2018-06-25
Nordic ID HH53 User Guide
Version 1.0

NORDIC ID HH53

USER GUIDE

TABLE OF CONTENTS

1. GETTING STARTED

1.1. GENERAL

Nordic ID HH53 is an ideal contemporary data collection tool. It consists of a mobile computer equipped with Android OS, a Gorilla Glass 2 touchscreen, and a high-performance RAIN RFID reader to perform quick, accurate and reliable inventories. Nordic ID HH53 integrates the new Nordic ID NUR2-1W module which provides state-of-the-art UHF RFID reading performance.

1.2. VARIANTS

1.2.1. NORDIC ID HH53 VARIANTS

The Nordic ID HH53 is available in 7 different variants that are

CODE	FREQUENCY	ACD	2D IMAGER	3G
HTG00037	868MHz (ETSI)	Yes	Yes	Yes
HTG00052	868MHz (ETSI)	Yes	No	Yes
HTG00036	868MHz (ETSI)	Yes	Yes	No
HTG00051	868MHz (ETSI)	Yes	No	No
HTG00038	915MHz (FCC)	Yes	Yes	No
HTG00053	915MHz (FCC)	Yes	No	No
HTG00054	868MHz (ETSI)	No	No	Yes

Picture 1 Nordic ID HH53 UHF ACD and Nordic ID HH53 UHF variants

1.3. AVAILABLE ACCESSORIES

CODE	DESCRIPTION
ACN00155	Nordic ID Medea, EXA51e and HH53 DTC, Desktop charger kit with spare Battery charging slot, DC USB out, EU/UK/US/CN Including: Desktop Charger, Universal (AC) wall power supply
ACN00146	Nordic ID Medea (for DTC only) & Morphic & Sampo, Universal (AC) wall power supply (EU, UK, US and CN)
CWH00036	Nordic ID Medea Micro-USB cable for device and desktop charger
BAR00017	Nordic ID Medea and HH53 Standard lithium polymer battery >3500 mAh (NOTE: Not suitable for Nordic ID Medea ACD and Nordic ID HH53 ACD)
BAR00020	Nordic ID Medea, EXA51e and HH53 Double capacity lithium polymer battery 7000 mAh (NOTE: Suitable only for Nordic ID Medea ACD, Nordic ID EXA51e and Nordic ID HH53 ACD)
ACN00148	Nordic ID Medea and HH53 protective cover (includes device cover), orange
ACN00149	Nordic ID Medea and HH53 protective covers for ACD variant (includes device and ACD antenna covers), orange
ACN00150	Nordic ID Medea and HH53 protective cover (includes device cover), black
ACN00151	Nordic ID Medea and HH53 protective covers for ACD variant (includes device and ACD antenna covers), black

1.4. INBOX CONTENT

Nordic ID HH53 inbox contains following items

- Nordic ID HH53
- Battery
- Safety and regulations guide

1.5. INSTALLING BATTERY

Picture 2 Installing battery

1.6. CHARGING

1.6.1. NORDIC ID HH53 CHARGING

The Nordic ID HH53 can be charged via desktop or USB charger. Maximum charging power via the desktop charger is 10W (5V @ 2A). The USB charger needs to have a micro USB connector and recommended charging power is 10W (5V @ 2A). Charging time from 0 – 100% via the desktop and 10W USB charger is about 3h for Nordic ID HH53 and 6h for Nordic ID HH53 UHF RFID ACD.

Picture 3 Charging of the Nordic ID HH53 via desktop charger

Picture 4 Charging of the Nordic ID HH53 via USB charger

NOTE! The desktop charger is sold separately by Nordic ID.

1.6.2. BATTERY CHARGING

Battery or spare battery of the Nordic ID HH53 can be charged in the desktop charger. Please note that when USB charging from the desktop charger is used, spare battery charging of the desktop charger is disabled. Please find more information about the battery charging from the Picture 6.

Picture 5 Battery charging in desktop charger

1.7. FEATURES OVERVIEW

Picture 6 Key features of Nordic ID HH53

1.8. USING THE READER

1.8.1. BUTTONS

The Nordic ID HH53 includes five physical keys for user interactions. Location of the keys can be seen in the .

Nordic ID HH53 UHF RFID variant includes also two side keys for triggering UHF RFID and/or barcode reading whereas Nordic ID HH53 UHF RFID ACD variant contains a pistol grip which includes a trigger button instead of the side buttons.

1.8.1.1. TRIGGER BUTTONS

The trigger (SCAN) buttons are in Nordic ID HH53 UHF RFID variant on the front part below the display and the side of the reader.

