

NORDIC ID HH83

USER GUIDE



TABLE OF CONTENTS

1.	GETTING STARTED.....	4
1.1.	GENERAL.....	4
1.2.	VARIANTS.....	4
1.2.1.	NORDIC ID HH83 VARIANTS	4
1.3.	AVAILABLE ACCESSORIES	5
1.4.	INBOX CONTENT.....	5
1.5.	REMOVING AND INSTALLING THE BATTERY.....	6
1.5.1.	BATTERY "HOT SWAP"	7
1.6.	CHARGING.....	8
1.6.1.	NORDIC ID HH83 CHARGING.....	8
1.6.2.	BATTERY CHARGING USING DESKTOP CHARGER	9
1.7.	FEATURES OVERVIEW.....	10
1.8.	USING THE READER.....	12
1.8.1.	BUTTONS	12
1.8.1.1.	SCAN BUTTONS.....	12
1.8.1.2.	POWER KEY.....	12
1.8.1.3.	HOME KEY.....	12
1.8.1.4.	BACK KEY	12
1.8.1.5.	APPS TASK MANAGER KEY.....	12
1.8.2.	STATUS LED	13
1.8.3.	SENSORS.....	13
1.8.3.1.	TOF SENSOR.....	13
1.8.3.2.	LIGHT AND PROXIMITY SENSOR.....	14
1.8.3.3.	NFC READER.....	14
1.8.4.	VOLUME	14
1.8.5.	SCANNING DIRECTIONS.....	15
1.8.6.	NORDIC ID HH83 RFID ACD VARIANT.....	16
1.8.7.	2D IMAGER.....	17
1.8.7.1.	USING CONFIGURATION BARCODES	17
1.8.7.2.	USING NORDIC ID RFID DEMO APPLICATION.....	18
1.8.7.3.	CONFIGURING VIA NUR ACCESSORY EXTENSION API	18
1.9.	RF PROFILES	19
2.	SOFTWARE.....	20
2.1.	NORDIC ID RFID APPLICATIONS.....	20

2.1.1.	NORDIC ID RFID DEMO FOR ANDROID.....	21
2.1.2.	NORDIC ID WEDGE SERVICE.....	22
2.2.	INSTALLING 3 RD PARTY APPLICATIONS.....	22
2.3.	UPDATE INSTRUCTIONS.....	24
2.4.	BACKUP AND RESTORE CONFIGURATION.....	25
2.4.1.	CREATE BACKUP.....	25
2.4.2.	RESTORE BACKUP.....	25
2.5.	APPLICATION DEVELOPMENT.....	26
2.5.1.	NUR API IN GENERAL.....	26
2.5.2.	APPLICATION DEVELOPMENT.....	26
3.	REGIONAL SETTINGS.....	27
4.	SERVICE AND SUPPORT.....	27
5.	WARRANTY.....	28
6.	RELATED DOCUMENTS AND CONTENT.....	28
7.	ABOUT NORDIC ID.....	28
8.	VERSION HISTORY.....	29
9.	APPENDICES.....	30
9.1.	APPENDIX 1 SAMPLE 2D IMAGER CONFIGURATION BARCODES.....	30

1. GETTING STARTED

1.1. GENERAL

Nordic ID HH83 is designed for quick, accurate and reliable data collection whether it is for barcode or UHF RFID reading. Featuring the Android operating system and a 4.7" HD touchscreen with high processing power. This enables sophisticated software development offering a superb user experience. The Gorilla Glass 3 touchscreen provides excellent display quality and robustness.

What makes Nordic ID HH83 RFID ACD so powerful is the Nordic ID NUR2-1W module which provides state-of-the-art UHF RFID reading performance is an ideal contemporary data collection tool.

The modular design of Nordic ID HH83 enables the only Barcode variant to be upgraded* to RFID+Barcode variant in future, instead of replacing the device.

* Upgrade must be made by authorized service centers. Upgrade ordering codes are ACN00199/200.

1.2. VARIANTS

1.2.1. NORDIC ID HH83 VARIANTS

The Nordic ID HH83 is available in 5 different variants (all of them with WLAN interface, rear camera and NFC reader) that are:

CODE	FREQUENCY	RFID ACD	2D IMAGER	4G
HTH00001	N/A	No	Yes	No
HTH00002	N/A	No	Yes	Yes
HTH00004	868 MHz (ETSI)	Yes	Yes	No
HTH00005	868 MHz (ETSI)	Yes	Yes	Yes
HTH00007	915 MHz (FCC)	Yes	Yes	No



Picture 1 Nordic ID HH83 RFID ACD (left) and Nordic ID HH83 Barcode (right) variants

