UM11136

NTAG SmartSensor getting started:
Using the one-time NFC program downloader

Rev. 2.02 — 5 November 2019   **User manual**

Document information

Information	Content
Keywords	NTAG SmartSensor, NHS3100, NHS3152, NFC, downloader
Abstract	Companion document to the NXP NTAG SmartSensor webpages. Explains how to get started using the one-time NFC program downloader.

Revision history

Rev	Date	Description
v.2	2019-08-30	Update following release of SDK 12.1
v.1	2018-07-05	first issue

1 Introduction

By default, the NHS31xx ICs mounted on the different PCBs do not contain firmware with which a particular use case can be demonstrated. Instead, they are flashed during production with the one-time NFC program downloader. Before using the PCB for demo purposes, the correct firmware application image must be downloaded in the FLASH memory of the NHS31xx chip.

This document provides QR-codes to the latest versions of the various demo firmware applications we have on offer. They can be used on the respective demo PCBs that can be obtained via www.nxp.com/NTAGSMARTSENSOR or through distributor channels.

To set up the board, follow the simple steps as described on one of these pages:

- Temperature monitoring starter kit: www.nxp.com/pages/:NHS3100
- UCODE® I^{2}C starter Kit: www.nxp.com/pages/:NHS3100UCODEADK
- Sensor board starter kit: www.nxp.com/pages/:NHS3100SENSORADK
- Therapy adherence starter kit:
  www.nxp.com/pages/:NHS3100THADADK-
  www.nxp.com/pages/:NHS3152THADADK
- General starter kit: www.nxp.com/pages/:NHS3152

Together with your NTAG SmartSensor board and this document, you can start a demo within minutes.

2   One-time NFC program downloader

Either an Android phone must be used, or an NFC dongle connected to your PC. When using your PC, you can use the Python script NFCprogramLoader.py, available in the SDK. Here, we focus on the Android phone.

2.1   Installation

Use an NFC enabled Android smartphone running 4.4 KitKat or higher.

Install the Android app *NHS31xx NFC Program Loader*. This app can be found on the Google Play Store. Scan the QR code or use this link:

https://play.google.com/store/apps/details?
id=com.nxp.nhs.dwn.nhs31xxprogramdownloader

aaa-031104

Figure 1. NHS31xx NFC program loader in the Google Play Store

2.2 Usage

When using the Android app, the NHS31xx NFC program loader, the images used for wireless download must all be in the .bin format.

2.2.1 Step 1

Scan the QR code with the Android app using the "GET FILE FROM QR" button. A list of QR codes pointing to the available application firmware files can be found in the next chapter.

