NORDIC ID EXA21

USER GUIDE

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1. GENERAL

Nordic ID EXA21 provides UHF RFID reader capabilities for host devices, such as smartphones, tablets or computers; Android, iOS or Windows 10. Nordic ID EXA21 is used with the host devices via Bluetooth® Low Energy wireless technology.

1.1. AVAILABLE VARIANTS

Nordic ID EXA21 is available in 2 different variants:

CODE	FREQUENCY
IWC00001	868MHz (ETSI)
IWC00002	915MHz (FCC)

1.2. AVAILABLE ACCESSORIES

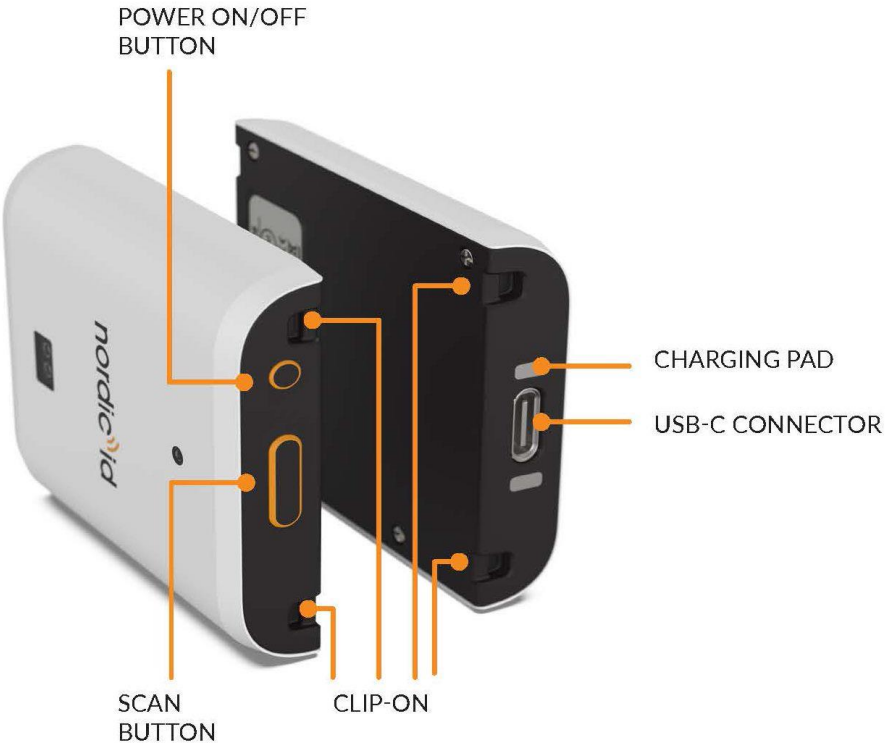
CODE	DESCRIPTION
ACN00183	Wall adapter QuickCharge3 USB Type-C Kit EU_UK_US
ACN00185	Nordic ID EXA21 Wrist Strap S-size
ACN00187	Nordic ID EXA21 Wrist Strap L-size
ACN00196	Nordic ID EXA21 4-Bay Desktop Charger Kit EU
ACN00197	Nordic ID EXA21 4-Bay Desktop Charger Kit UK
ACN00198	Nordic ID EXA21 4-Bay Desktop Charger Kit US
ACP00097	Quad Lock Universal Adaptor v1

1.3. PACKAGE CONTENT

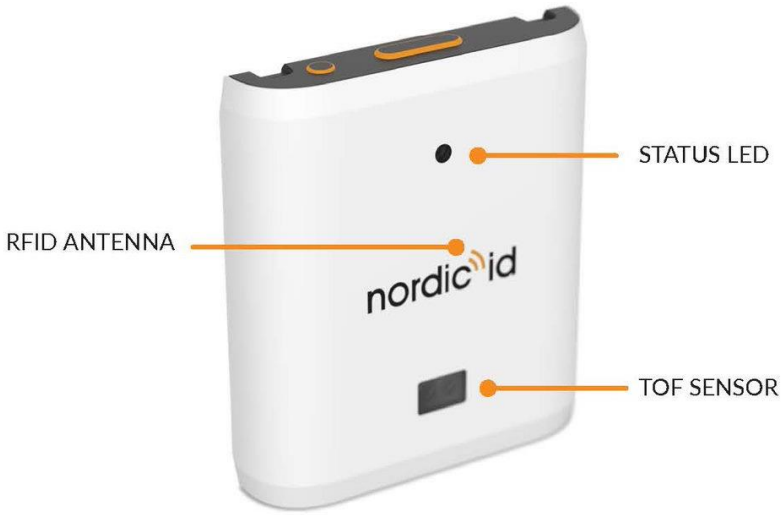
Nordic ID EXA21 package contains following items