1.3. AVAILABLE ACCESSORIES

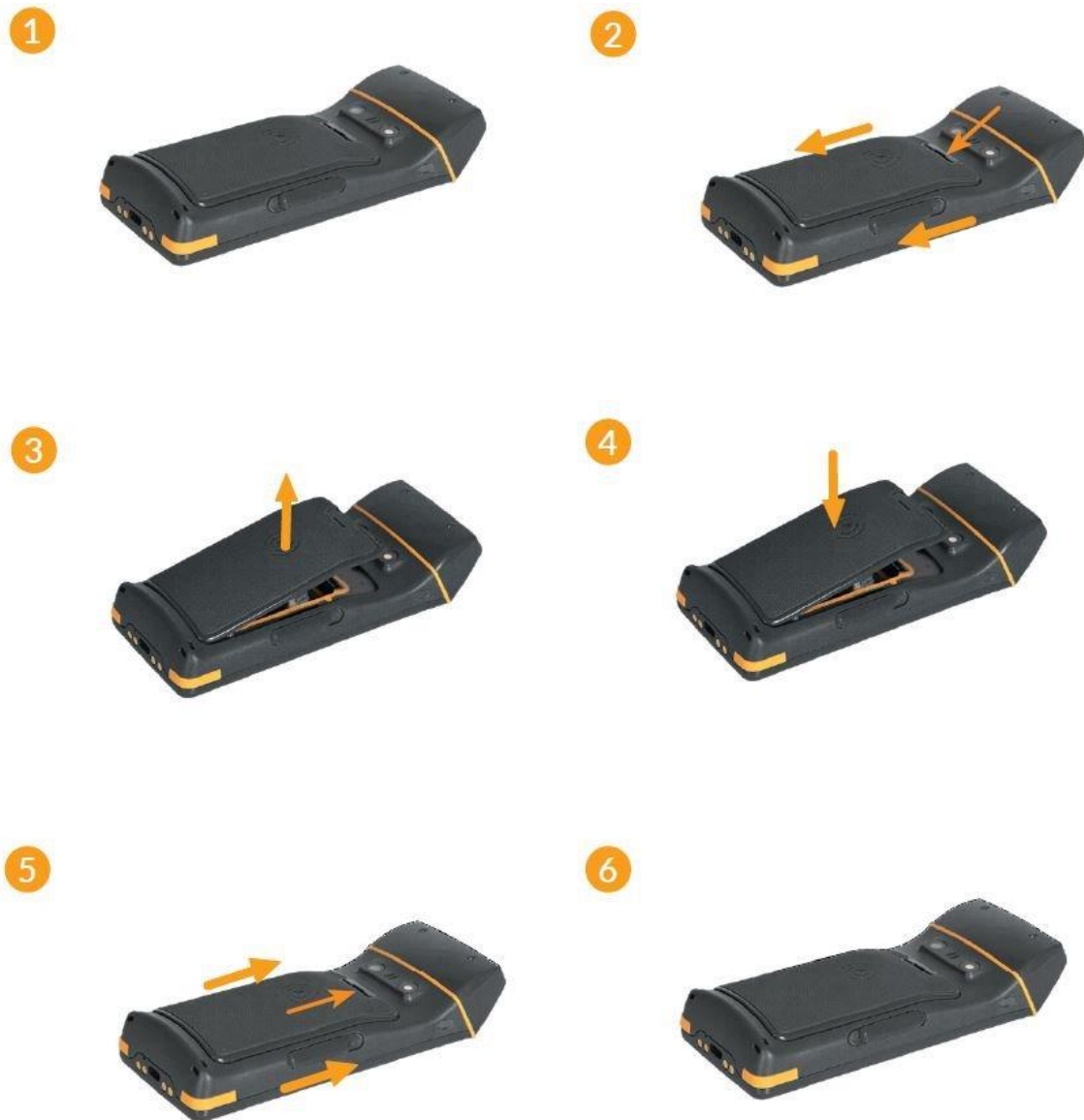
CODE	DESCRIPTION
ACN00190	HH83 Desktop Charger Kit EU
ACN00191	HH83 Desktop Charger Kit UK
ACN00192	HH83 Desktop Charger Kit US
ACN00193	HH83 4-Bay Desktop Charger Kit EU
ACN00194	HH83 4-Bay Desktop Charger Kit UK
ACN00195	HH83 4-Bay Desktop Charger Kit US
ACN00180	HH83 Spare Battery 6700mAh with Cover
ACN00181	HH83 Spare Battery 3350mAh with Cover
ACN00182	HH83 USB Type-C-to-Ethernet Adapter
ACN00183	Wall adapter QuickCharge3 USB Type-C kit, EU UK US
ACN00205	HH83 Belt Holster

1.4. INBOX CONTENT

Nordic ID HH83 inbox contains following items

- Nordic ID HH83 device
- Changeable battery (pre-installed inside Nordic ID HH83 unit).
 - 6700mAh battery included in Nordic ID HH83 RFID ACD variants
 - 3350mAh battery included in Nordic ID HH83 Barcode variants
- Wrist strap
- Safety and regulations card

1.5. REMOVING AND INSTALLING THE BATTERY

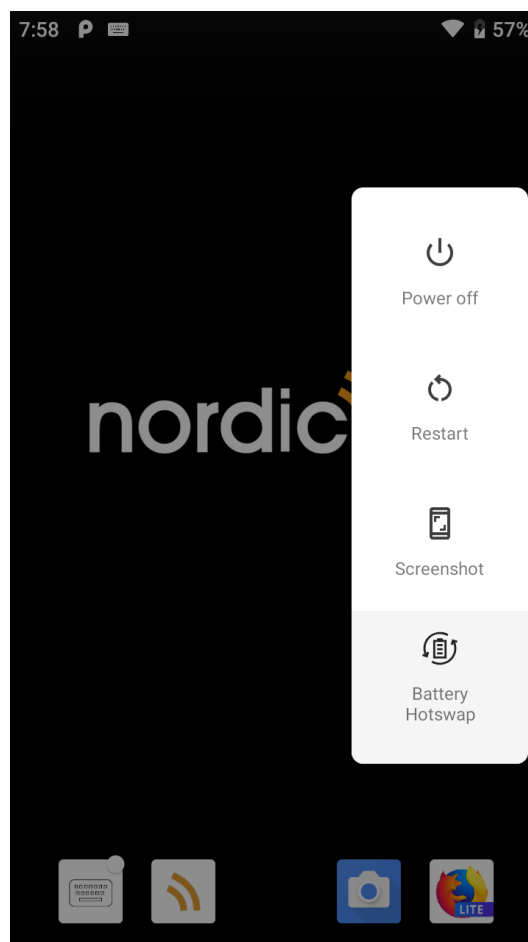


Picture 2 Removing and installing battery

1.5.1. BATTERY "HOT SWAP"

The Nordic ID HH83 provides a battery "hot swap" functionality which the user can activate from the Android "power off" menu (displayed when Power button is pressed during 1 second). This feature allows removing a (discharged) battery and installing a fully charged one in a matter of seconds, thus allowing a larger usage time of the device when having extra batteries for replacement.

When selecting "Battery Hotswap", the device will go to sleep mode and, after waiting for a short vibration, then the user can swap the battery without losing any data, as the device will not reboot or power off as it would do without "hot swap" support.



