and 7 inch, with both variants available in portrait orientation. To accommodate different budgets and needs, the device will be available in low-cost and high-cost variants, with the latter featuring 4GB RAM and dual display support. Its integrated NFC reader simplifies contactless solution development for developers. This standardized interface enables the creation of secure mobile payments, smart ticketing, rapid device pairing, and diverse, innovative NFC applications.

The **Android NFC reader** is designed to read NFC cards in front of its display, effectively decreasing the device footprint and enhancing the user experience.

Payment functionality is a primary focus of this device.

The **SoftPOS** system can be easily used to process contactless Visa and Master cards. Developers can work within the familiar Android environment, leveraging the internal NFC. Seamless integration

with our μ FR MDK System further enables the use of our μ FR SDK for fast development. Additionally, the device supports our access control modules and the connection of external Zero readers.

IDEAL FOR THE FOLLOWING APPLICATIONS:

- **SoftPOS payment systems:**
Accept contactless payments quickly and securely.
- **Time Attendance:**
Modernize employee tracking with convenient NFC taps.
- **Access Control:**
Implement user-friendly NFC-based access solutions.
- **Royalty Systems:**
Digitize programs with easy NFC interactions.
- **Event management:**
Streamline ticketing and check-in processes.
- **Vending machines:**
Enable contactless purchases and customer interaction.

Release date: Q4 2024

Reader



μFR add-on Shields

01

RS485

Small footprint interface in a form of add-on shield for connecting μFR Series readers to RS485 line. Main purpose is to establish communication on long cable runs.

Release date: Q3 2024

02

Wiegand

Interface for connecting μFR Series readers to industry standard Wiegand enabled hardware.

Release date: Q4 2024

03

Battery module

Add-on shield with Li-Ion battery pack for powering μFR Series readers. Very useful for low power demanded applications, especially in a lack of constant power source.

Release date: Q4 2024

04

PinPad

Standardized numeric keypad with 3x4 rows for entering PIN and other numeric values. Can be easily integrated with μFR Series readers.

Release date: Q4 2024

UHF Reader

With increased demand for long range RFID devices, we decided to add it to our family of RFID devices. This compact low power reader features EPC Class 1 Gen2 transponder chips, based on ST25RU3993 highly integrated RF front end chip. It can be both high RF power, long-range reader and a low RF power, short-range RFID reader, supporting vast majority of RFID tags with working frequency of 840 MHz to 960 MHz, depending on radio regulation directives of specific country/area.

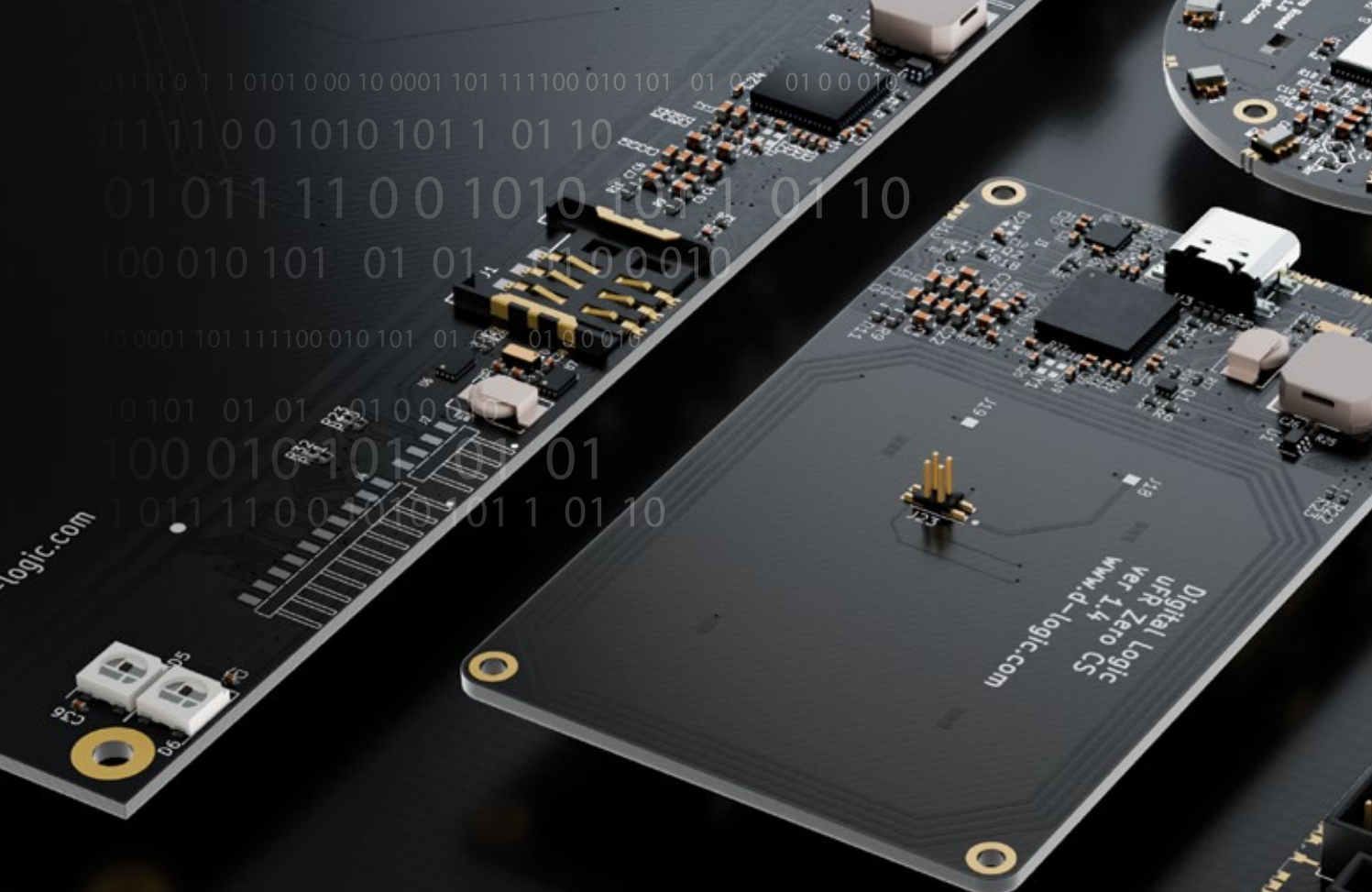
Feature set:

- Protocols supported
 - ISO/IEC 18000-63:2015 / Gen2V2
 - ISO/IEC 18000-62:2012
 - ISO 29143 (Air interface for mobile RFID)
 - Fully Gen 2 compliant, ISO 18000-6b & 6c
- Interface USB 2.0/3.0, UART
- Controllable Indicator LEDs
- Internal antenna
- External antenna connector
- Low power, can be battery powered
- Adjustable Output Power
- Adjustable Receive – Sensitivity level
- Adaptive to different frequency schemes (FCC ETSI)
- Dense Reader Mode functionality
- Changeable Gen2 specific parameters like BLF, Coding, Anti-Collision Slots
- Advanced Tag Manipulations such as R/W to different memory banks and define passwords

Common Applications:

- Embedded Consumer Applications
- Mobile Applications
- Low Power Handheld devices, PDA's, Smart Phones
- Embedded Industrial Applications
- Inventory/Asset management
- Tracking of goods
- Gaming

Release date: Q1 2025



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