- Nordic ID EXA21
- Safety and regulations guide

1.4. FEATURES OVERVIEW



Picture 1. Key features of Nordic ID EXA21 (back cover)



Picture 2. Key features of Nordic ID EXA21 (front cover)

NOTE! When holding the Nordic ID EXA21 device, please avoid covering it with the hand.

1.5. CHARGING

Nordic ID EXA21 can be charged via USB charger. Charging time from 0 to 100 % is about 2 hours, and 70-80 % is reached after only 1 hour. The USB charger needs to have a USB-C connector and the recommended charging power is at least 2.5 W (5 V @ 500 mA).

The Nordic ID EXA21 desktop charger can also be used to charge up to 4 Nordic ID EXA21 devices simultaneously.

Charging state is indicated by blinking green LED. Please see section 1.8.4 for information how the LED functions in different situations.

Picture 3 Charging Nordic ID EXA21 via USB-C charger

NOTE: The USB-C charger is sold separately by Nordic ID.
See section 1.2

Picture 4 Charging Nordic ID EXA21 via 4-bay desktop charger

NOTE: The Desktop Charger Kit is sold separately by Nordic ID.
See section 1.2

1.6. FASTENING

Nordic ID EXA21 can be fastened with several methods. More accessories for other fastening and wearing methods will be included in next versions of this guide.

1.6.1. QUAD LOCK® FASTENING

The Quad Lock fastening is a popular and easy-to-use fastening system. The Quad Lock fastening system provides strong and secure fastening and is suitable for different kind of host devices. Please visit Quad Lock web pages for more information about different adapters.

Fastening of Nordic ID EXA21 with the Quad Lock is easy. The first step is to attach a Quad Lock adapter on the back cover (black side) of Nordic ID EXA21. The second step is to fasten Nordic ID EXA21 with Quad Lock mount wherever needed.

NOTE! Quad Lock® universal adaptor is sold separately
See section 1.2

1.6.2. WRIST STRAP

As a wearable device, using the Nordic ID EXA21 wrist strap, the device can be worn as a watch, allowing hands free usage.

The wrist strap is available in two sizes: S (length 236mm) and L (length 288mm).

Picture 5 Nordic ID EXA21 with wrist strap

NOTE! The wrist strap is sold separately by Nordic ID.
See section 1.2

1.7. CONNECTIONS

Nordic ID EXA21 supports Bluetooth Low Energy Class 2 and USB connections for host devices. Supported Bluetooth Low Energy versions are 4.0 – 5.0 and supported profiles are GATT (generic data transfer) and HID (keyboard emulation).

NOTE! Bluetooth Low Energy needs to be supported by host device

1.7.1. CONNECTING WITH HOST DEVICE

There are four ways to connect Nordic ID EXA with host device, being the third one (Nordic ID Smart Pair) the most advanced and easiest way to connect wirelessly.

1. **Connect without pairing via Bluetooth**
   Nordic ID EXA21 will advertise itself via Bluetooth allowing the host device to connect. Bluetooth connection remains active until the host device closes the connection. Once the connection is closed Nordic ID EXA21 will start advertising again and allowing any host device to connect.
   Most applications will not require pairing with the host device. Without pairing, Nordic ID EXA21 can be connected to any host device which can see its advertisement. When Nordic ID EXA21 disconnects from host device, other host devices are available to connect as long advertisement is seeing from the Nordic ID EXA21.

