2019-05-09
Nordic ID EXA51e User Guide
Version 2.4

NORDIC ID EXA51e

USER GUIDE

TABLE OF CONTENTS

1. GETTING STARTED

1.1. GENERAL

Nordic ID EXA51e does provide UHF RFID reader capabilities and optional 1D/2D barcode scanning functionalities for host devices, such as smartphones, tablets or computers. The Nordic ID EXA51e is used with the host devices via Bluetooth® Low Energy wireless technology.

Nordic ID EXA51 (without "e") was the previous discontinued version of Nordic ID EXA51e. Please refer to User Guides version 2.1 or lower if you are using it instead of Nordic ID EXA51e.

1.2. DIFFERENCES BETWEEN NORDIC ID EXA51 AND NORDIC ID EXA51e

Differences between Nordic ID EXA51 and Nordic ID EXA51e have been listed in the following table.

FEATURE	NORDIC ID EXA51 (discontinued)	NORDIC ID EXA51e
UHF RFID module	NUR-10W	NUR2-1W
Supported standard	ISO 18000-63 (EPC Class 1 Gen2v2) AES authentication in accordance with ISO/IEC 29167-10 supported	ISO 18000-63 (EPC Class 1 Gen2v2)
Nominal reading distance	Up to 7m	Up to 10m
Nominal reading speed	200 tags/s	Up to 1000 tags/s
Usage time	Up to 24h	Up to 14h

1.3. NORDIC ID EXA51E VARIANTS

CODE	FREQUENCY	2D IMAGER	WIRELESS CHARGING	QUAD LOCK®
IWA00014-EU	868MHz (ETSI)	Yes	No	Yes
IWA00015	915MHz (FCC)	Yes	No	Yes
IWA00016-EU	868MHz (ETSI)	No	No	Yes
IWA00017	915MHz (FCC)	No	No	Yes
IWA00010-EU	868MHz (ETSI)	Yes	Yes	No
IWA00018	915MHz (FCC)	Yes	Yes	No
IWA00019-EU	868MHz (ETSI)	No	Yes	No
IWA00020	915MHz (FCC)	No	Yes	No

1.4. AVAILABLE ACCESSORIES

CODE	DESCRIPTION
ACN00155	Nordic ID EXA51/Medea Desktop Charger DC USB Out
CWH00036	Nordic ID EXA51/Medea Micro-USB cable for device and desktop charger (Length 1.8m, type A-Male – type Micro-B-Male –connectors)
ACN00162	Host device installation kit for Nordic ID EXA51. The kit includes counter parts of magnets (2 pcs) and screws (2pcs) (Minimum order quantity 10 pcs)
ACP00097	Quad Lock Universal Adaptor v1. The Quad Lock Universal Adaptor with 3M™ adhesive is a super thin adaptor that is compatible with all Quad Lock™ mounts. The Quad Lock Universal Adaptor designed to be used only once, it is not re-stick-able (link to product page)

1.5. INBOX CONTENT

The Nordic ID EXA51e inbox contains following items

- The Nordic ID EXA51e
- Battery (installed)
- Counter parts of magnets for magnet fastening of host device
- Screws for screw fastening
- Safety and regulations guide
- Business card with link to quick guide

NOTE! Quad Lock® universal adaptor is sold separately

1.6. FEATURES OVERVIEW

Picture 1 Key features of wireless charging variant

Picture 2 Key features of Quad Lock variant

1.7. REMOVING BATTERY

Picture 3 Removing battery

1.8. CHARGING

1.8.1. NORDIC ID EXA51E CHARGING

The Nordic ID EXA51e can be charged via cradle and USB charger. Maximum charging power via the cradle is 10W (5V @ 2A). Charging time from 0 – 100% via the cradle is about 5h. The USB charger needs to have a micro USB connector and recommended charging power is 10W (5V @ 2A).

Charging status is indicated by Power LED. Please see section 1.12.2.3 for information how the Power LED functions in different situations.

Picture 4 Charging of the Nordic ID EXA51e via cradle

Picture 5 Charging of the Nordic ID EXA51e via USB charger

NOTE! The cradle is sold separately by Nordic ID. The USB charger is not included in the Nordic ID EXA51e inbox and is not sold by Nordic ID.