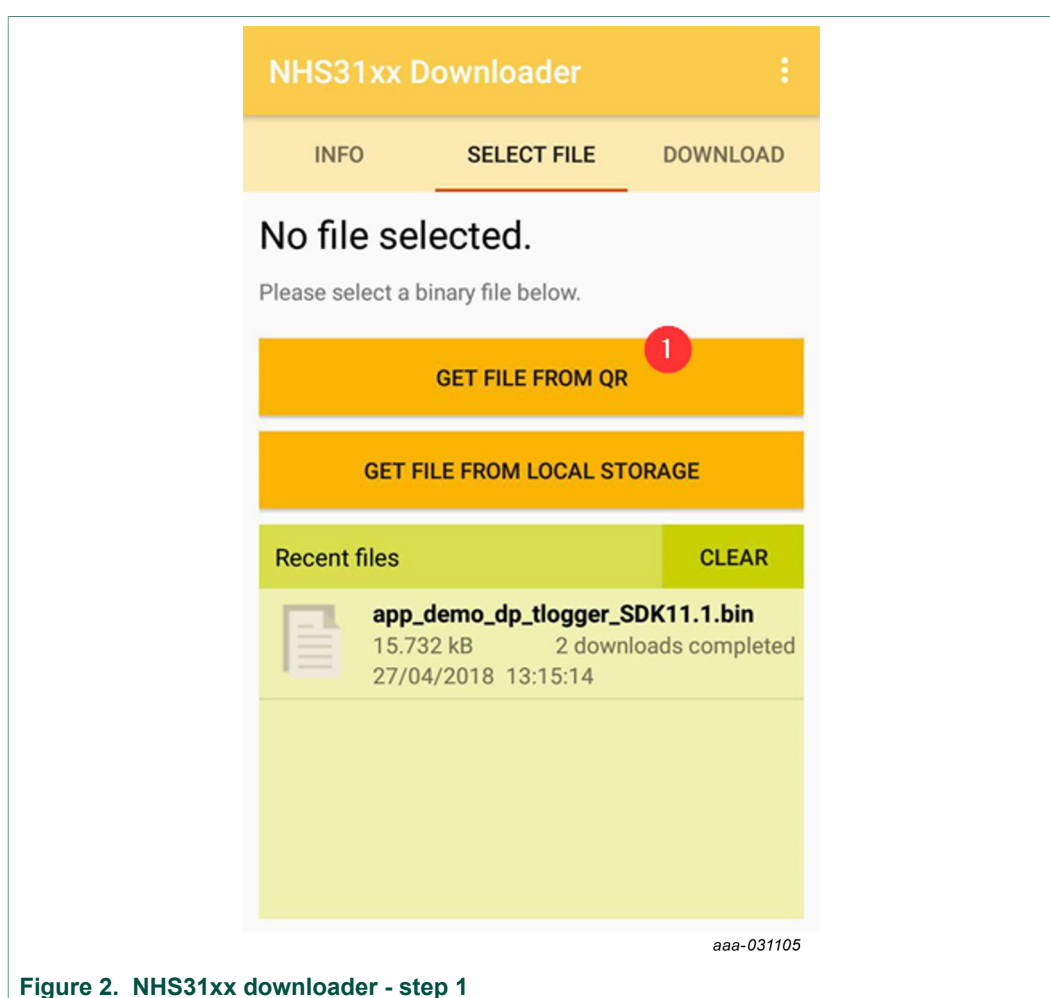**Warning**: Scan the correct QR code. Programming wirelessly can only be done once!

aaa-031105

Figure 2. NHS31xx downloader - step 1

After downloading the firmware image, the Android app automatically moves to the next tab.

2.2.2 Step 2

Bring the demo PCB in the NFC field of the phone and maintain its position. Programming starts automatically. When the operation is completed, the IC resets and runs the demo firmware immediately.

Warning: While programming is ongoing, maintain a steady position within the NFC field of the phone. If programming fails, you must move the demo PCB away from the phone, wait a few seconds, and try again.