2. **Connect with secure pairing via Bluetooth**
   Pairing Nordic ID EXA21 with a specific host device increases security by preventing other hosts to connect to the paired Nordic ID EXA21. When paired, applications (like Nordic ID RFID Demo) connect to the device automatically. The connection remains active as long the host device is in Bluetooth range. Entering a passcode in the host device is needed to allow pairing. The passcode can be changed and reset to factory defaults by using Nordic ID RFID Demo application (see section 0).

3. **Connect with Nordic ID Smart Pair feature**
   The new awesome Nordic ID Smart Pair feature provides an exceptionally easy way to connect and disconnect host device to our EXA readers. Just select "Nordic ID Smart Pair" from "Connection" listing in Nordic ID RFID Demo and host device starts looking for the EXA readers. Smart Pair works only when EXA is not paired.

4. **Connect via USB**
   The Nordic ID EXA21 can connected with the host using USB-C type data cable. When connected, Bluetooth advertising stop and blue led is continuously on. Advertising start again when USB cable removed.

1.7.2. SECURE PAIRING

By default, pairing support is disabled from the Nordic ID EXA21 settings.

To enable pairing support using Nordic ID RFID demo, connect the Nordic ID EXA21 to host device and go to *Settings → Reader → Host device connection → check "**Enable pairing**"* tick box.

For easy pairing, press "**Pair**" button. Next, the passcode (PIN) will be asked.

By default, passcode is 6 last digits of the device serial number. By pressing "**Set Passkey**" you can see current key and change if wanted.

Screenshot from: Nordic ID RFID Demo → Settings → Reader → Host device connection

Once paired, the Nordic ID EXA21 is continuously connected to the paired device and other host devices can't connect to Nordic ID EXA21 until it's unpaired (following process described in Section 1.7.3).

1.7.3. UNPAIRING

Use the Nordic ID RFID Demo app (in the paired host device) *Settings → Reader → Host device connection* and press "**Unpair**" button. Unpairing process clears the pairing information from the EXA21 and from the host device.

Unpairing manually from EXA21

- Press "**Scan**" button down and then "**Power**" button down and keep at least 3 second until device beeps three times. Then pairing is cleared and device reboots.
- Remember to clear pairing information from the host device too. (Settings→Bluetooth→Paired devices)

iOS devices typically prompt "pairing request" message box if pairing is enabled in Nordic ID EXA21 (as explained in 1.7.2). In case pairing is not needed, the user can press "cancel" button and device connect without the pairing. If iOS device is going to be used without the pairing, please disable pairing support and then "pairing request" prompt doesn't appear anymore.

1.7.4. CONNECTING WITH NORDIC ID SMART PAIR FEATURE

When using a Nordic ID EXA21 reader with a smartphone, both the Nordic ID EXA21 reader and your smartphone are always close to each other while being used. Nordic ID Smart Pair is aware of this and thus it establishes the connection only when they are close to each other.

- Connecting: One can connect the host device to the EXA reader just by placing host device close to the EXA reader.
- Disconnecting will be done by pressing Power and Scan buttons simultaneously 3 seconds (LED stops blinking).

Requirements: Nordic ID RFID demo app 1.5.7 (or newer) and EXA21 with firmware 3.6.2 (or newer).

The Nordic ID Smart Pair feature is always enabled in Nordic ID RFID Wear OS app.

1.8. USING THE READER

Nordic ID EXA21 has one sensor (ToF) and two physical buttons for user interactions: Scan button and Power button. Location of the buttons and ToF sensor can be seen in Picture 6.

Picture 6 Location of the buttons

1.8.1. POWER BUTTON

Quick press of power button turns reader On/Off when no host connection. The power button is disabled when Nordic ID EXA21 has an active connection with the host device. In that case, only key notifications will be sent to host.