1.6. CHARGING

1.6.1. NORDIC ID HH83 CHARGING

The Nordic ID HH83 can be charged via desktop or USB-C charger. The USB charger needs to have a USB-C connector and preferably support for Quick Charge 3.0. Charging time from 0 – 100 % via the desktop and Quick Charge 3.0 USB charger is about 4 h for both Nordic ID HH83 Barcode and RFID ACD variants.

The status LED on the unit shows the charging progress, as explained in section 1.8.2: while charging, the status LED is red when battery level is below 15%, yellow when it's between 15% and 90% and green when it's above 90%.



Picture 3 Charging of the Nordic ID HH83 via USB charger

NOTE! The USB-C and desktop chargers are sold separately by Nordic ID.

1.6.2. BATTERY CHARGING USING DESKTOP CHARGER

Both the battery in the Nordic HH83 plus a spare battery can be charged simultaneously in the desktop charger. This means that when using the Nordic ID HH83 4-Bay Desktop Charger, four Nordic ID HH83 devices plus four extra batteries can be charged at the same time, i.e., eight batteries.



Picture 4 Nordic ID HH83 single Desktop Charger and 4-Bay Desktop Charger

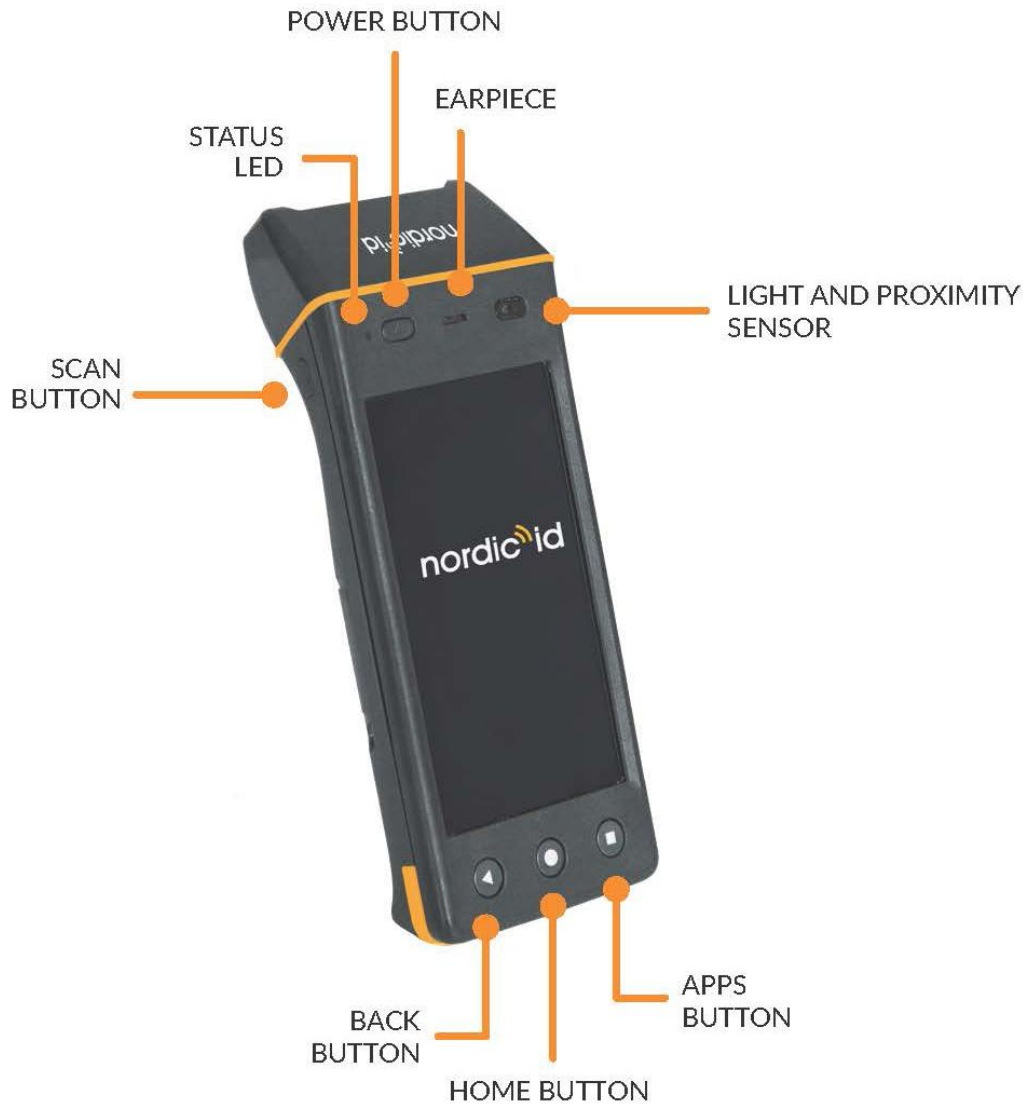


Picture 5 Features of Nordic ID HH83 Desktop Charger

The behavior (color) of the LEDs depends on how the main Nordic ID HH83 unit is being connected (using the USB-C port) to external devices or network and whether an extra battery is being charged or not:

- Power status LED
 - Green when the desktop charger is connected to power
- Communication mode LED
 - Off when there is nothing connected to USB-C port
 - Green when the Nordic ID HH83 unit is in client mode (e.g., connected to a computer via USB)
 - Blue when the Nordic ID HH83 unit is in host mode (e.g., connected to a network using USB to Ethernet adapter)
- Extra battery status LED
 - Red when a Nordic ID HH83 battery is being charged
 - Green when a Nordic ID HH83 battery is fully charged

1.7. FEATURES OVERVIEW



Picture 6 Nordic ID HH83 keys and user interface (front side)

The three buttons below the screen map the typical on-screen Android buttons.