The trigger buttons are in Nordic ID HH53 UHF RFID ACD variant on the front part below the display and the pistol grip.

Trigger buttons can be used to start/stop UHF RFID/barcode scanning and waking reader up if it's sleeping (**side buttons in Nordic ID HH53 UHF RFID variant don't wake up the reader if sleeping**). When waking the reader up the trigger button needs to be pressed 0.5 seconds 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! Side buttons in Nordic ID HH53 UHF RFID variant don't wake up the reader if sleeping

1.8.1.2. POWER KEY

Power key turns reader On/Off. The power key can be used also to wake the reader up if it's sleeping and setting reader to Airplane mode if the power key is pressed continuously 2s. Pressing the power key continuously 5s reader will shut down immediately (soft reset).

1.8.1.3. MENU KEY

Menu key will show menu of Android OS and/or application if supported by the view/application.

1.8.1.4. GREEN KEY

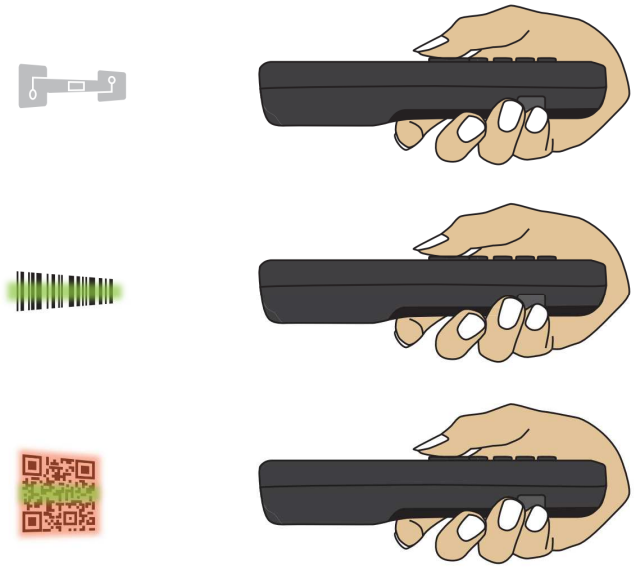
Green key doesn't have any default action. Its functionality can be customized via API.

1.8.1.5. RED KEY

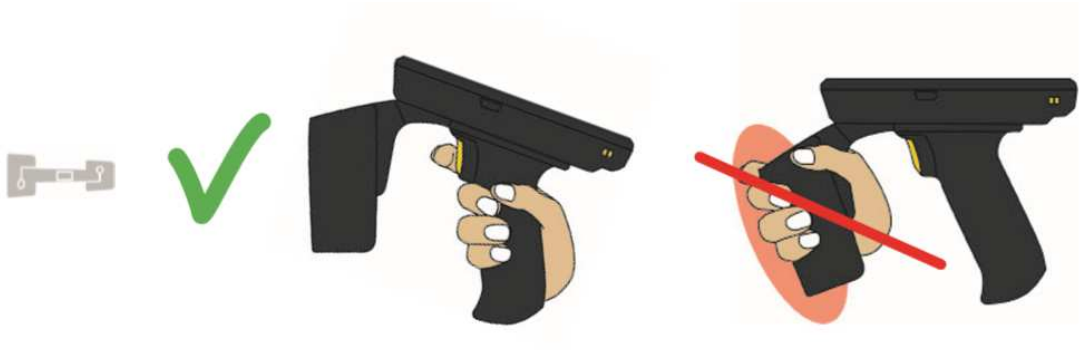
Red key acts as a normal back key in Android OS.

1.8.2. SCANNING DIRECTIONS

Two variants of Nordic ID HH53 are available with different UHF RFID antennas: ACD and linear antenna variants. To get maximum reading performance, Nordic ID HH53 reader have to be handled by following these pictures showing ergonomic and easy way to hold and use the reader:



Picture 7 Scanning direction with Nordic ID HH53



Picture 8 Correct grip of Nordic ID HH53 ACD variant

1.8.1. NORDIC ID HH53 UHF RFID VARIANT

Nordic ID HH53 UHF RFID includes linear antenna which nominal reading distance is about 1m / 3.3ft.