Reader can be restored to factory defaults by keeping power button down at least 5 seconds when **no active host connection**. See section 1.8.7

NOTE! If device is not responsive, hardware reset can be forced by pressing and keeping power button down until device reboots (~5 sec)

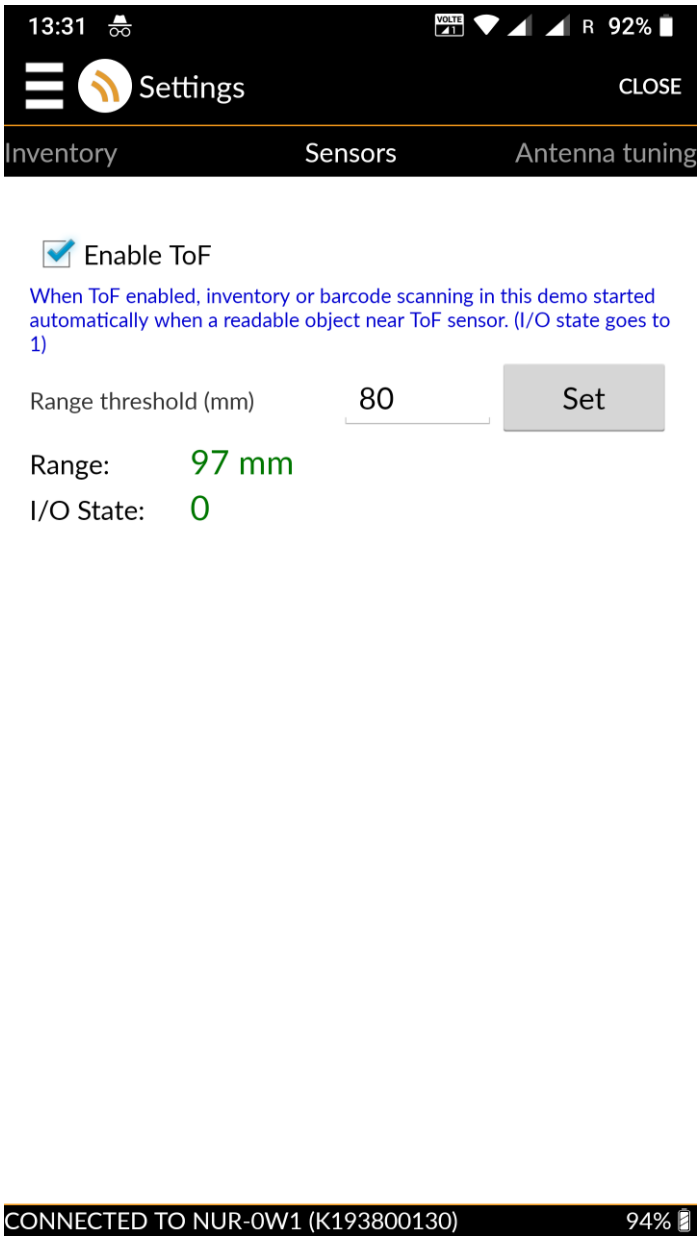
1.8.2. SCAN BUTTON

The scan button is located at the top of the reader. It can be used to start/stop UHF RFID scanning. Depending on the application in use, the trigger button starts/stops UHF RFID reading. By default, the first press of the button starts the reading and the second press of the button stops it.

1.8.3. TOF SENSOR

The ToF (Time-Of-Flight) sensor is located on the front side of the reader. It is used to trigger UHF RFID scanning instead of using the Scan button. ToF mode is disabled by default. When enabled, the ToF sensor sends an artificial light signal. UHF RFID scanning is automatically performed while any item interrupts this signal, e.g., an object or your finger is placed in front of the sensor. Once the item disappears from the sensor line of sight, UHF RFID scanning stops.

Enable and play with ToF sensor using Nordic ID RFID Demo in Android → *Settings* → *Sensor*



1.8.4. STATUS LED

Nordic ID EXA21 has one multicolour LED for user indications. Location of the LED can be seen in Picture 77.

Picture 7 Location of Status LED

Blue, blinking slow
Device advertising, not paired yet

Blue, blinking fast
Paired, no BLE connection

Blue, stable
Host connection via BLE or USB

Green, blinking
Charging

Blue and red, blinking in between
Low battery (<15%)

Red, blinking fast
Critical battery (<5%)

Green
RFID scanning

Orange
DFU (firmware update) mode

1.8.5. BUZZER

The Nordic ID EXA21 includes a buzzer which can be used to give an audible indication to user. By default, the buzzer beeps in the following situations:

- The reader is turned On/Off
- Bluetooth unpair done
- Bluetooth is connected/disconnected
- During HID operations

1.8.6. ANTENNA

Nordic ID EXA21 is equipped with a circularly polarized UHF RFID antenna. Nominal read range is up to 0.5m / 1.64 ft.