1.8.2. HOST DEVICE CHARGING

Host device attached on the Nordic ID EXA51e can be charged via wireless charging or USB from the cradle.

1.8.2.1. WIRELESS CHARGING

Wireless charging is based on inductive charging technology and is compliant with Qi v1.2 specification. With the inductive charging technology, the power is transmitted between a transmitter and receiver coils placed closely together. The Nordic ID EXA51e acts as a transmitter and host device acts as a receiver. The coils of the transmitter and receiver must be aligned well to make the connection. Charging efficiency greatly depends on how well the coils are aligned. The wireless charging may not work or may work unreliably if the coils are misaligned. Please see section 1.6 for information about the coil location of the Nordic ID EXA51e. When wireless charging is powered from the battery of the Nordic ID EXA51e then wireless charging is disabled in following cases:

- Battery level of the Nordic ID EXA51e is < 10%
- The Nordic ID EXA51e goes to sleep mode

Please note that the Nordic ID EXA51e does not go into sleep mode and will keep wireless charging enabled when charged via the cradle or USB charger. Maximum charging power via the wireless charging when the Nordic ID EXA51e is charged is 5W. Maximum charging power via the wireless charging when the Nordic ID EXA51e is not charged is 2.5W (wireless charging power is delivered from the battery of the Nordic ID EXA51e).

Picture 6 Wireless charging of host device with Nordic ID EXA51e on cradle

NOTE! Host device needs to support Qi based inductive wireless charging technology in order to charge from the Nordic ID EXA51e. Please contact your device manufacturer in order to make sure wireless charging is supported.

1.8.2.2. CHARGING VIA USB

Host device can be charged via the cradle using a proper USB cable (the cradle contains an USB type-A connector). Maximum charging power via the cradle depends on charge level of the Nordic ID EXA51e battery. Maximum 7W charging power can be achieved when the battery of the Nordic ID EXA51e is full/almost full. When the Nordic ID EXA51e charges at full power then the maximum charging power of host device is limited to 4W.

Picture 7 USB charging of host device with Nordic ID EXA51e on cradle

1.8.3. BATTERY CHARGING

The battery or spare battery of the Nordic ID EXA51e can also be charged in the cradle. Please note that when USB charging from the cradle is used, spare battery charging of the cradle is disabled. Please find more information about the how charging from the Picture 8 Battery charging in cradle.

Picture 8 Battery charging in cradle

1.9. FASTENING

The Nordic ID EXA51e provides three different fastening methods for host devices. The fastening methods are Quad Lock, magnets, and screw fastenings.

1.9.1. QUAD LOCK® FASTENING

The Quad Lock fastening uses popular and easy to use Quad Lock 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 page for more information about different adapters.

Fastening of the host device on the Nordic ID EXA51e with the Quad Lock fastening system is easy. The first step is to attach a Quad Lock adapter on the host device. Second step is to fasten the host device on the Nordic ID EXA51e by attaching and locking the Quad Lock fastening system.

Picture 9 Nordic ID EXA51e fastening with Quad Lock

NOTE! Quad Lock® universal adaptor is sold separately

1.9.2. MAGNET FASTENING

The magnet fastening is a tight but effortless option to fasten the host device on the Nordic ID EXA51e. Using magnet fastening is easy. The first step is to place the counter parts of magnets to the recesses located on the top cover of the Nordic ID EXA51e (Note! Protective/adhesive tape should be pointing outwards from the Nordic ID EXA51e). The second step is to remove protective tape from the counter parts of magnets. The third step is to place the host device on top of the Nordic ID EXA51e and ensure that the magnet counter parts are securely attached (adhesive) to the host device.

Picture 10 Nordic ID EXA51e fastening with magnets

1.9.3. SCREW FASTENING

The screw mounting is a robust option to mount a host device on the Nordic ID EXA51e. This option requires a protective case or cover for the host device which is screwed on the Nordic ID EXA51e. The first step is to screw the case/cover to screw holes of the Nordic ID EXA51e. The distance between the screw holes is 68mm and the diameter of each screw is 3.5mm. The second step is to place the host device into the case/cover.

