

UM11910

Introduction to FRDM-STBI-A8971 sensor toolbox development board

Rev. 1 — 31 March 2023

User manual

Document information

Information	Content
Keywords	FXLS8971CF, 3-axis accelerometer, sensor toolbox development board, precision leveling, angle measurement
Abstract	This document describes details about FRDM-STBI-A8971 sensor toolbox development board for FXLS8971CF 3-axis accelerometer. This document also provides instructions to get started with FRDM-STBI-A8971 board.



Revision history

Rev	Date	Description
v.1	20230331	initial release

1 Introduction

This document describes the details of the FRDM-STBI-A8971 sensor toolbox development board for the FXLS8971CF^[2] three-axis accelerometer. This user manual also provides instructions to get started with the FRDM-STBI-A8971 board to accelerate evaluation and development with the FXLS8971CF.

The Sensor Toolbox Ecosystem^[3] offers enablement and development flexibility with software and tools to simplify a customer’s evaluation, development, and design using NXP’s sensors. The FRDM-STBI-A8971 sensor development board for the FXLS8971CF is offered along with supported software collaterals through the sensor toolbox ecosystem.

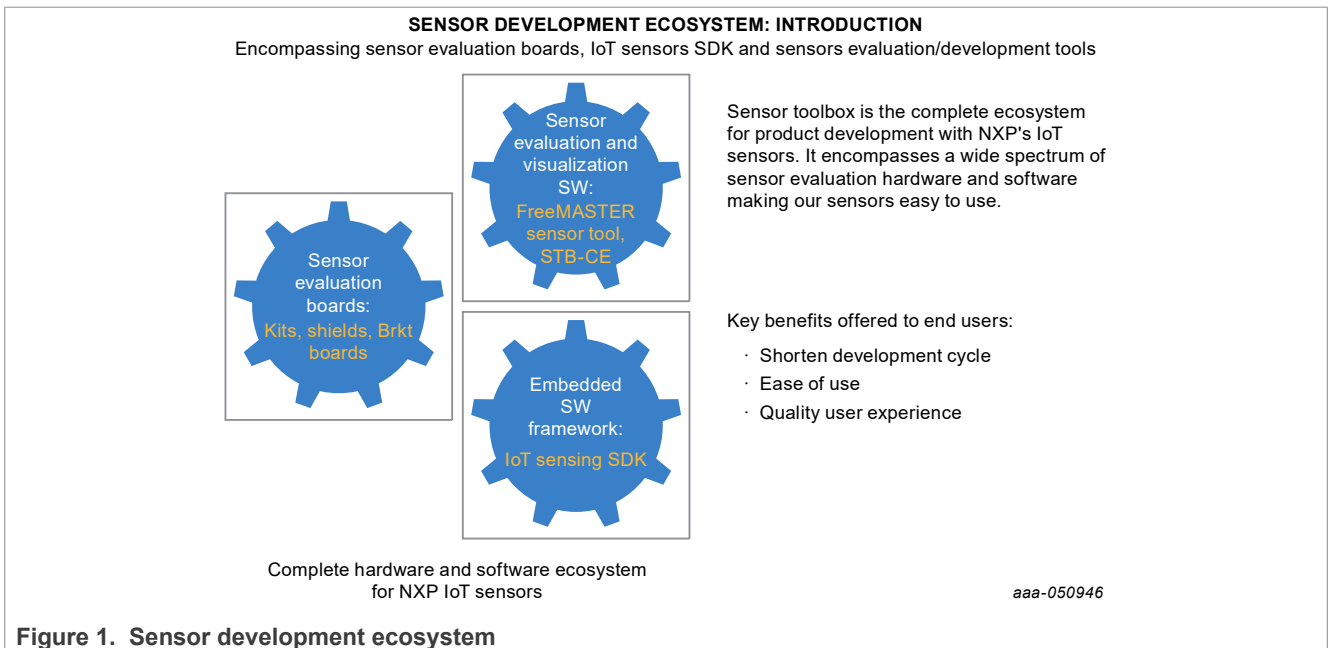


Figure 1. Sensor development ecosystem

2 Finding kit resources and information on the NXP web site

NXP Semiconductors provides online resources for this evaluation board and its supported device(s) on [sensors evaluation boards page](#)^[4].

The information page for the FRDM-STBI-A8971 sensor toolbox development board is available at www.nxp.com/FRDM-STBI-A8971. The information page provides overview information, documentation, software and tools, ordering information, and a Getting Started tab. The Getting Started tab provides quick-reference information applicable to using the FRDM-STBI-A8971 development board, including the downloadable assets referenced in this document.

