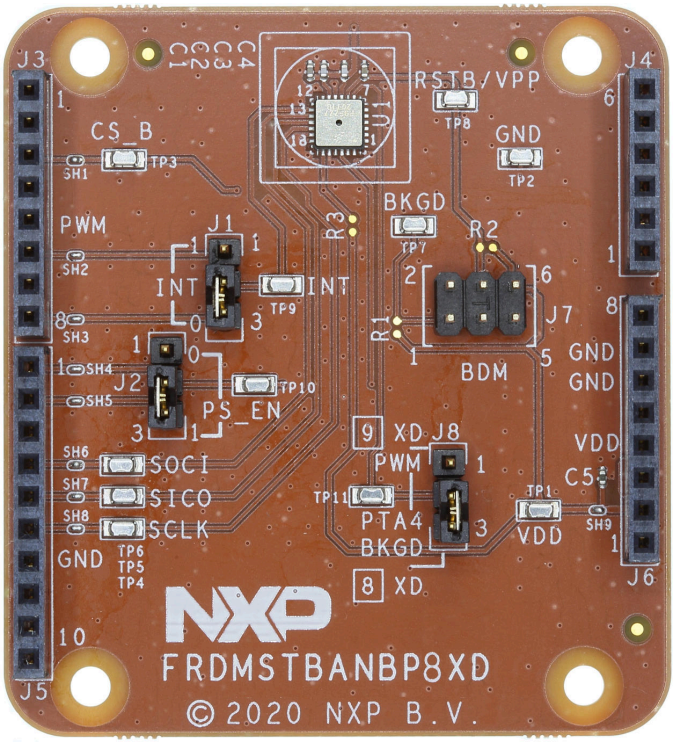
# UM11568

## Introduction to the FRDMSTBANBP8XD Shield Board

Rev. 1 — 19 March 2021 User manual

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# 1 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 http://www.nxp.com.

The information page for the NBP8FD battery pressure monitor sensor can be found at:

https://www.nxp.com/products/sensors/pressure-sensors/highly-integrated-battery-pressure-monitor-sensor:NBP8-9x.

The information page for the FRDMSTBANBP8XD evaluation shield board can be found at:

http://www.nxp.com/FRDMSTBANBP8XD

The information page provides overview information, documentation, software, tools, ordering information, and a Getting Started tab. The Getting Started tab contains quick-reference information applicable to using the FRDMSTBANBP8XD, including the downloadable assets referenced in this document.

## 1.1 Collaborate in the NXP community

The NXP Community is for sharing ideas and tips, asking and answering technical questions, and receiving input on just about any embedded design topic.

The NXP Community is at http://community.nxp.com.

# 2 Getting Started

## 2.1 Kit contents

The FRDMSTBANBP8XD contents include:

- FRDMSTBANBP8XD shield board with Arduino headers

## 2.2 Additional hardware

The FRDMSTBANBP8XD can be paired with a variety of NXP MCU boards. However, an evaluation project is available to customers who select the FRDM-KW36 board. More information is detailed in Section 3 "Getting to Know the Hardware".

# 3 Getting to Know the Hardware

## 3.1 General description: FRDMSTBANBP8XD

The FRDMSTBANBP8XD shield board incorporates an NBP8FD fully integrated battery pressure monitor sensor that offers:

- a small footprint in a 4 x 4 mm package
- low power consumption
- PWM
- SPI
- ready/interrupt and power supply enable capabilities

The FRDMSTBANBP8XD shield board can be easily connected to an NXP Freedom MCU board via the Arduino headers for evaluation. The FRDM-KW36 board is recommended.

Users can connect the two boards to evaluate the NPB8XD battery pressure monitor sensor by using either a terminal program and commands or a demo GUI. In either case, the hardware facilitates software development.

These boards provide an intuitive way to change the interrupts, PWM, and power supply enable signals for specific pin configurations. The board also contains test points that are typically used for evaluation. The NBP8X data sheet provides additional information and configuration details about these features.

## 3.2 NBP8FD pressure monitor sensor features

The NBP8 family consists of small QFN (4 mm x 4 mm x 1.98 mm), fully integrated battery pressure monitoring sensors (BPMS). The NBP8 BPMS solution integrates an 8-bit central processing unit (CPU) and NXP-provided firmware to create a ready-to-use pressure sensor. Features include:

- Transducer measurement interfaces with low-power AFE:
  - 10-bit compensated pressure sense element
  - 8-bit compensated internal device temperature measurement
  - 8-bit compensated internal device voltage measurement
- 12-entry pressure FIFO
- Selectable host wake-up indications:
  - Fixed pressure threshold breach
  - Relative pressure threshold breach
  - Pressure rate of change threshold breach
- Client SPI to support host access to internal peripherals, registers, and memory
- Qualified in compliance with AEC-Q100, Rev. H
- User-selectable sampling interval
- Low-voltage detection

## 3.3 Example system block diagram

Figure 1 shows an example block diagram of the NBP8 with an external host. The low-power configuration shows that when a pressure breach occurs, the NPB8 can enable the power supply to the host.