Picture 7 Features of Nordic ID HH83 (back side)

The variant shown in Pictures 6 and 7 is Nordic ID HH83 Barcode. Keys and user interactions are the same in Nordic ID HH83 RFID ACD, expect:

- Nordic ID HH83 RFID ACD does not build a ToF sensor.
- Module containing the barcode scanner also builds the RFID UHF reader and antenna.

1.8. USING THE READER

1.8.1. BUTTONS

The Nordic ID HH83 includes six physical keys for user interactions. Location of the keys can be seen in the Picture 6.

Both Nordic ID HH83 Barcode and RFID ACD variants include two side keys for triggering UHF RFID and/or barcode reading, allowing usage with both right and left hands.

1.8.1.1. SCAN BUTTONS

The trigger (SCAN) buttons are in Nordic ID HH83 on both sides of the device. 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! By default, side buttons in Nordic ID HH83 don't wake up the reader if sleeping.

Scanning is the default behavior of these side keys when using Nordic ID applications such as Nordic ID RFID Demo, Nordic ID Keyboard Wedge or Nordic ID Radea Mobile Client.

The scan buttons information (status) is also available for 3rd party applications via the Android API, as a push or release event, so that their behavior can be customized.

1.8.1.2. POWER KEY

Power key turns the device On/Off. The power key can be used also to wake the device up if it's sleeping and displaying the "Power off" menu if the key is pressed continuously for 1 second. When pressing the power key continuously for 10 seconds, the device will reboot immediately.

1.8.1.3. HOME KEY

▣ Home key will show the menu of Android OS and/or application if supported by the view/application or move back to the home screen from any application.

1.8.1.4. BACK KEY

◀ Back key equals to tapping a "Return" or "Previous" button in any application. It behaves as the "back" Android button.

1.8.1.5. APPS TASK MANAGER KEY

▣ Apps key will show the task manager of Android OS. It behaves as the "apps" Android button.

1.8.2. STATUS LED

Whilst the Nordic ID HH83 is being charged, using either the USB-C charger or the Nordic ID HH83 desktop charger, the status LED indicates the charging progress, i.e. battery level, of the device:

- red when battery level is below 15%
- yellow when it's between 15% and 90%
- green when it's above 90%

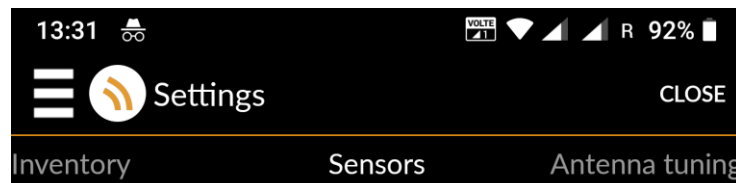
1.8.3. SENSORS

The Nordic ID HH83 includes several sensors which can be seen in the Pictures 6 and 7.

1.8.3.1. TOF SENSOR

The ToF sensor is located on the top front side of the Nordic ID HH83 Barcode device, by the barcode scanner. It is used to trigger barcode scanning instead of using the Scan button. ToF mode is disabled by default. When enabled, the ToF sensor sends an artificial light signal. Barcode scanning is automatically performed while any item interrupts this signal, e.g., an object finger is placed in front of the sensor at a given (customizable) distance.

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



Enable ToF

When ToF enabled, inventory or barcode scanning in this demo started automatically when a readable object near ToF sensor. (I/O state goes to 1)

Range threshold (mm)

80

Set

Range: 97 mm

I/O State: 0

1.8.3.2. LIGHT AND PROXIMITY SENSOR

The light and sensors are located on the front side of the device, by the ear speaker.

The light sensor is used to adjust the brightness of the screen according to the ambient light (if the display brightness level is set to adaptative).

The proximity sensor detects when you have the phone up to your ear, so that touchscreen is switched off to prevent accidental tapping.

1.8.3.3. NFC READER

An NFC reader is located on the back side of the Nordic ID HH83. NFC antenna is indicated with a ((waves)) icon.

Multiple NFC standards are supported, proximity and vicinity, which makes Nordic ID HH83 also compliant with existing NFC Android apps.

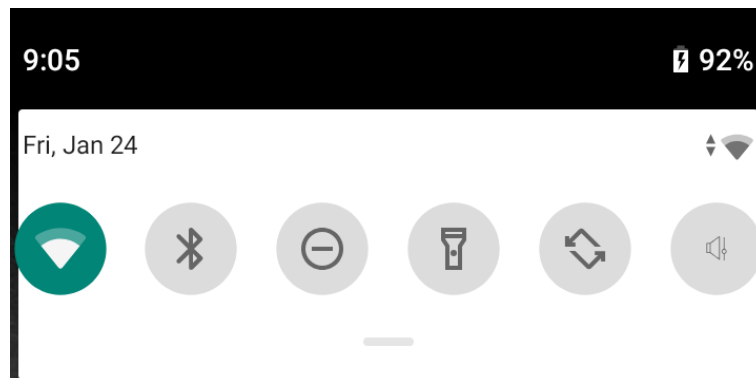
The Nordic ID RFID Demo app can also be used to read NFC tags and get basic information.

1.8.4. VOLUME

The Nordic ID HH83 has a speaker and an earpiece, which volume can be adjusted as typically done in Android devices.

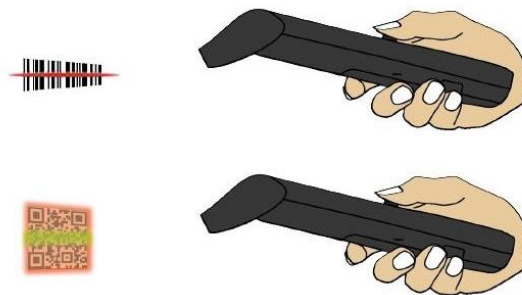


The Nordic ID HH83 does not have physical volume control buttons. To change the volume of the audio, you can use the shortcut at the dropdown notification menu.