3 Getting ready

3.1 Kit contents

The FRDM-STBI-A8971 sensor toolbox development board includes:

- FRDM-STBI-A8971: FXLS8971CF sensor shield board
- LPC55S16-EVK: MCU board
- USB cable
- Quick Start Guide

3.2 Developer resources

The following developer resources are recommended to jump-start the evaluation or development using the FRDM-STBI-A8971 board:

- [Get Started with FRDM-STBI-A8971 evaluation board](#)
- [Get Started with IoT Sensing SDK](#)
- [Get Started with FreeMASTER-Sensor-Tool](#)

4 Getting to know the hardware

4.1 Kit overview

The FRDM-STBI-A8971 sensor evaluation board is offered as a sensor kit with the LPC55S16-EVK.

The sensor shield board includes the following sensor part:

- FXLS89671CF^[2]: 3-axis digital accelerometer

The FRDM-STBI-A8971 sensor kit enables quick customer evaluation of the FXLS8971CF using the sensor toolbox enablement software and tools.

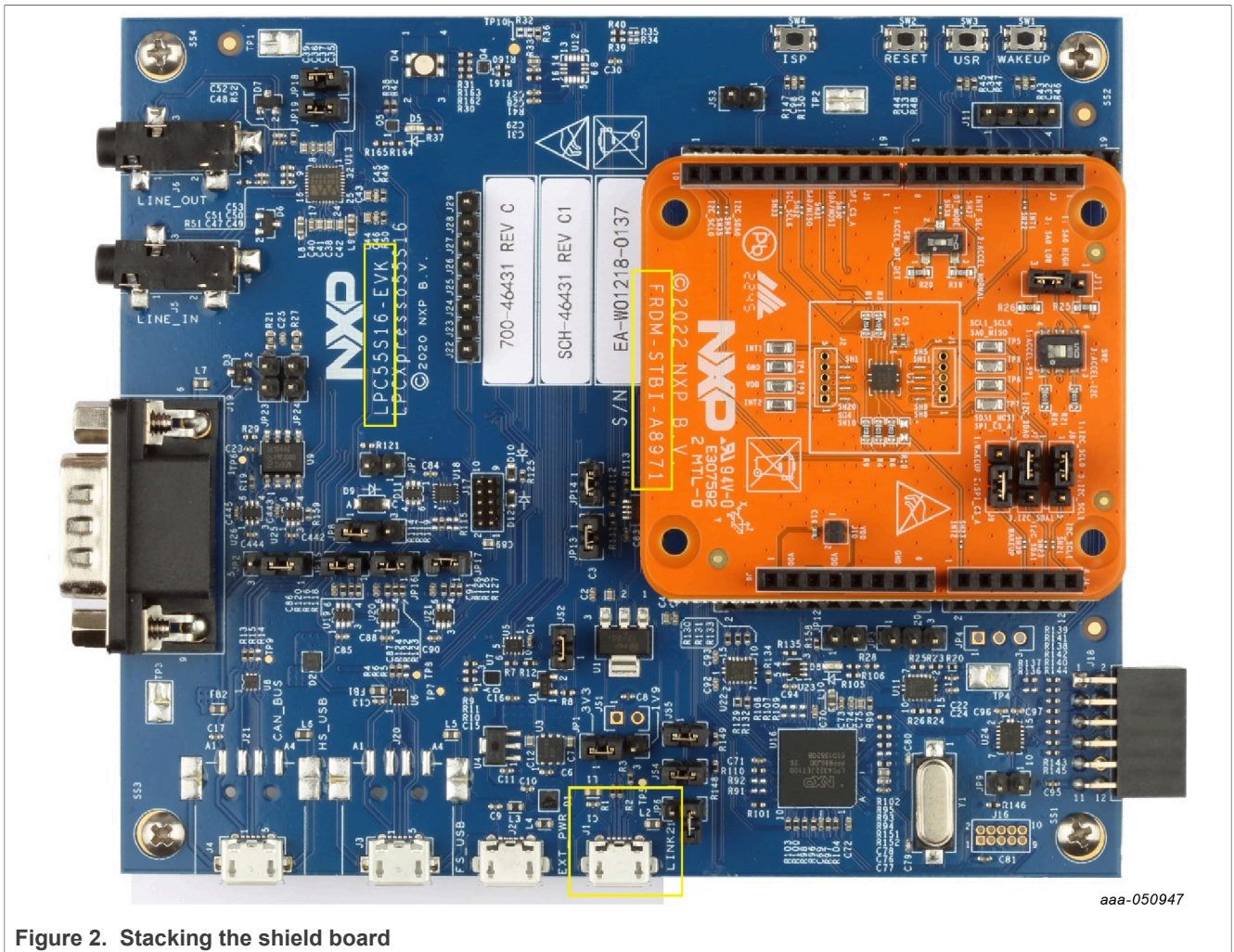
4.2 Board features

- Sensor evaluation and development kit for the FXLS8971CF.
- Enables quick sensor evaluation and helps accelerate quick prototyping, development using NXP sensors.
- Compatible with Arduino® and most NXP Freedom development boards.
- Allows evaluation of current consumption and pin-voltage characteristics.
- Supports I²C and SPI communication interface with the host MCU.
- Supports hardware configurability to Switch Accelerometer mode (normal vs motion detect) and I²C/SPI Interface mode.
- Supports multiple test points on the board.

4.3 Kit featured components

The combination of a shield development board and a freedom development MCU board enable a complete solution for quick sensor evaluation, prototyping, and development using the sensor toolbox development ecosystem.

The board is designed to be fully compatible with Arduino I/O headers and optimized for the operating conditions. The FRDM-STBI-A8971 sensor shield board is powered up by the LPC55S16-EVK MCU board by stacking the shield board on top of the MCU board using Arduino I/O headers, as shown in [Figure 2](#), and connecting the LPC55S16-EVK to the PC via the USB cable between the LINK2 USB port on the MCU board and the USB connector on the PC.



aaa-050947

Figure 2. Stacking the shield board

This sensor kit is enabled with the FreeMASTER-Sensor-Tool software tool^[6] providing an out-of-box demonstration GUI. The sensor toolbox ecosystem collaterals enable end users to move through each phase of product development quickly and increase ease of use.

4.4 Schematic, board layout and bill of materials

The schematic, board layout and bill of materials for the FRDM-STBI-A8971 evaluation board are available at www.nxp.com/FXLS8971CF.

5 Configuring the hardware

1. Check and confirm the FRDM-STBI-A8971 sensor shield board settings as described below:
 - To select the I²C digital interface, connect pins 2-3 of SW2 on the FRDM-STBI-A8971.
 - Connect pins J7, J8 pins 1-2 to select I²C0 pins on the shield board.
 - To select the SPI digital interface, connect pins 1-2 of SW2 on the FRDM-STBI-A8971.
 - Connect pins 2-3 of SW1 to select the default Accelerometer Operating mode, that is, ACCEL NORMAL mode.
2. Connect the FRDM-STBI-A8971 sensor shield board to the LPC55S16-EVK MCU board on the Arduino I/O headers.
3. Connect the sensor evaluation kit (FRDM-STBI-A8971 kitted with the LPC55S16-EVK) to a windows PC via the USB cable between the LINK2 USB port on the board and the USB connector on the PC.

6 References

- [1] **Motion sensors** - Accelerometers for IoT, Industrial and Medical applications, [Motion-Sensors](#) or [Accelerometers](#)
- [2] **FXLS8971CF** - 3-axis accelerometer ideal for precision leveling and angle measurement, [FXLS8971CF](#)
- [3] **Sensors development ecosystem** - Complete ecosystem for product development with NXP's sensors targeted toward IoT, Industrial, Medical applications, [Sensor-Toolbox](#)
- [4] **Sensor evaluation boards** - Sensor Toolbox Development Kits, [Sensor Evaluation Boards](#)
- [5] **ISSDK** - IoT Sensing SDK: framework enabling embedded development using sensors, [ISSDK](#)
- [6] **FreeMASTER-Sensor-Tool** - Sensor evaluation and application development software, [FreeMASTER-Sensor-Tool](#)

7 Legal information

7.1 Definitions

Draft — A draft status on a document indicates that the content is still under internal review and subject to formal approval, which may result in modifications or additions. NXP Semiconductors does not give any representations or warranties as to the accuracy or completeness of information included in a draft version of a document and shall have no liability for the consequences of use of such information.

7.2 Disclaimers

Limited warranty and liability — Information in this document is believed to be accurate and reliable. However, NXP Semiconductors does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information. NXP Semiconductors takes no responsibility for the content in this document if provided by an information source outside of NXP Semiconductors.

In no event shall NXP Semiconductors be liable for any indirect, incidental, punitive, special or consequential damages (including - without limitation - lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges) whether or not such damages are based on tort (including negligence), warranty, breach of contract or any other legal theory.

Notwithstanding any damages that customer might incur for any reason whatsoever, NXP Semiconductors' aggregate and cumulative liability towards customer for the products described herein shall be limited in accordance with the Terms and conditions of commercial sale of NXP Semiconductors.