Picture 11 Nordic ID EXA51e fastening with screws

1.10. CONNECTIONS

The Nordic ID EXA51e supports only Bluetooth Low Energy Class 2 connection for host devices. Supported Bluetooth Low Energy versions are 4.0 – 4.2 and supported profiles are GATT (generic data transfer) and HID (keyboard emulation).

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

1.10.1. CONNECTING WITH HOST DEVICE

There are three 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.

1. **Connect without pairing (this is the most straightforward way)**
   Nordic ID EXA will advertise itself via Bluetooth until the host device connects to it. Bluetooth connection remains active until the host device closes the connection. Once the connection is closed Nordic ID EXA51e will start advertising itself again and any host device can connect to it.

2. **Connect with pairing**
   By default, pairing support is disabled (since firmware version 2.2.1). When Nordic ID EXA51e is paired with the host device, applications (like Nordic ID RFID demo) connects to it automatically. Connection remains active if the host device is in Bluetooth range.

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.

1.10.1.1. PAIRING AND UNPAIRING NORDIC ID EXA51E WITH A HOST DEVICE

By default, pairing support is disabled (since firmware 2.2.1). Before Nordic ID EXA51e can be paired with the host device, pairing support needs to be enabled. This can be done with two different ways that are:

1. Using Nordic ID RFID demo. Connect Nordic ID EXA51e to host device and go to Settings -> Reader -> Host device connection -> check Pairing enabled tick box

2. Reading configuration barcodes to enable/disable pairing support.
   a. ALLOWPAIRON = Pairing enabled
   b. ALLOWPAIROFF = Pairing disabled

NOTE! Barcode configuration codes can be read only when there is no active Bluetooth connection with the host device

Nordic ID EXA51e can be paired based on the instructions below once pairing has been enabled.

1. Turn Bluetooth of the host device On.
   NOTE: Android 6.0 or newer needs location to be enabled also
2. Power on the Nordic ID EXA51e by pressing the power button for 2...3 seconds
3. Open Bluetooth connection settings of host device and you should see “EXA51e XXXXXX” in the list
4. Select “EXA51e XXXXXX” from the list in order pair your host device with the Nordic ID EXA51e

NOTE! XXXXX is a serial number of the Nordic ID EXA51e

iOS devices typically prompt “pairing request” message box if Nordic ID EXA51e supports pairing. In case pairing is not needed, 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.

Other host devices can’t connect to Nordic ID EXA51e until pairing information has been cleared from the host device and Nordic ID EXA51e. Unpairing can be done based on information found from section 1.12.1.3 or using clear Bluetooth pairings barcode. Read barcode below to clear Bluetooth pairings from the Nordic ID EXA51e.

NOTE! Barcode configuration codes can be read only when there is no active Bluetooth connection with the host device

1.10.1.2. CONNECTING WITH HOST DEVICE VIA HID MODE

In this mode, the Nordic ID EXA51e 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. When operating in HID mode, the Nordic ID EXA51e needs to be paired with the host device and configured for the HID mode.

NOTE! When the Nordic ID EXA51e is configured for HID mode: remember that you will need to reconnect the Nordic ID EXA51e 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.

1.10.1.3. CONNECTING WITH NORDIC ID SMART PAIR FEATURE

When using a Nordic ID EXA51e reader with the smartphone fastened on top of it, both the Nordic ID EXA51e reader and your smartphone are always close to each other while being used. Nordic ID Smart Pair is aware of this and thus it keeps 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: Just move the host device further away from the EXA51e to disconnect automatically.

In this mode, the Nordic ID EXA51e keeps connected to host device only when it is located nearby it, but if you want to use your mobile device separated from the EXA51e, then you can disable the "Auto disconnect from EXA51e" option from "Reader" tab in Nordic ID RFID Demo for Android. In this mode, the mobile device doesn't disconnect automatically when moved further away. Disconnecting will be done by pressing Power and Unpair buttons simultaneously 2 seconds (Read/HID LED stops blinking).

Requirements: Nordic ID RFID demo app 1.2.7.3 (or newer) and EXA51e with firmware 2.2.5 (or newer).