NOTE! The reading range depends on used tag and environment

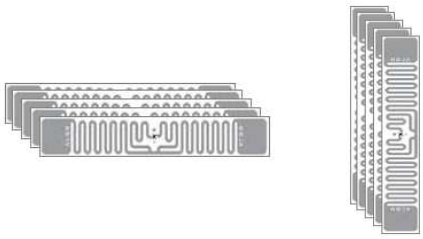
1.8.2. NORDIC ID HH53 UHF RFID ACD VARIANT

Nordic ID HH53 UHF RFID ACD includes Adaptive Cross Dipole antenna that includes four SW controllable (via Nordic ID RFID demo application and NUR API) antenna modes that are

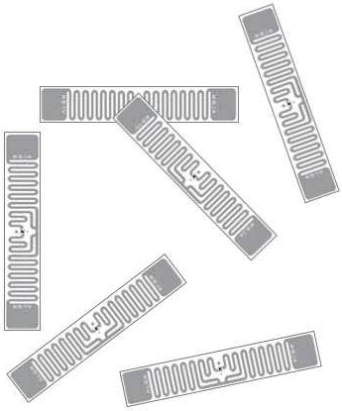
- Linear with horizontal and/or vertical polarization mode
  - Nordic ID HH53: Nominal reading distance about 10m/33ft)
- Circular polarization mode
  - Nordic ID HH53: Nominal reading distance about 6m/20ft)
- Proximity mode (reading distance down to 1cm/0.4inch)

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). 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 (). 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 9 Tags in horizontal and vertical alignment



Picture 10 Tags in random alignment

1.8.3. 2D IMAGER

This section describes methods for configuring 2D imager of Nordic ID HH53. 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

1.8.3.1. 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 HH53 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@

1.8.3.2. 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.

1.8.3.3. 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);

1.9. RF PROFILES

Nordic ID HH53 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 HH53. Nordic ID provides the SDK along with the examples through the GitHub. The Nordic ID HH53 supports powerful NUR API so developers can use familiar NUR API for application development.

2.1. NORDIC ID RFID APPLICATIONS

Nordic ID provides following feature rich yet easy-to-use applications for Nordic ID HH53. The application are pre-installed on Nordic ID Hh53.

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 also from the Google Play store.

2.1.2. 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.

GET IT ON Google Play

Nordic ID Keyboard

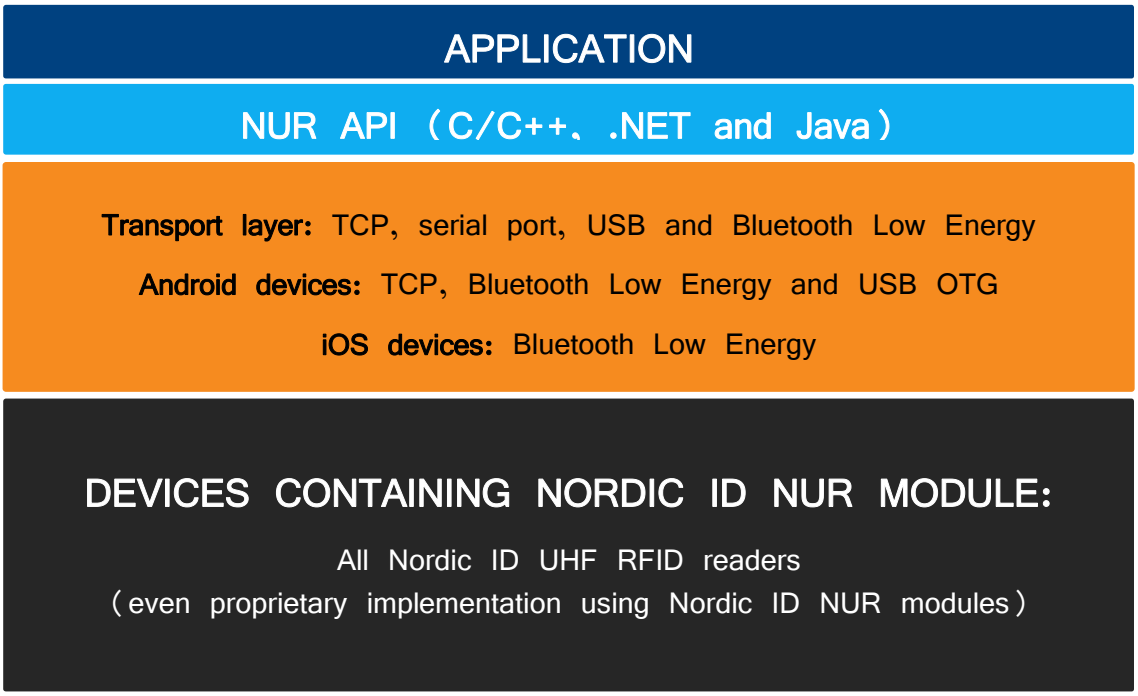
GET IT ON Google Play

Nordic ID Wedge service

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 2.



Picture 2 NUR API architecture

2.2.2. 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

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 HH53 datasheet
- Nordic ID HH53 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	25.6.2018	The first version

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