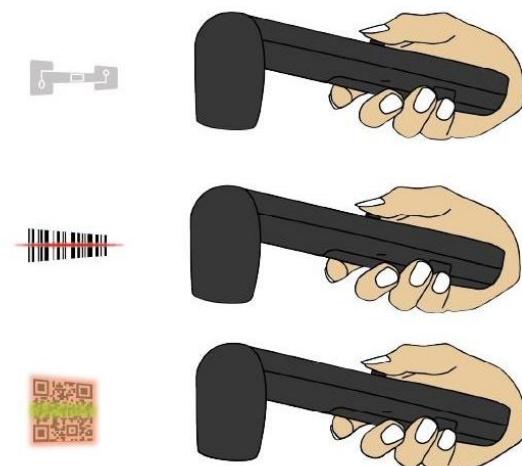


1.8.5. SCANNING DIRECTIONS

To get maximum reading performance, Nordic ID HH83 reader must be handled by following these pictures showing ergonomic and easy way to hold and use the device:



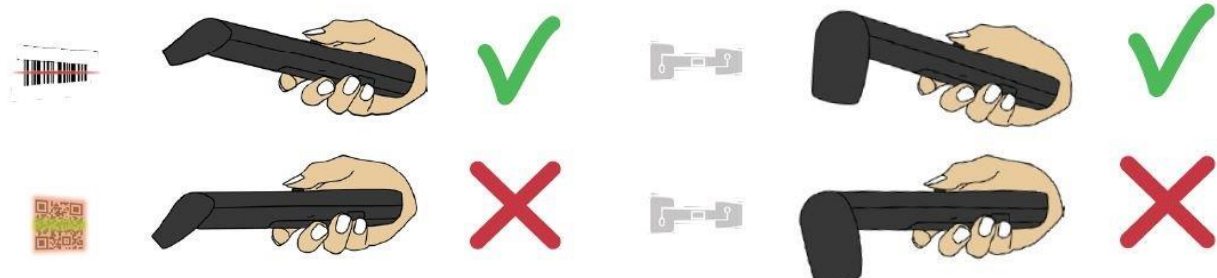
Picture 8 Scanning direction with Nordic ID HH83 Barcode



Picture 9 Scanning direction with Nordic ID HH83 RFID ACD

NORDIC ID HH83 BARCODE

NORDIC ID HH83 RFID ACD



Picture 10 Correct grip of Nordic ID HH83 variants

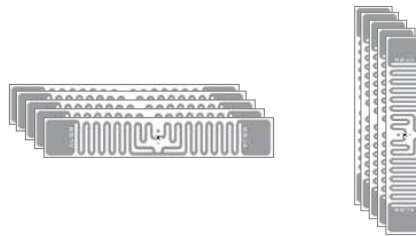
1.8.6. NORDIC ID HH83 RFID ACD VARIANT

Nordic ID HH83 RFID ACD includes Advanced Cross Dipole antenna that includes SW controllable (via Nordic ID RFID demo application and NUR API) antenna polarizations (vertical and/or horizontal), enabling a nominal reading distance is about 15 m / 50 ft.

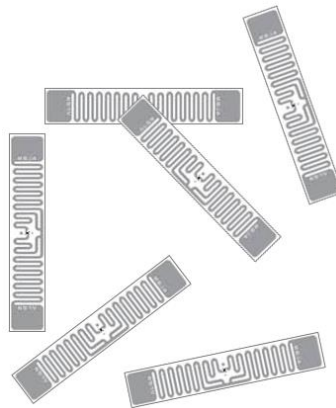
NOTE! The reading range depends on used tag and environment

The linear antenna modes (only one antenna is enabled) are intended for long range reading when tag density is high, and tags are in horizontal or vertical position (picture 11).

Enabling both linear antennas provides a lower reading speed but it does provide the best reading performance when tags are in random positions (picture 12).



Picture 11 RFID tags in horizontal and vertical alignment



Picture 12 RFID tags in random alignment

1.8.7. 2D IMAGER

This section describes methods for configuring 2D imager of Nordic ID HH83. The 2D imager module in use is Opticon MDI-4100 2D scan engine.

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

1.8.7.1. USING CONFIGURATION BARCODES

The easiest way to configure 2D imager is to read a configuration code with the 2D imager. Please use Opticon's online configuration tools to create a configuration barcode and print it onto paper. Then scan the code with the 2D imager of Nordic ID HH83 and new settings will be set and saved automatically.

Quick Instructions to generate imager configuration barcodes:

1. Opticon's online configuration tools: <http://opticonfigure.opticon.com/>
2. Select "Browse" in the left corner of the page
3. Select "Code options"
4. Select "Settings of readable codes"
5. Select "Enabling of readable codes"
6. Select a barcode from the list e.g. Code 39
7. Press "Add" button at the bottom
8. From right corner of the page, select "Barcode Type": e.g. PDF417
9. You can adjust the size of the code from the "Barcode Size"
10. Select "Advanced" from the lower part of the right column
11. The "2D code" field indicates the corresponding configuration string.

Find example configuration barcodes below. More configuration barcodes can be found at 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@

1.8.7.2. 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 instead of graphic barcodes when you select "Enabling a single readable code" instead of "Enabling of readable codes" in step 4. 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@"
```

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 2.5.2 for more information.

1.8.7.3. 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 non-volatile memory of imager.

```
//SAVE CONFIGURATION TO IMAGER MEMORY  

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

1.9. RF PROFILES

Nordic ID HH83 includes Nordic ID NUR2-1W UHF RFID module which 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 HH83. Nordic ID provides the SDK along with the examples through the GitHub. The Nordic ID HH83 supports powerful NUR API so developers can use familiar NUR API for application development.

Some pre-installed applications are delivered together with Nordic ID HH83 to quickly start evaluating and using the device. It also allows installation of 3rd party applications for unlimited use cases.

2.1. NORDIC ID RFID APPLICATIONS

Nordic ID provides following feature rich yet easy-to-use applications for Nordic ID HH83.

The applications are pre-installed on Nordic ID HH83 and shortcuts added to home screen by default.