Warning: To guarantee successful flash operations when programming wirelessly, make sure that the demo PCB contains a battery. The energy harvested from the NFC field is sufficient for application execution, EEPROM, and sensor operations. However, when changing flash contents, it may fail.
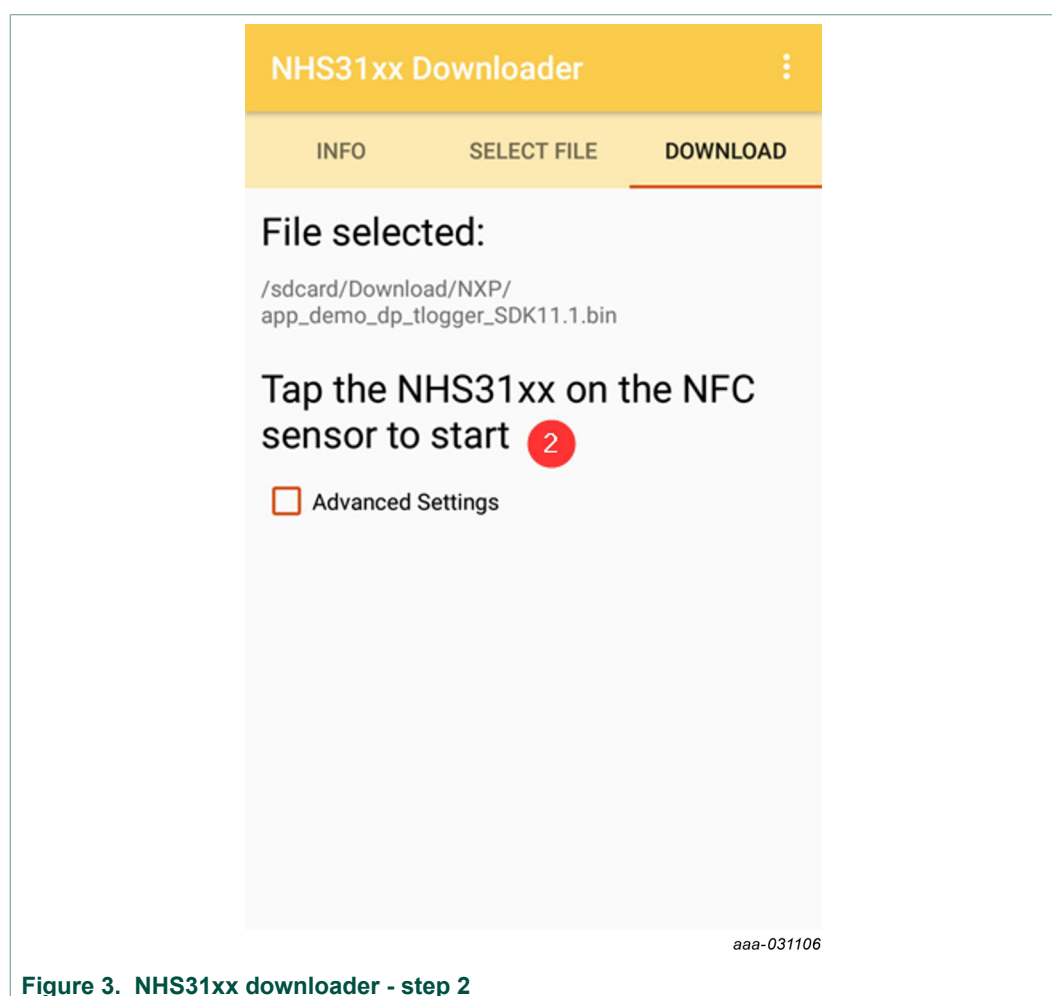

aaa-031106

Figure 3. NHS31xx downloader - step 2

3 Boards

Note: This document can be downloaded from one of the pages that can be reached through www.nxp.com/NTAGSMARTSENSOR. *Always download the most recent version of this document. Over time, the QR-codes given below may change or new ones may be added. No prior notice is given.*

3.1 NHS3100 temperature monitor board

aaa-031109

Figure 4. NHS3100TEMODB

This demo PCB is best suited to demonstrate the temperature logger demo. More information can be found at www.nxp.com/pages/:LAST-MILE-DRUG-TEMP-MONITOR.

The demo is used together with the NHS3100 Temperature Logger app, available on different platforms:

• Android: Google Play Store. Setup, status, and full data readout.
• iOS: Apple App Store. Status and full data readout via NFC.
• macOS: available in the SDK under *sw/macos/tlogger*. Setup, status, and full data readout via NFC.

The QR code below links to the binary file www.nxp.com/downloads/en/apps/app_demo_dp_tlogger.bin, to be scanned using the one-time NFC program downloader app.

Figure 5. tlogger.bin

3.1.1 Temperature URL demo

Another option is use this demo PCB passively. The temperature URL demo generates dynamically at each tap a new URL which can be read out and accessed without the need for a dedicated app.

The demo can be used with any recent phone or any PC with a USB NFC reader:

- Android: No app is required. Close all apps and use the default built-in Android handling.
- iOS: You can use the NFC TagInfo app of NXP Semiconductors or any other generic NFC app.
- macOS: a generic communication tool for NTAG SmartSensor is available in the SDK under *sw/QT/comm*.
- Win10: a generic communication tool for NTAG SmartSensor is available in the SDK under *sw/QT/comm*.

Warning: Be sure to insert a battery before the wireless download operation starts, and to remove the battery afterward. The wireless download requires a battery to guarantee successful flash operations, while the application firmware of the temperature URL demo is coded with the assumption no battery is present.