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

1.10.2. CONFIGURING HID MODE WITH BARCODE

Read barcode below to configure the Nordic ID EXA51e to desired HID mode. Please note barcode configuration codes can be read only when there is no active Bluetooth connection with the host device.

- HIDMODE0 = All HID modes disabled
- HIDMODE1 = HID barcode enabled
- HIDMODE2 = HID RFID enabled

Both HIDMODE1 and HIDMODE2 can be simultaneously enabled.

1.10.3. CONFIGURING HID MODE VIA APPLICATION

1. Install Nordic ID RFID Demo application (see section 2.1)
2. Connect your device
3. Turn on HID mode, RFID and/or barcode mode in reader settings
4. Close application and make sure Bluetooth connection is closed
5. Reboot your EXA51e device by pressing the power button for 2...3 seconds.

1.11. OPERATING WITH HID MODES

1.11.1. HID BARCODE ENABLED

Reading Barcode:

- Pressing trigger down → barcode aimer starts →Releasing trigger →scanning start
- When tag found, result is sent to HID immediately
- Pressing trigger down during scan → scanning aborted

1.11.2. HID RFID ENABLED

Reading RFID tags:

- Pressing trigger down → RFID reading starts
- Reader read tags in memory as long trigger is kept down. Short beep when new tags found
- Releasing trigger → Reading stops and tags in memory will be transmitted to HID. Short beep when single tag sent. If no tags found, double low note beeps.

NOTE! XXXXX is a serial number of the Nordic ID EXA51e

1.11.3. BOTH: HID BARCODE & HID RFID ENABLED.

Activate Barcode reader:

- Trigger click (short press (<350ms) and released immediately) → Barcode scanning start immediately without aiming.
- Trigger press and keeping down at least 350ms → Barcode aimer starts →Trigger released → scanning starts.

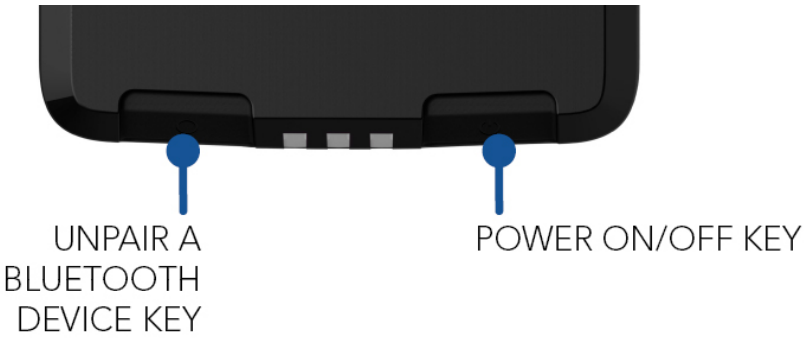
Activate RFID reader:

- Pressing trigger “double click” and keeping down → RFID reading start. Searching tags. Beep when tags found.
- Releasing trigger → Reading stop and tags in memory will be transmitted to HID. Short beep when single tag sent. If no tags found, double low note beeps.
- Pressing trigger during tag sending → aborted.
- Pressing trigger during barcode scanning → aborted.

1.12. USING THE READER

1.12.1. KEYS AND BUTTONS

The Nordic ID EXA51e includes two capacitive buttons and one physical button for user interactions. Location of the keys can be seen in the Picture 12.



Picture 12 Location of capacitive keys

1.12.1.1. TRIGGER BUTTON

The trigger button is located on the pistol grip and it can be used to start/stop UHF RFID/barcode scanning and turn reader on. When turning the reader on the trigger button needs to be pressed 0.5 seconds until blue LED starts blinking before it triggers. This ensures that accidental presses are avoided. Depending on the application in use, the trigger button starts/stops UHF RFID or barcode reading. By default, the first press of the button starts the reading and the second press of the button stops it.

NOTE! Button usage depends on the application in use.

1.12.1.2. POWER KEY

Power key turns reader On/Off. The power key needs to be pressed for about 2...3 seconds until red led turns to green before it triggers, this ensures that accidental presses are avoided. The power key is disabled when Nordic ID EXA51e has an active Bluetooth connection with host device.