2.1.1. NORDIC ID RFID DEMO FOR ANDROID



The Nordic ID RFID Demo application for Android is a full featured application to perform different functionalities with Nordic ID HH83 and all the others Nordic ID devices supporting Android OS.



Inventory



Locate



Write



NFC



Barcode



Settings



Nordic ID RFID Demo application can be used for testing the capabilities of compatible Nordic ID devices and how the various RFID settings affect the reading performance.

Nordic ID RFID Demo application enables different key features:

- RFID Inventory (EPC, TID and user memory) **
- Locate an RFID tag with a given EPC **
- Write RFID tag **
- Read NFC tag */**
- Barcode scanning */**
- Firmware update */**

* Available in Nordic ID HH83 Barcode variant

** Available in Nordic ID HH83 RFID ACD variant

2.1.2. NORDIC ID WEDGE SERVICE



Nordic ID Wedge Service application provides wedge functionality for Nordic ID HH83, so that the code of the RFID tags and barcodes scanned are typed as a keyboard input.

We suggest enabling the “Automatic start” function of NUR Wedge Settings in Nordic ID HH83 Barcode variant, if you are not using an app which was developed using the NUR API. That way, any existing 3rd party application (text editors, spreadsheets, web forms, etc) can straightaway use the barcode scanning as a keyboard input.

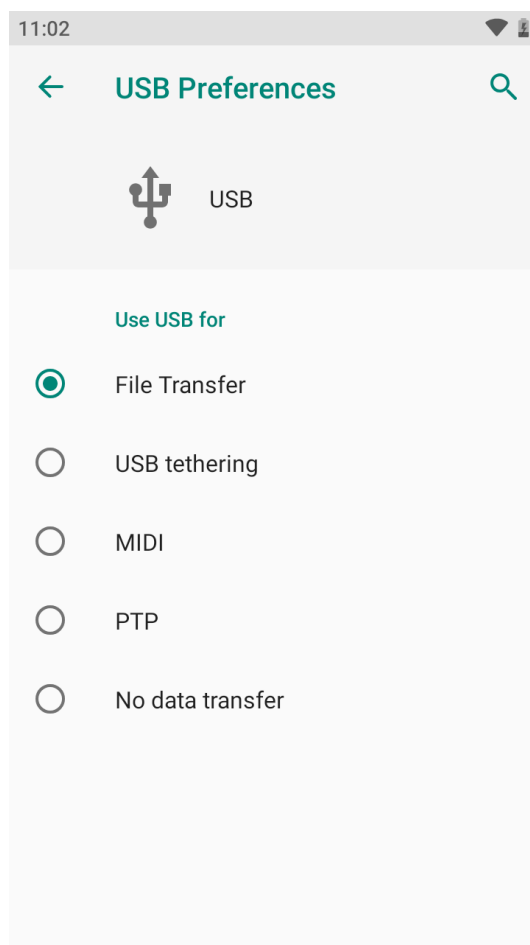
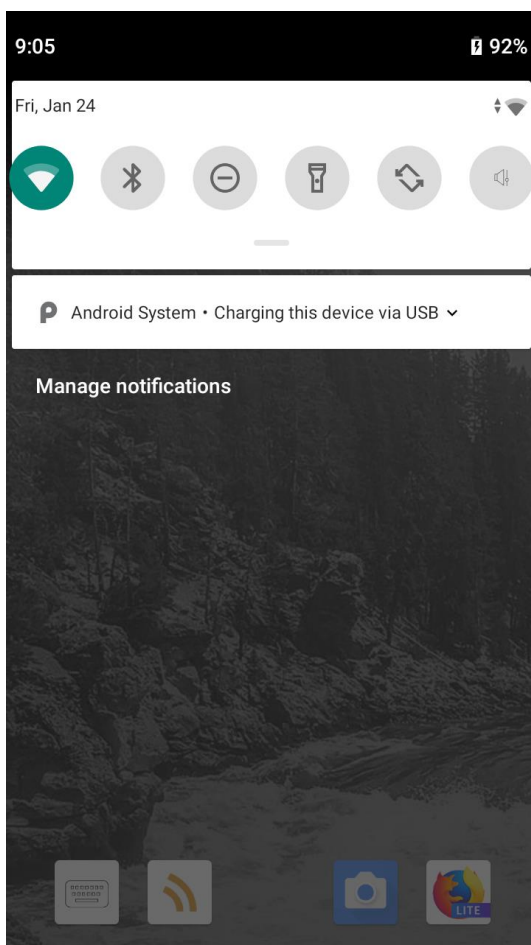
2.2. INSTALLING 3RD PARTY APPLICATIONS