The QR code below links to the binary file, to be scanned using the one-time NFC program downloader app.
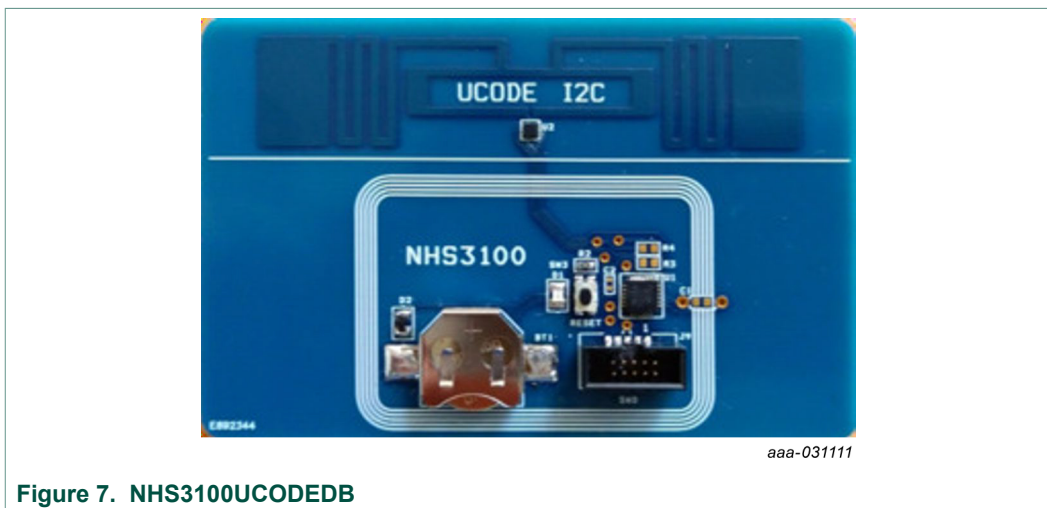
aaa-035574

Figure 6. url.bin

3.2 NHS3100 - UCODE-I2C solution board

aaa-031111

Figure 7. NHS3100UCODEDB

This demo PCB is best suited to demonstrate the temperature logger demo with logistics status reporting. It expands the temperature logger demo listed above with additional reporting via the Rain RFiD UHF interface. Host apps are available for all major platforms:

• Android: Google Play Store. Setup, status, and full data readout via NFC.
• iOS: Apple App Store. Status and full data readout via NFC.
• macOS: available in the SDK under *sw/macos/tlogger*. Setup, status, and full data readout via NFC.
  macOS: available in the SDK under *sw/QT/tloggerucode*. Status readout via UHF.
• Win10: available in the SDK under *sw/QT/tloggerucode*. Status readout via UHF.

The QR code below links to the binary file www.nxp.com/downloads/en/apps/app_demo_dpu_tloggerucode.bin, to be scanned using the one-time NFC program downloader app.

aaa-031107

Figure 8. tloggerucode.bin

UM11136

User manual **Rev. 2.02 — 5 November 2019**

10 / 18
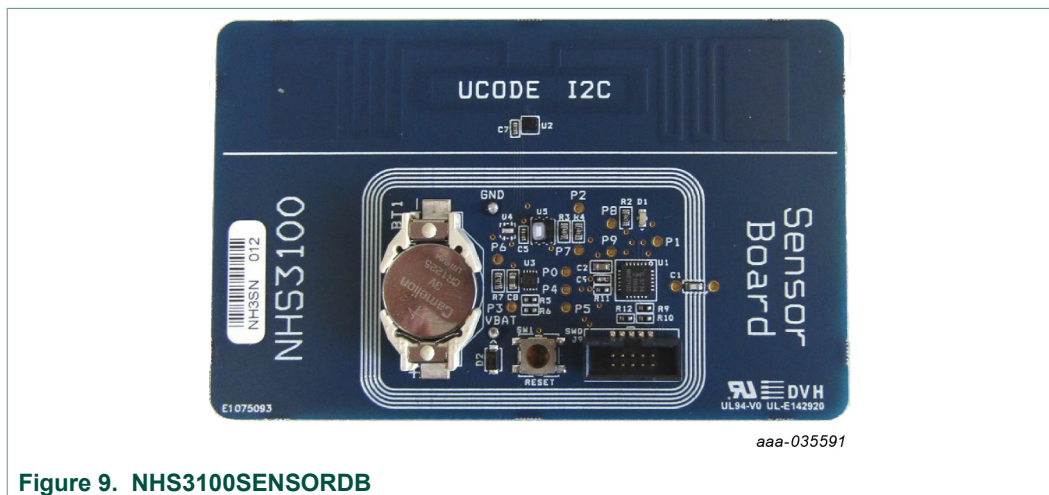
3.3 NHS3100 sensor board

aaa-035591

Figure 9. NHS3100SENSORDB

This demo PCB is best suited to demonstrate the condition monitoring demo for asset tracking. The solution combines the NHS3100 IC with the FXLS897X compact 3-axis MEMS accelerometer - used here for shock and tilt detection, the SL3S4011FHK UCODE-I2C IC and a third-party humidity sensor. More information can be found at www.nxp.com/pages/:SMART-LOGISTICS.