NOTE! Reader can be powered down even though it has an active Bluetooth connection by pressing power button down at least 7 seconds

1.12.1.3. UNPAIR A BLUETOOTH DEVICE KEY

If the Nordic ID EXA51e is paired to the host device, it stores information about the paired devices and tries to connect automatically when turned on. Using the "Unpair a Bluetooth device" key clears paired device from the Nordic ID EXA51e memory.

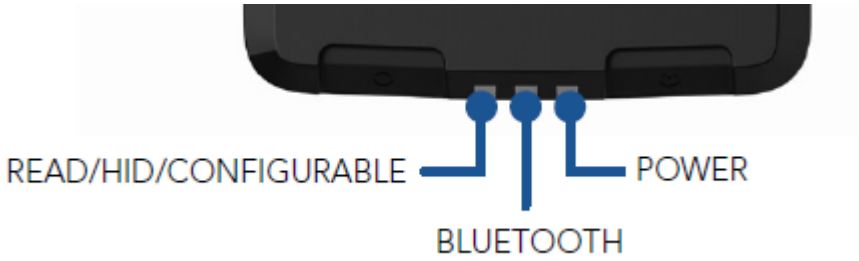
Unpairing:

- Make sure device is disconnected.
- Press and keep "Unpair" button down at least 3 second.
- When device beeps three times, pairing is cleared. Device may reboot.

NOTE! The "Unpair a Bluetooth device" key is disabled when Nordic ID EXA51e has an active Bluetooth connection with host device

1.12.2. LED INDICATORS

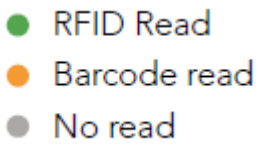
The Nordic ID EXA51e includes three LEDs for user indications. Location of the LEDs can be seen from the Picture 13.



Picture 13 Location of LEDs

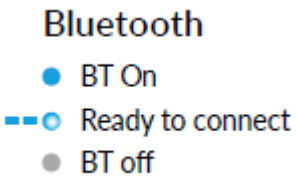
1.12.2.1. READ/HID/CONFIGURABLE LED

By default, Read/HID/Configurable LED indicates whether RFID or barcode reading is active. The Read/HID/Configurable LED can be configured via API if needed.



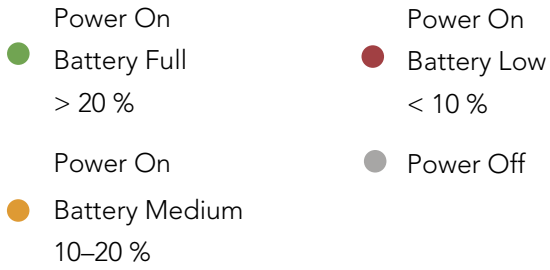
1.12.2.2. BLUETOOTH LED

The Bluetooth LED indicates whether the Bluetooth connection is On/Off or in search mode.



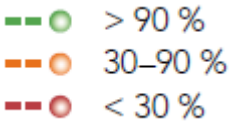
1.12.2.3. POWER LED

The Power LED indicates whether the reader is On/Off it also indicates the battery level of the reader. The battery level is indicated by the colour of the Power LED.



NOTE! Wireless charging is disabled when battery level is low (Power LED is red)

Blinking of the Power LED indicates that the device is charging. The battery level during charging is indicated by the colour of the blinking Power LED.



1.12.3. BUZZER

The Nordic ID EXA51e 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
- When barcode is read successfully

1.12.4. ANTENNAS

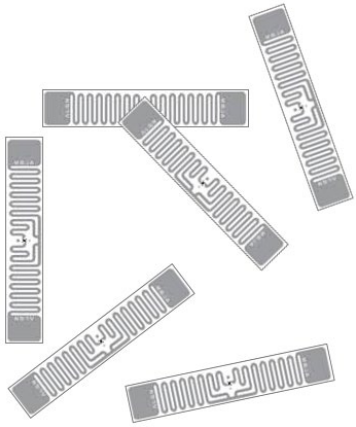
The Nordic ID EXA51e includes Adaptive Cross Dipole antenna that includes four SW controllable (via Nordic ID RFID demo application and NUR API) antenna modes that are