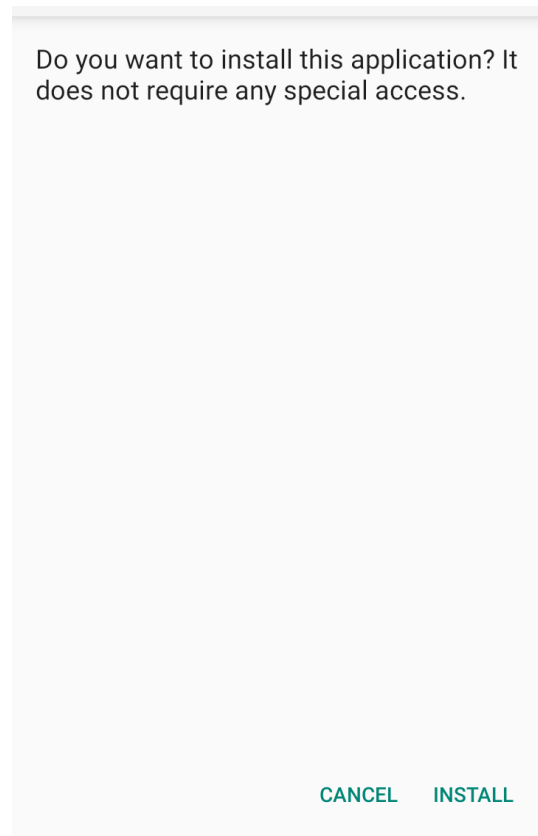
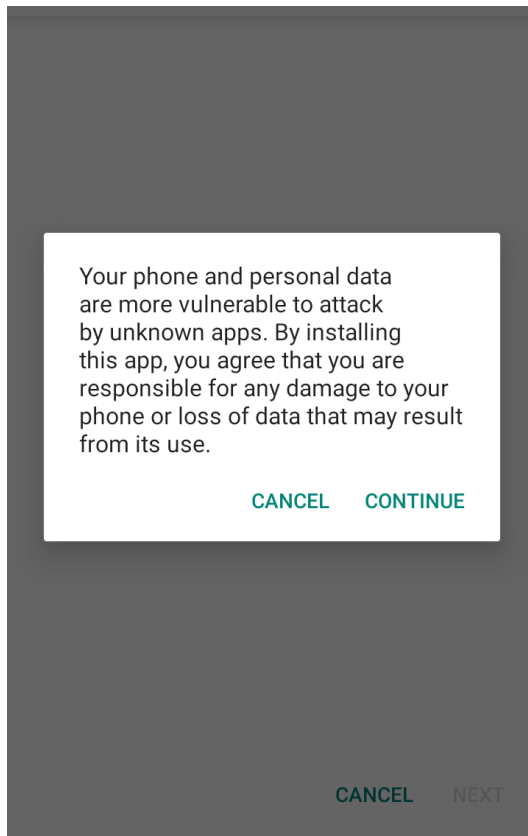
A 3rd party Android app can be installed in the Nordic ID HH83 device, just by copying the APK installation file to the device and launching it using the Files app.

In order to copy a file to the Nordic ID HH83 device, please follow these instructions:

1. Connect the Nordic ID HH83 to your computer using a USB cable
2. “Tap for more options” in the drop-down USB notification, and then select “File Transfer”



3. You will now be warned about unknown apps, potential attacks and app permissions requests. Please make sure that you are installing a safe and known app before accepting both prompts.

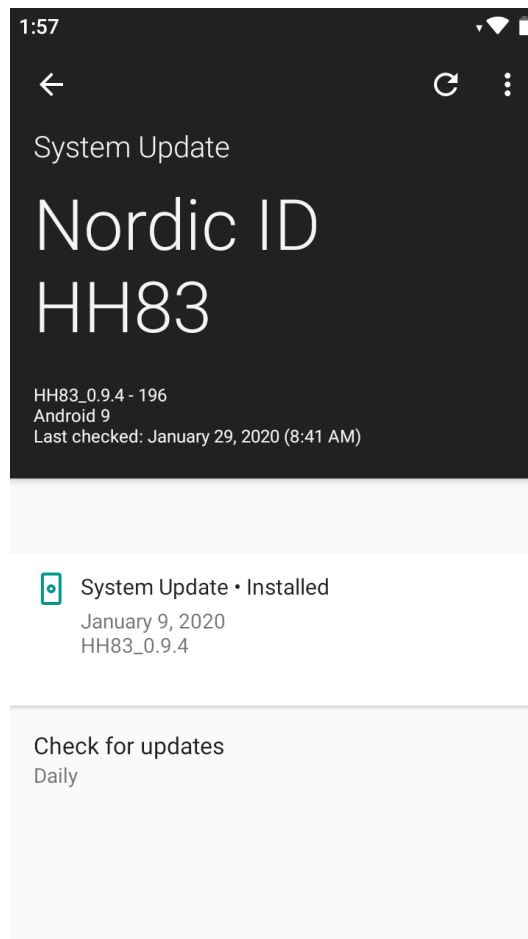


2.3. UPDATE INSTRUCTIONS

Android OS and Nordic ID HH83 drivers/firmware can be updated by following these steps:

1. Connect to the Internet using WLAN, LTE or the desktop cradle with Ethernet adapter.
2. Open Settings menu (Android menu, not Nordic ID RFID Demo settings).
3. Select "System" → "Advanced" and tap "Additional system updates"
4. Then tap the circular refresh arrow on top right to check for an available update and download it from the Internet.

Instead of manual checking, you can also enable an automatic update checking every day, week, 2 weeks or month.



2.4. BACKUP AND RESTORE CONFIGURATION

The settings in the Nordic ID HH83 can be exported to a file, which can later be imported in the same or another Nordic ID HH83 unit to apply the same settings. This enables an easy mass configuration and roll out of Nordic ID HH83 devices.

2.4.1. CREATE BACKUP

In order to create a configuration backup, please go to
Settings → System (Advanced) → Backup → Create Backup