The demo can be operated using the Sensor board app, available on all major platforms:

• Android: Google Play Store.
• iOS: Apple App Store.
• macOS: available in the SDK under *sw/XF/Monitor*.
• Win10: available in the SDK under *sw/XF/Monitor*.

The QR code below links to the binary file www.nxp.com/downloads/en/apps/app_demo_dpahu_sensormonitor.bin, to be scanned using the one-time NFC program downloader app.

aaa-035575

Figure 10. app_demo_dpahu_sensormonitor.bin

3.3.1 Monitoring existing machinery demo

Another option is using this demo PCB for our Industry 4.0 demo. This demo is created to target a small sensor button which combines the NHS3100 IC with the FXLS897X compact 3-axis MEMS accelerometer - used here for vibration detection. More information can be found at www.nxp.com/pages/:ANOMALY-DETECTION.

This small sensor button is not publicly available, but the NHS3100 sensor board can be used instead. It features the same accelerometer and is pin-compatible.

The demo can be operated with the Sensor button app, available on all major platforms:

• Android: Google Play Store.
• iOS: Apple App Store.
• macOS: available in the SDK under *sw/XF/Monitor*.
• Win10: available in the SDK under *sw/XF/Monitor*.

The QR code below links to the binary file www.nxp.com/downloads/en/apps/app_demo_dpa_sensormonitor.bin, to be scanned using the one-time NFC program downloader app.

UM11136

User manual

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Rev. 2.02 — 5 November 2019

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12 / 18

aaa-035576

Figure 11. app_demo_dpa_sensormonitor.bin

UM11136

User manual **Rev. 2.02 — 5 November 2019**

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13 / 18

3.4 NHS3100 therapy adherence board
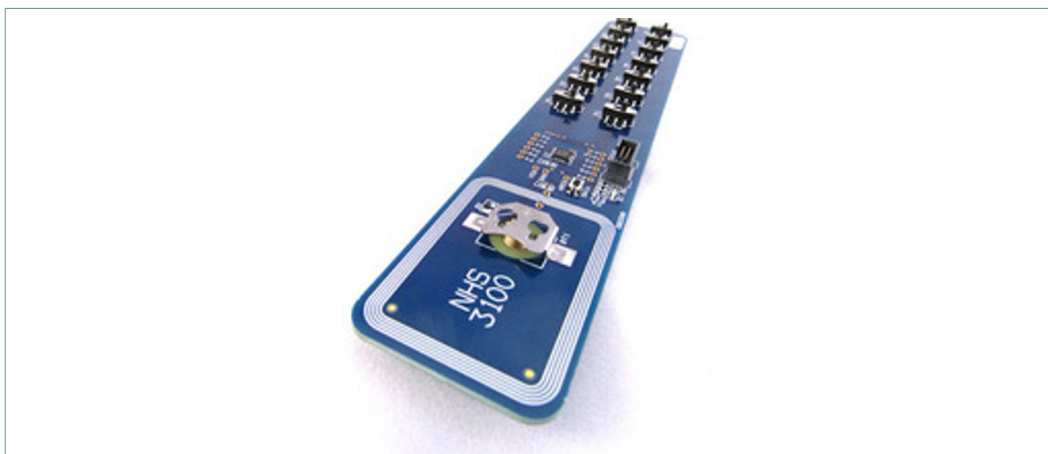
Figure 12. NHS3100THADDB

This demo PCB is best suited to demonstrate the **therapy adherence demo** (using 14 switches and 8 digital pins). More information can be found at www.nxp.com/pages/:SMART-BLISTERS.

The demo is used together with the *NXP Therapy Config* app, available in the Google Play Store.