- Linear with horizontal and/or vertical polarization mode
  - Nominal reading distance about 10m/33ft
- Circular polarization mode
  - Nominal reading distance about 6m/20ft
- Proximity mode:
  - Reading distance down to 1cm/0.4inch

NOTE! The reading range depends on used tag and environment

The linear antenna modes are intended for long range reading when tag density is high and tags are in horizontal or vertical position (Picture 14). In most cases enabling both linear antenna modes do provide the best performance. The circular polarization mode is intended for use cases requiring medium range reading and alignment of tags is random (Picture 15). The circular polarization mode works well if good performance tags are used and the tags easily readable. The proximity mode is ideal for locate and tag writing functionalities but shouldn't be enabled if not needed because it will slow down reading speed.

Picture 14 Tags in horizontal and vertical alignment



Picture 15 Tags in random alignment

1.12.5. 2D IMAGER

This section describes methods for configuring 2D imager of Nordic ID EXA51e. The 2D imager module in use is Opticon MDI-4100 2D scan engine.

Opticon provides online configuration tools: http://opticonfigure.opticon.com/

Standalone PC software: https://wiki.opticonusa.com/techsupport/en/Universal_Config_Tool_2D

There are three different ways to configure the 2D imager that are

1. Using configuration barcode
2. Using Nordic ID RFID demo application
3. Configuring via NUR Accessory extension API

1.12.5.1. USING CONFIGURATION BARCODES

The easiest way to configure 2D imager is to read configuration code with the 2D imager. Please use Opticon's configuration tools (see link above) for creating configuration barcode and print it onto paper. Read the configuration code with the 2D imager of Nordic ID EXA51e and new settings will be set and saved automatically. Please note barcode configuration codes can be read only when there is no active Bluetooth connection with the host device. Please find example configuration barcodes below. More 2D imager configuration barcodes can be found from APPENDIX 1.

1 - Enable 1D codes: Tri-Optic, Industrial 2 of 5, Code 39 and S-Code

@MENU_OPTO@ZZ@JZ@R7@B2@R9@ZZ@OTPO_UNEM@

2 - Disable 1D codes: Tri-Optic, Industrial 2 of 5, Code 39 and S-Code

@MENU_OPTO@ZZ@DDJ@X4K@VB@DDK@ZZ@OTPO_UNEM@

1.12.5.2. USING NORDIC ID RFID DEMO APPLICATION

Nordic ID RFID demo application allows testing of different kind of barcode configurations effortlessly. Configurations can be read and set from specific file. The specific file is a simple text file containing configuration command strings generated by the Opticon's configuration tool. The configuration settings of Nordic ID RFID demo applications can be accessed via Settings menu or barcode functionality.

Opticon's configuration tools do provide configuration strings. Barcode type must be 2D-Code like PDF417. Format of configuration string is:

@MENU_OPTO@ZZ@<config codes separated by @>@ZZ@OTPO_UNEM@

Opticon's configuration tools shows two or three letter configuration code for each configurable item.

Example:

Enable Tri-Optic = JZ, Enable Code39 = B2

Configuration string = "@MENU_OPTO@ZZ@JZ@B2@ZZ@OTPO_UNEM@"

Opticon's configuration tools shows two or three letter configuration code for each configurable item.

After sending configuration file to the reader, Nordic ID RFID demo will send "save settings" command automatically to the 2D imager. Source code of Nordic ID RFID demo is public, so one can study how 2D imager configuration using the specific files has been implemented on Android. See section 2.2.2 for more information.

1.12.5.3. CONFIGURING VIA NUR ACCESSORY EXTENSION API

NUR Accessory Extension API provides command for sending configuration string to the 2D imager:

byte [] imagerCmd (String cmd, int type);
cmd: Configuration string.
type: Type of imager in use (0= Opticon MDI-4100 2D scan engine)

Return value is byte array of response depending on command code(s) sent to the 2D imager. Null if command string is not valid. The first byte of array contains ACK (0x6 success) or NAK (0x15 fail).

example:

```
//Send Enable Tri-Optic and Enable Code39 commands
byte [] rsp = imagerCmd("@MENU_OPTO@ZZ@JZ@B2@ZZ@OTPO_UNEM@", 0);

if(rsp[0] == null)
{
 //Not valid command
}
else if(rsp[0] == 0x6) //ACK
{
  //Config success!
}
else if(rsp[0] == 0x15) //NAK
{
  //Config failed!
}
```

After sending configuration to the 2D imager, settings are ready to use but next power down causes settings to lost. Therefore, it's important to save settings to volatile memory of imager.