NOTE! The reading range depends on used tag and environment

1.8.7. FACTORY DEFAULTS

The Nordic ID EXA21 can be restored to factory defaults by keeping power button down at least 5 seconds when no active host connection.

Factory defaults:

- Pairing disabled.
- Secure passkey to default (6 last digits of serial number)
- RFID HID mode disabled
- ToF sensor disabled.
- ToF Range filter threshold values to default.

1.8.8. HARDWARE RESET

If the device is not responsive, hardware reset can be forced by pressing and keeping power button down until device reboots (~5 sec).

1.9. HID RFID MODE

In HID mode, the Nordic ID EXA21 functions and communicates in a similar manner as a keyboard. Therefore, the device will work with any application that supports an active cursor on input fields, for example web browser applications. This mode works both when connecting to host via Bluetooth or when connecting via USB.

Practical usage is to bring tag over the EXA21 ToF (Time-of-Flight) sensor for activating reading. The Nordic ID EXA21 emits beep sound after successful read and push result (EPC of tag) into the HID channel as keystrokes.

- Enable RFID HID mode using Nordic ID RFID Demo →Settings→HID RFID support → "Enable HID RFID"
- Enable ToF sensor using Nordic ID RFID Demo→Settings→Sensor → "Enable ToF" (see section 0)

1.9.1.1. HID MODE VIA BLUETOOTH

When operating in HID mode via Bluetooth, the Nordic ID EXA21 needs to be paired with the host device and USB data cable must not be plugged. However, USB charge cable is allowed.

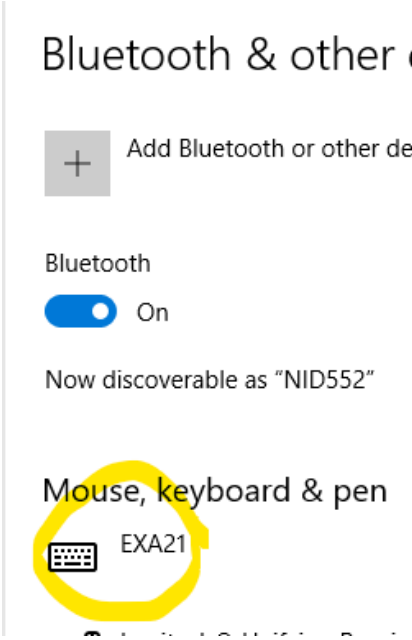
NOTE! When the Nordic ID EXA21 is configured for HID mode via Bluetooth, you may need to reconnect after using non-HID applications (such as Nordic ID RFID Demo). This will enable the HID mode again. The easiest way to do this is turn off/on Bluetooth of host device.

NOTE! HID operation via Bluetooth can be very slow and it's not useful for cases where need to read and transfer high amount of tags (> 5).

Also, accuracy of HID output may vary between host devices.

1.9.1.2. HID MODE VIA USB

Connecting USB data cable between the Nordic ID EXA21 and the host device, overrides Bluetooth communication. USB HID is faster and more reliable compared to Bluetooth.



NOTE: If you had previously installed any Nordic ID software or drivers in your computer, the Nordic ID EXA21 could be not detected as a keyboard in the PC, but as "NUR" in "Other devices". In this case, you will need to uninstall the NUR driver (Device manager -> Ports (COM & LPT)). After this, unplug the cable from EXA21, connect it again and it will appear as a keyboard.

1.9.1.3. READING RFID TAGS

- The reading process is triggered by pressing **Scan** button or bringing tag over **ToF** sensor.
- Green led indicates reading in progress.
- The Nordic ID EXA21 read tags and transmits EPC of tag once into HID. Short beep when new tag(s) are found.
- When releasing trigger (2nd push of Scan button or removing item from ToF sensor), the reading process stops and Blue led is continuously on.