The QR code below links to the binary file www.nxp.com/downloads/en/apps/app_demo_dp_tadherence_gpio14.bin, to be scanned using the one-time NFC program downloader app.

Figure 13. tadherence.bin (using PIOs)

UM11136

User manual **Rev. 2.02 — 5 November 2019**

14 / 18

3.5 NHS3152 therapy adherence board

aaa-031114

Figure 14. NHS3152THADDB
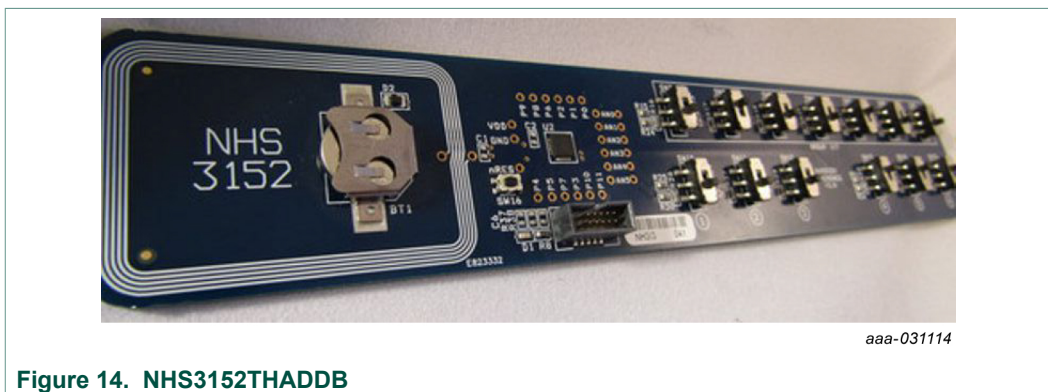
This demo PCB is best suited to demonstrate the therapy adherence demo (using 13 switches and 6 analog pins). It is used with the NXP therapy config app, available in the Google Play Store.

The QR code below links to the binary file www.nxp.com/downloads/en/apps/app_demo_dp_tadherence-resistive13.bin, to be scanned using the one-time NFC program downloader app.

aaa-031115

Figure 15. tadherence.bin (using ANAs)
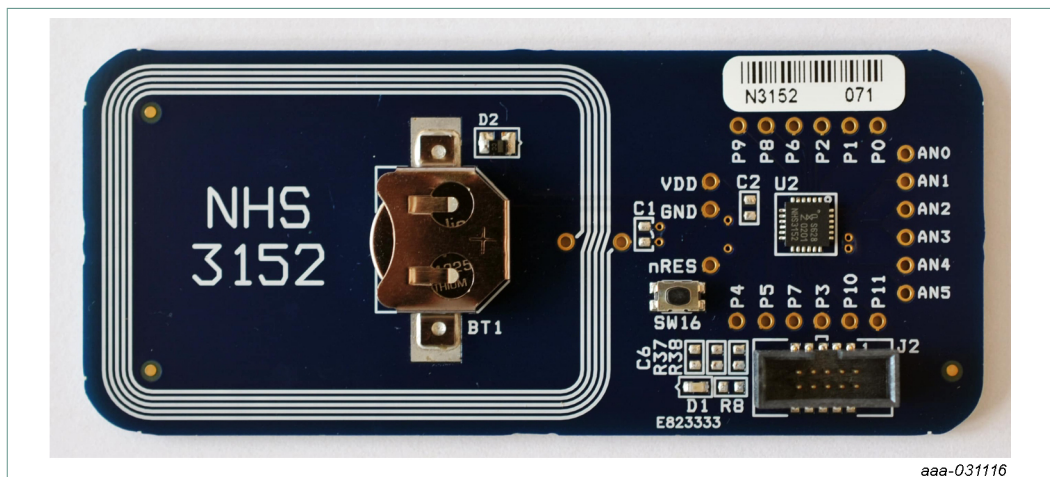
3.6 NHS3152 board

aaa-031116

Figure 16. NHS3152DB

No demo application has been created that specifically targets this board. It is intended purely as a development board, providing easy access to all pins. Use this board to integrate the NHS3152 IC with custom external components and sensors.

UM11136

User manual   **Rev. 2.02 — 5 November 2019**

16 / 18

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Contents