//SAVE CONFIGURATION TO IMAGER MEMORY

imagerCmd ("@MENU_OPTO@ZZ@Z2@ZZ@OTPO_UNEM@", 0);

1.13. RF PROFILES

Nordic ID NUR2-1W UHF RFID module supports three different kind of RF profiles. The profiles are Robust, Nominal and High speed. It's important to select the correct RF profile based on use case and environment. More detailed description about the RF profiles can be found below:

- **Robust**

- Robust RF profile is intended to be used in challenging environments. It provides the best filtering against the interfering signals coming from nearby reader(s), other signal sources and from reflective environment. This profile uses link frequency of 250 kHz and Miller 4 coding scheme providing read rates up to 200 tags/s. Due to the low data speed and best filtering the Robust RF profile provides the best sensitivity.

- **Nominal**
  - Nominal RF-profile is the default setting of readers containing Nordic ID NUR2-1W UHF RFID module. It uses link frequency of 300 kHz and Miller 2 coding providing read rates up to 350 tags/s.

- **High speed**
  - High speed RF profile is intended to be used in use cases where the highest read rates are required. It uses link frequency of 400 kHz and FM0 coding and provides read rates up to 1000 tags/s. Due to the high data speed this profile is quite sensitive to interferences.

NOTE! Read rates will depend from the environment, reader settings, tag population and tag type.

2. SOFTWARE

Nordic ID has taken an open source SW development approach in use with the Nordic ID EXA51e. Nordic ID provides the SDK along with the examples through the GitHub. The Nordic ID EXA51e 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

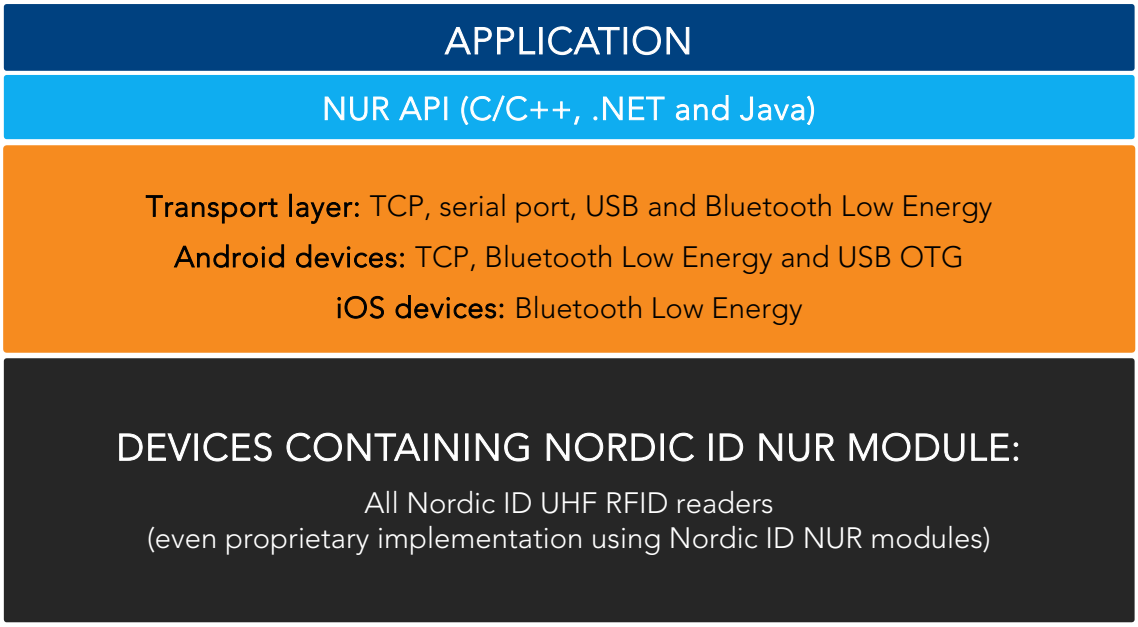
2.1.4. NORDIC ID SMART WEAR APP

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 16.