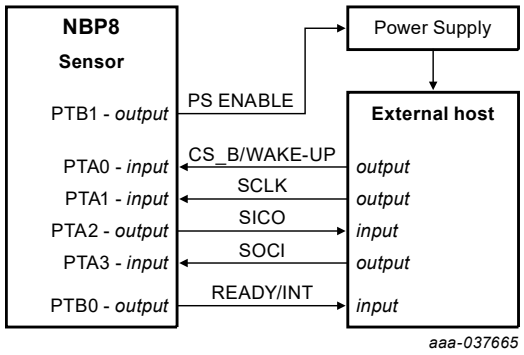


**Figure 1. Connections between the NBP8 and an external host**

# 4 FRDMSTBANBP8XD Featured Components

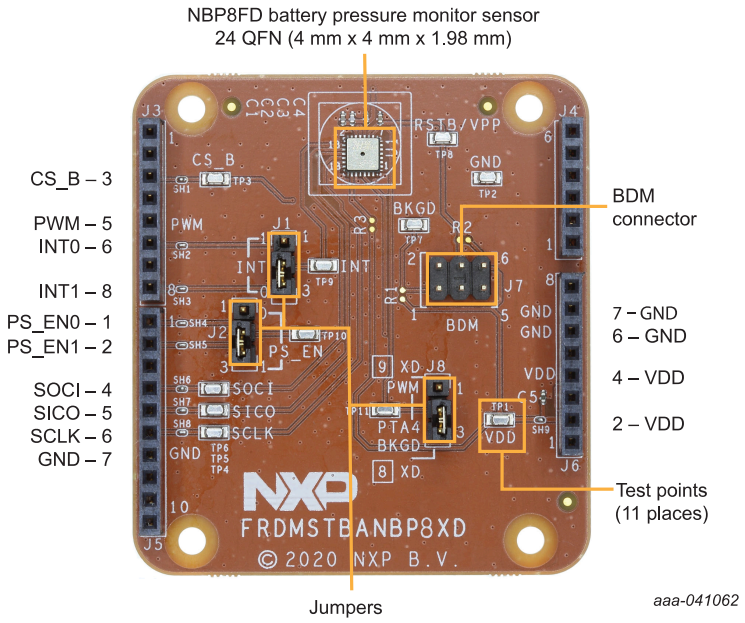


**Figure 2. FRDMSTBANBP8XD featured components**

The FRDMSTBANBP8XD shield board comes with standard Arduino headers and can be paired and connected with NXP Freedom MCU boards for user evaluations and software development. For quick evaluation and prototyping, NXP provides a demo project targeted to the FRDM-KW36 board and hardware design files that help reduce the time to market.

As shown in Figure 2, the following signals are available on the Arduino headers of the FRDMSTBANBP8XD shield board:

- The interrupt signals, INTx can be ported to either J3-6 or J3-8 by selector jumper J1.
- The power supply enable signal, PS_ENx can be ported to either J5-1 or J5-2 by selector jumper J2.
- The PWM signal (NPB9FD only) can be ported to J3-5 by selector jumper J8, pins 1-2. Note that the default setting is the BKGD signal (J8, pins 2-3) used to program U1 via the BDM port through J7.
- The SPI interface is provided through J3 and J5. These are:
  - J3-3, CS_B, Client Select
  - J5-4, SOCI, Server-Out-Client-In data
  - J5-5, SICO, Server-In-Client-Out data
  - J5-6, SCLK, SPI clock
- VDD is supplied through J6-2 / J6-4. This is typically supplied through a Freedom MCU board such as the FRDM-KW36.
- GND is supplied through J6-6 / J6-7. This is typically supplied through a Freedom MCU board such as the FRDM-KW36.

## 4.1 Jumpers

**Table 1. Jumpers**

| Jumper | Position | Function |
|---|---|---|
| J1 | 1–2 | Connects INT0 signal from Arduino J3-6 to Interrupt pin (Pin 13) on NBP8 |
| | 2–3 (default) | Connects INT1 signal from Arduino J3-8 to Interrupt pin (Pin 13) on NBP8 |
| J2 | 1–2 | Connects PS_EN0 signal from Arduino J5-1 to Power Supply Enable pin (Pin 22) on NBP8 |
| | 2–3 (default) | Connects PS_EN1 signal from Arduino J5-2 to Power Supply Enable pin (Pin 22) on NBP8 |
| J8 | 1–2 | Connects PWM signal at PTA4 (Pin 7) on NBP8 to Arduino J3-5 |
| | 2–3 (default) | Selects Background Debug Mode (BDM) at PTA4 (Pin 7) on NBP8 |

## 4.2 BDM Multilink connector (J7)

**Table 2. BDM connector**

| Pin | Name | Function |
|---|---|---|
| 1 | BKGD | Connects to Background Debug Mode signal (PTA4 - Pin 7) on NBP8 |
| 2 | GND | Ground |
| 3 | NC | No connection |
| 4 | RSTB/VPP | Connects to RST_B (Pin 8) on NBP8 |
| 5 | NC | No connection |
| 6 | VDD | VDD power supply |

## 4.3 Test points

For a definition of the 11 FRDMSTBANBP8XD test points, see schematic (available here for customers who purchase the board).

# 5 References

**Table 3. References**

| Item | Description | Link |
|---|---|---|
| NBP8FD | Battery pressure monitor sensor product page | https://www.nxp.com/products/sensors/pressure-sensors/highly-integrated-battery-pressure-monitor-sensor:NBP8-9x |
| FRDMSTBANBP8XD design files | Tools and software tab | http://www.nxp.com/FRDMSTBANBP8XD |

# 6 Revision history

**Table 4. Revision history**

| Document ID | Release date | Data sheet status | Supersedes |
|---|---|---|---|
| UM11568 v.1 | 20210319 | Initial release | — |
| Modifications | • NA | | |

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