2. SOFTWARE

Nordic ID has taken an open source SW development approach in use with Nordic ID EXA21. Nordic ID provides the SDK along with the examples through the GitHub. Nordic ID EXA21 supports powerful NUR API so developers can use familiar NUR API for application development.

2.1. NORDIC ID RFID DEMO APPLICATIONS

Nordic ID provides feature rich yet easy-to-use RFID demo applications for iOS and Android platforms.

2.1.1. NORDIC ID RFID DEMO FOR ANDROID

Nordic ID RFID demo application for Android supports Android 5.0 and newer versions. The Nordic ID RFID demo application is available from the Google Play store.

2.1.2. NORDIC ID RFID DEMO FOR IOS

Nordic ID RFID demo application for iOS supports iOS 9 and newer versions. The Nordic ID RFID demo application is available from the Apple App store.

2.1.3. NORDIC ID KEYBOARD AND WEDGE SERVICE

Nordic ID Keyboard and Wedge service applications do provide wedge functionality for Android devices. Android 5.0 and newer versions are supported.

Nordic ID Keyboard

Nordic ID Wedge service

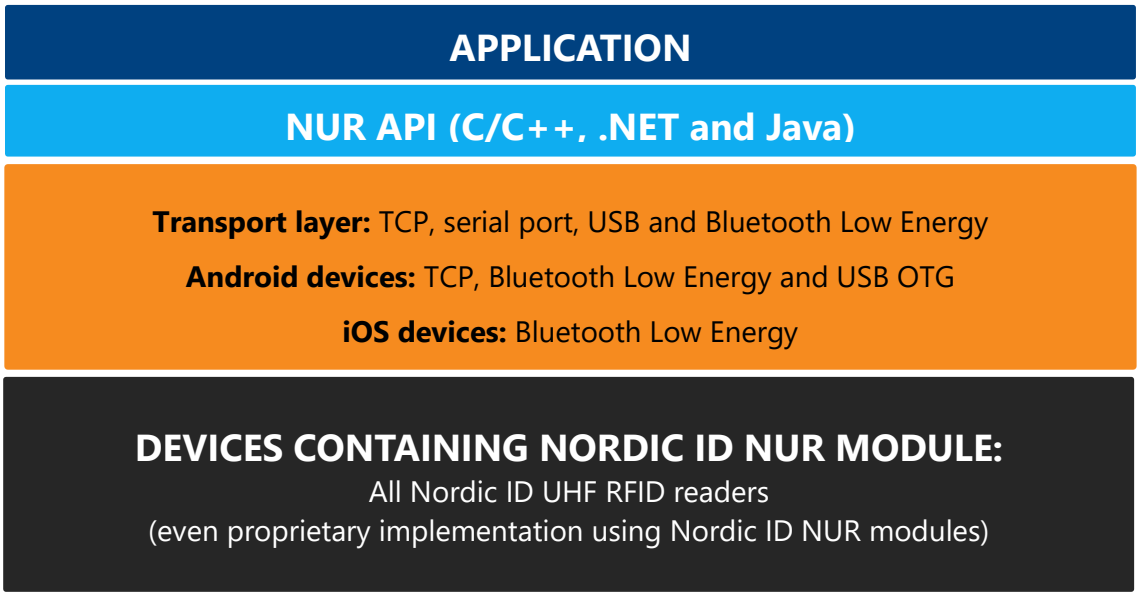
2.1.4. NORDIC ID SMART WEAR APP

Nordic ID Smart Wear app for smartwatches supports Android Wear 2.0 or Wear OS 1.0 and newer versions. The Nordic ID RFID Smart Wear app is available from the Google Play store.

2.2. APPLICATION DEVELOPMENT

2.2.1. NUR API IN GENERAL

NUR API is an application programming interface for Nordic ID UHF RFID module. It provides control for all Nordic ID UHF RFID readers. The NUR API provides compatibility between Nordic ID UHF RFID reader from RFID functions perspective. The NUR API consists of application, NUR API, transport and HW layers as depicted in Picture 8.