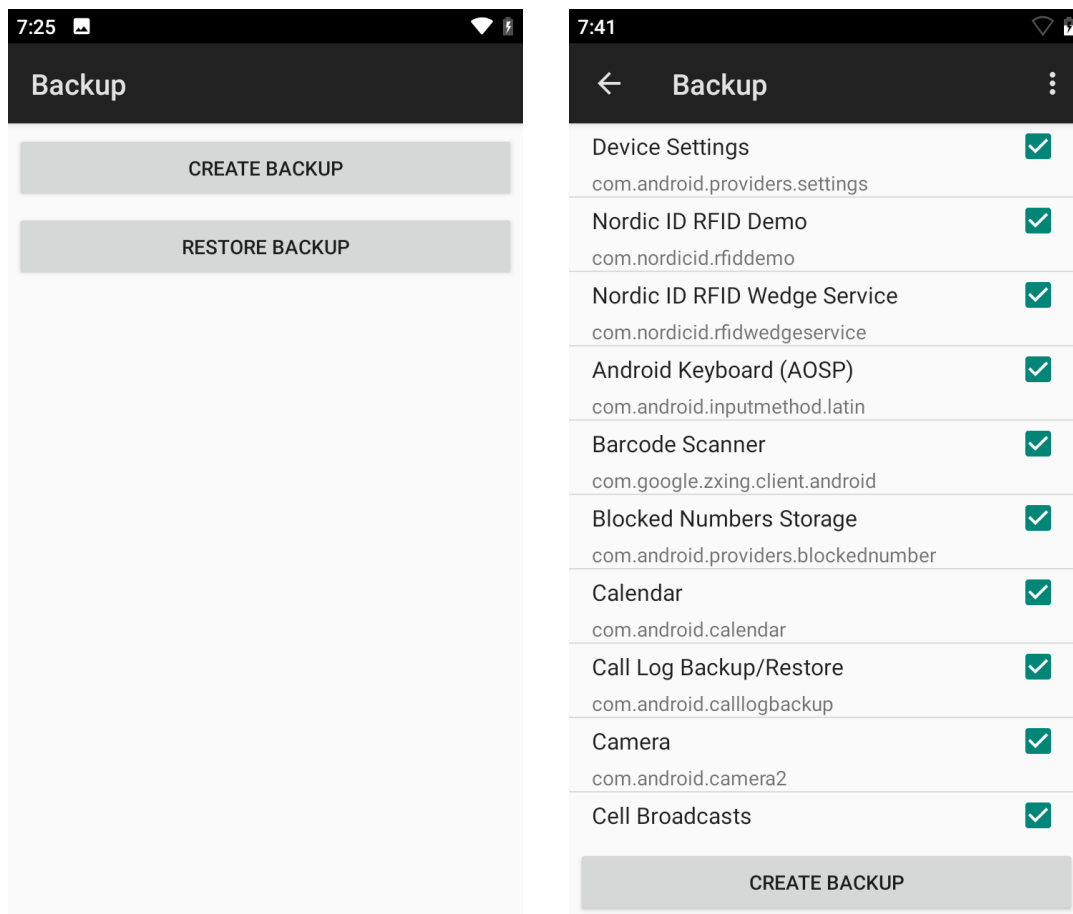
These settings include e.,g. home screen shortcuts and widgets, WLAN configuration, apps settings.

NOTE! The backup does not include any installed app or files

2.4.2. RESTORE BACKUP

In order to restore a configuration backup, please go to
Settings → System (Advanced) → Backup → Restore Backup
 and select the backup file to restore.

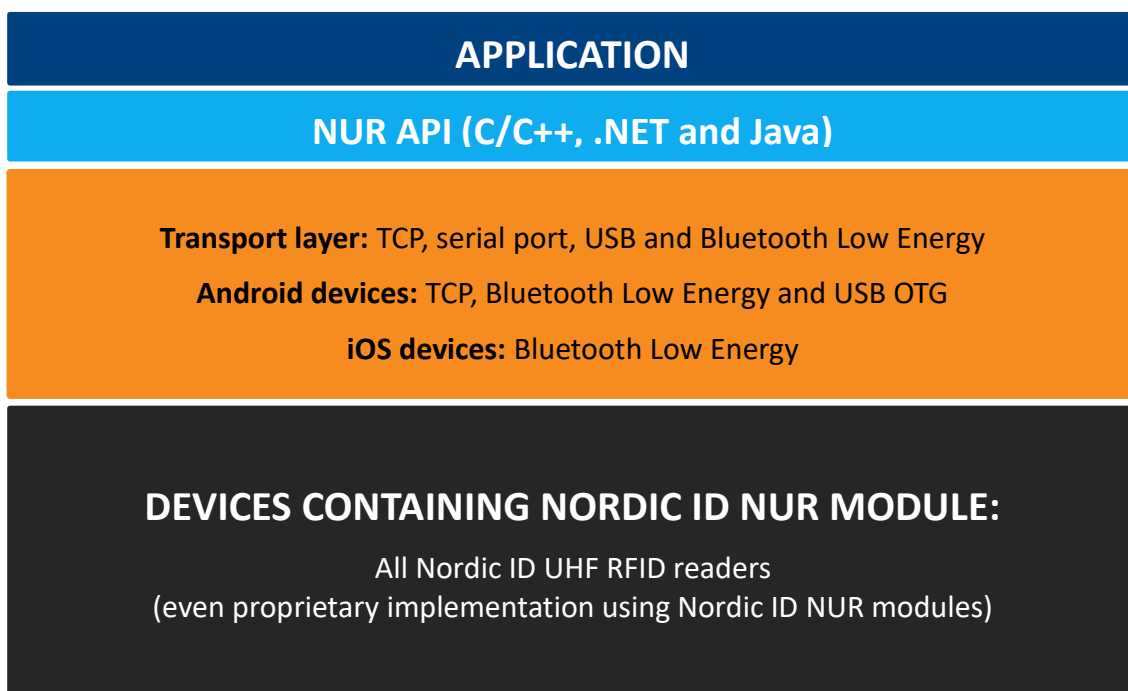
If the backup file is renamed to "auto_restore_backup" and saved in the root folder of a USB flash drive, the restore process will start automatically when you attach the USB drive to a Nordic ID HH83.



2.5. APPLICATION DEVELOPMENT

2.5.1. 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 13.



Picture 13 NUR API architecture

2.5.2. APPLICATION DEVELOPMENT

Nordic ID provides Software Development Kits (SDK) and code samples via GitHub. More information including source code and samples can be found from GitHub via following link:



Android

https://github.com/NordicID/nur_nurapi_android

https://github.com/NordicID/nur_nurapi_android

https://github.com/NordicID/nur_tools_rfiddemo_android

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 HH83 datasheet
- Nordic ID HH83 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.

Nordic ID Group

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8. VERSION HISTORY

<u>Version</u>	<u>Date</u>	<u>Modifications</u>
1.0	22.08.2019	The first version
1.1	31.01.2020	Added Android screenshots, desktop charger description, ToF sensor, volume, backup option, new pictures and holster accessory

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



Codabar



Industrial 2 of 5 / Interleaved 2 of 5