Right to make changes — NXP Semiconductors reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

Suitability for use — NXP Semiconductors products are not designed, authorized or warranted to be suitable for use in life support, life-critical or safety-critical systems or equipment, nor in applications where failure or malfunction of an NXP Semiconductors product can reasonably be expected to result in personal injury, death or severe property or environmental damage. NXP Semiconductors and its suppliers accept no liability for inclusion and/or use of NXP Semiconductors products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

Applications — Applications that are described herein for any of these products are for illustrative purposes only. NXP Semiconductors makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Customers are responsible for the design and operation of their applications and products using NXP Semiconductors products, and NXP Semiconductors accepts no liability for any assistance with applications or customer product design. It is customer's sole responsibility to determine whether the NXP Semiconductors product is suitable and fit for the customer's applications and products planned, as well as for the planned application and use of customer's third party customer(s). Customers should provide appropriate design and operating safeguards to minimize the risks associated with their applications and products.

NXP Semiconductors does not accept any liability related to any default, damage, costs or problem which is based on any weakness or default in the customer's applications or products, or the application or use by customer's third party customer(s). Customer is responsible for doing all necessary testing for the customer's applications and products using NXP Semiconductors products in order to avoid a default of the applications and the products or of the application or use by customer's third party customer(s). NXP does not accept any liability in this respect.

Terms and conditions of commercial sale — NXP Semiconductors products are sold subject to the general terms and conditions of commercial sale, as published at <http://www.nxp.com/profile/terms>, unless otherwise agreed in a valid written individual agreement. In case an individual agreement is concluded only the terms and conditions of the respective agreement shall apply. NXP Semiconductors hereby expressly objects to applying the customer's general terms and conditions with regard to the purchase of NXP Semiconductors products by customer.

Export control — This document as well as the item(s) described herein may be subject to export control regulations. Export might require a prior authorization from competent authorities.

Suitability for use in non-automotive qualified products — Unless this data sheet expressly states that this specific NXP Semiconductors product is automotive qualified, the product is not suitable for automotive use. It is neither qualified nor tested in accordance with automotive testing or application requirements. NXP Semiconductors accepts no liability for inclusion and/or use of non-automotive qualified products in automotive equipment or applications.

In the event that customer uses the product for design-in and use in automotive applications to automotive specifications and standards, customer (a) shall use the product without NXP Semiconductors' warranty of the product for such automotive applications, use and specifications, and (b) whenever customer uses the product for automotive applications beyond NXP Semiconductors' specifications such use shall be solely at customer's own risk, and (c) customer fully indemnifies NXP Semiconductors for any liability, damages or failed product claims resulting from customer design and use of the product for automotive applications beyond NXP Semiconductors' standard warranty and NXP Semiconductors' product specifications.

Translations — A non-English (translated) version of a document, including the legal information in that document, is for reference only. The English version shall prevail in case of any discrepancy between the translated and English versions.

Security — Customer understands that all NXP products may be subject to unidentified vulnerabilities or may support established security standards or specifications with known limitations. Customer is responsible for the design and operation of its applications and products throughout their lifecycles to reduce the effect of these vulnerabilities on customer's applications and products. Customer's responsibility also extends to other open and/or proprietary technologies supported by NXP products for use in customer's applications. NXP accepts no liability for any vulnerability. Customer should regularly check security updates from NXP and follow up appropriately. Customer shall select products with security features that best meet rules, regulations, and standards of the intended application and make the ultimate design decisions regarding its products and is solely responsible for compliance with all legal, regulatory, and security related requirements concerning its products, regardless of any information or support that may be provided by NXP.

NXP has a Product Security Incident Response Team (PSIRT) (reachable at PSIRT@nxp.com) that manages the investigation, reporting, and solution release to security vulnerabilities of NXP products.

7.3 Trademarks

Notice: All referenced brands, product names, service names, and trademarks are the property of their respective owners.

NXP — wordmark and logo are trademarks of NXP B.V.

Figures

Fig. 1. Sensor development ecosystem 3 Fig. 2. Stacking the shield board7

Contents

1	Introduction	3
2	Finding kit resources and information on the NXP web site	4
3	Getting ready	5
3.1	Kit contents	5
3.2	Developer resources	5
4	Getting to know the hardware	6
4.1	Kit overview	6
4.2	Board features	6
4.3	Kit featured components	6
4.4	Schematic, board layout and bill of materials	7
5	Configuring the hardware	8
6	References	9
7	Legal information	10

Please be aware that important notices concerning this document and the product(s) described herein, have been included in section 'Legal information'.

© 2023 NXP B.V.

All rights reserved.

For more information, please visit: <http://www.nxp.com>

Date of release: 31 March 2023
Document identifier: UM11910