Picture 8 NUR API architecture

2.2.2. APPLICATION DEVELOPMENT KIT

Nordic ID provides Software Development Kits (SDK) and code samples via GitHub for Android, iOS and Windows 10:

https://github.com/NordicID/

The Software Development Kits provide development basics for Nordic ID EXA21. Samples utilizing the Android, iOS and Windows 10 specific accessory extension used with Nordic ID EXA21 are available from GitHub as well (includes e.g. RFID HID). Samples utilizing NUR API in general are available for Android, iOS and Windows 10 (includes RFID generic operations such as write, locate etc.).

Xamarin SDK is available on demand, too.

More information including source code and samples can be found from GitHub via:

Android

https://github.com/NordicID/nur_nurapi_android

iOS

https://github.com/NordicID/nur_sample_ios

https://github.com/NordicID/nur_sample_windows/tree/master/Win10_UWPSample

2.3. FIRMWARE UPDATE

Firmware of Nordic ID EXA21 can be updated by using Nordic ID RFID Demo application in Android, "Updates" option in main menu.

When firmware update is started, the device goes in DFU mode.

3. REGIONAL SETTINGS

Nordic ID UHF RFID readers do support operating frequency range between 860 - 960MHz. Some of the readers do cover full operating frequency band and some of them have two sub bands that are 868 ETSI band (865.6 - 867.6 MHz) and 915 FCC band (902 - 928 MHz). Regional organizations as ETSI and FCC have set rules and requirements for operating frequencies, output power and other RF parameters for the UHF RFID readers to comply local regional requirements. See variants in section 1.2.

Nordic ID has created set of regional settings in order to fulfil local regulations. Nordic ID is required to ensure compliance of Nordic ID products will remain after production. Solution for this is products including UHF RFID functionality will be set and locked in production based on customer order e.g. if a product is ordered to Europe, it will be locked to ETSI region. And for example, if a product is ordered to Australia region, then it's locked to Australia region. When a product is locked to individual region, it will comply local regulations of the region.

4. SERVICE AND SUPPORT

For technical enquiries regarding Nordic ID devices or software development, please contact our Technical Support:

E-mail: support@nordicid.com
Telephone: +358 2 727 7790

As a manufacturer, Nordic ID stands responsible for providing repair services for its devices during and after the warranty period. Together with partners Nordic ID serves customers globally. When your Nordic ID device needs repair, always use Nordic ID Service or our authorized service partners. We want to make sure that your Nordic ID product serves you the best possible way, and by using our preferred service partners the quality of the service is trustworthy and the spare parts are original. This way the existing product warranty remains, and you receive a 3-month service warranty for the repaired devices.

Nordic ID works together with full support and primary support partners. Full support partners can handle both warranty and non-warranty repairs on behalf of Nordic ID in their own regions. In addition, Nordic ID has a network of smaller repair centres, primary support partners, who offer the first line of support to their customers locally.

For any enquiries about Nordic ID repair service please contact:

E-mail: service@nordicid.com
Telephone: +358 2 727 7791

5. WARRANTY

Nordic ID warrants that the Products are at the time of delivery free from defects in materials and workmanship, provided the Products remain unmodified and are operated under normal and proper conditions. Warranty period is the longer of twenty-four (24) months from the date of delivery in case the Customer is end-customer or twenty-seven (27) months from the date of manufacture in case the Customer is reseller. Spare parts are warranted against defects in workmanship and materials for a period of ninety (90) days from the date of delivery to Customer.

For more detailed information about the warranty can be found from Nordic ID Sales Terms.

6. RELATED DOCUMENTS AND CONTENT

- Nordic ID EXA21 datasheet
- Nordic ID EXA21 Quick Guide
- Nordic ID Safety and Regulations Guide
- Nordic ID GitHub account for developers (https://github.com/NordicID)

7. ABOUT NORDIC ID

Nordic ID is at the centre of today's real-time item tracking and reliable RFID technology. We help organizations fight the damaging effects of item loss, facilitate streamlined business procedures, and stay ahead of the competition.

We are ready to help you take advantage of our wide range of products and services designed to fit your needs. Contact us now, and we will help you to tackle your challenges and get your business to the next level.

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8. VERSION HISTORY

Version	Date	Modifications
1.0	01.04.2019	The first version
1.1	23.01.2020	Added HID, Pairing, ToF, accessories. Updated LEDs and buttons behaviour.