Picture 16 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 the Nordic ID EXA51e. Samples utilizing the Android, iOS and Windows 10 specific accessory extension used with the Nordic ID EXA51e are available from GitHub as well (includes e.g. barcode and 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.).

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

There are two different firmware versions available for Nordic ID EXA51, Nordic ID EXA51e and Nordic ID EXA31 UHF RFID readers. Versions including differences can be found from Table 3.

Table 3 Firmware versions

	High speed version	Default version
Naming	Marked with postfix "-H"	Marked with postfix "-L"
Size of MTU	158	23
Compatibility	Devices supporting Bluetooth LE standards 4.2 or higher	Devices supporting Bluetooth LE standards 4.0 and 4.1
Reading speed	600…1000 tag/s	About 200 tag/s
Default firmware installed in production	Nordic ID EXA51e	Nordic ID EXA51 and Nordic ID EXA31

Even though default firmware for Nordic ID EXA51e is a high-speed version it also works with default version. Same applies to Nordic ID EXA51 and Nordic ID EXA31. To gain maximum UHF RFID reading data throughput, it's recommended to use high speed version with smart phones/tablets supporting Bluetooth LE standard 4.2 or higher. It's recommended to use default version in applications where data throughput requirement is not critical.

Firmware of Nordic ID EXA51e is consisted of four different firmwares that are:

- NUR firmware (firmware of the NUR RFID module)
- NUR bootloader (bootloader of the NUR RFID module)
- Device firmware (firmware of the reader)
- Device bootloader (bootloader of the reader)

All the firmwares can be updated using Nordic ID RFID demo applications presented in section 2.1 or implementing update functionality to 3rd party application using instructions that can be found from section 2.2.

Please note if firmware version of Nordic ID EXA51e is 2.0.2 or 1.x then it's not possible to use Nordic ID RFID demo application to update the firmware. In those cases, please refer to instructions below:

- Firmware version 2.0.2: Please refer to instructions that can be found from GitHub (link)
- Firmware version 1.x: Please contact Nordic ID Support for further instructions (link)

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.

Nordic ID has created set of regional settings in order to fulfill 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 only our 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 EXA51e datasheet
- Nordic ID EXA51e 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	10.3.2017	The first version
1.1	15.3.2017	Minor changes
1.2	21.3.2017	Minor changes
1.3	26.4.2017	Antennas section added
1.4	9.6.2017	HID mode operations added
1.5	14.7.2017	Firmware update section added
1.6	23.8.2017	Trigger and power keys functionality modified. Bluetooth LED section updated. Nordic ID EXA51e added. Logo changed.
1.7	22.9.2017	New brand look updated
1.8	3.11.2017	Buzzer, firmware and regional settings sections added
1.9	10.1.2018	Minor changes in antenna section. Connecting with host device, 2D imager and Nordic ID Keyboard and Wedge service sections added.
2.0	25.1.2018	RF profiles section added
2.1	23.4.2018	Windows 10 support added to application development section. Android GutHub address updated. Minor updates.
2.2	28.5.2018	Nordic ID Smart Pair added
2.3	13.12.2018	Nordic ID EXA51 removed and Nordic ID Smart Wear app added
2.4	9.5.2019	New battery indications and new Nordic ID Smart Pair mode

9. APPENDICES

9.1. APPENDIX 1 SAMPLE 2D IMAGER CONFIGURATION BARCODES

NOTE! Barcode configuration codes can be read only when there is no active Bluetooth connection with the host device

Code 39

Code 39

Code39 Italian Pharmaceutical

Code 39 Full ASCII

Tri-Optic

Codabar

Codabar

Codabar ABC

Codabar CX

Industrial 2 of 5 / Interleaved 2 of 5

Industrial 2 of 5

Interleaved 2 of 5

S-Code