# THE DATASHEET OF

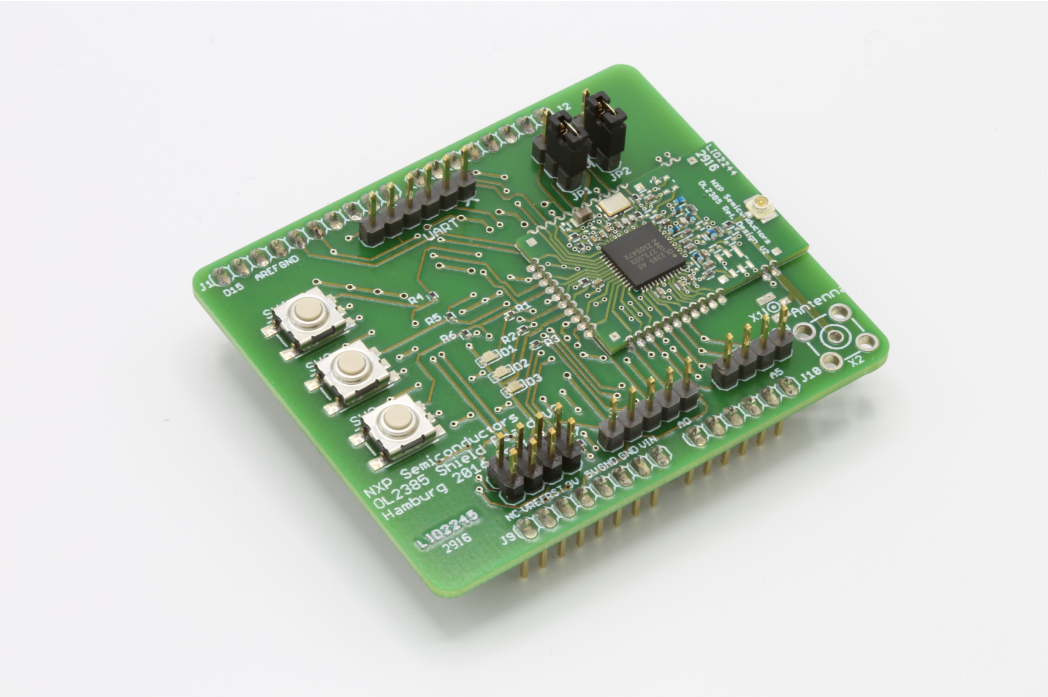
# OM2385/SF001

# KTOM2385SF001UG

## OM2385/FS001 development kit

Rev. 1.0 — 28 October 2016 User guide

## 1 OM2385/SF001



## 2 Important notice

NXP provides the enclosed product(s) under the following conditions:

This evaluation kit is intended for use of ENGINEERING DEVELOPMENT OR EVALUATION PURPOSES ONLY. It is provided as a sample IC pre-soldered to a printed circuit board to make it easier to access inputs, outputs, and supply terminals. This evaluation board may be used with any development system or other source of I/O signals by simply connecting it to the host MCU or computer board via off-the-shelf cables. This evaluation board is not a Reference Design and is not intended to represent a final design recommendation for any particular application. Final device in an application will be heavily dependent on proper printed circuit board layout and heat sinking design as well as attention to supply filtering, transient suppression, and I/O signal quality.

The goods provided may not be complete in terms of required design, marketing, and or manufacturing related protective considerations, including product safety measures typically found in the end product incorporating the goods. Due to the open construction of the product, it is the user's responsibility to take any and all appropriate precautions with regard to electrostatic discharge. In order to minimize risks associated with the customers applications, adequate design and operating safeguards must be provided by the customer to minimize inherent or procedural hazards. For any safety concerns, contact NXP sales and technical support services.

Should this evaluation kit not meet the specifications indicated in the kit, it may be returned within 30 days from the date of delivery and will be replaced by a new kit.

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# 3 Overview of the OM2385/FS001 development kit

The OM2385/FS001 development kit provides an evaluation platform for designing SIGFOX network applications that use NXP's OL2385 single-chip RF transceiver.

The kit consists of three boards: the OL2385 Shield Board, the OL2385 Reference Design Board and a FRDM-KL43Z board. The OL2385 Reference Design board is permanently affixed to the surface of the OL2385 Shield Board. The Reference Design Board contains an embedded OL2385 transceiver and serves as a wireless modem. When connected to an antenna (included in the kit), it provides all the functionality required to communicate with the SIGFOX network. The OL2385 Shield Board contains connectors for external communication. The Shield Board is mounted by means of four Arduino™ connectors to the FRDM-KL43Z. The FRDM-KL43Z acts as the communication link between the development kit and a PC. It comes pre-loaded with microcode that manages the interface between the PC and the OL2385 reference board.

Users must initially register their device with SIGFOX using a unique ID and access code provided with the kit. Once the device has been registered, the kit can be used to connect to the SIGFOX network and test the functionality of the OL2385-based application under development.

To interact with the development kit, users must connect the kit to a PC through the OpenSDA port on the FRDM-KL25Z. A terminal emulator (such as HyperTerminal) provides the interface, allowing users to login to the network and send and receive messages. Designers can also use the Kinetis Design Studio (KDS) to develop and download microcode to the KL43Z.

# 4 Getting started

## 4.1 Kit contents/packing list

The OM2385/SF001 development kit contents includes:

- Assembled and tested OM2385/SF001 FRDM board mounted to a firmware loaded FRDM-KL43Z board
- Antenna with attached uFL connector
- Standard A (male) to Mini B (male) USB cable
- Quick start guide

## 4.2 Jump start

NXP's analog product development boards provide an easy-to-use platform for evaluating NXP products. The boards support a range of analog, mixed-signal and power solutions. They incorporate monolithic ICs and system-in-package devices that use proven high-volume technology. NXP products offer longer battery life, a smaller form factor, reduced component counts, lower cost and improved performance in powering state of the art systems.

1. Go to http://www.nxp.com/OM2385.
2. Review your Tools Summary Page.
3. Locate and click:


4. Download the documents, software and other information.

Once the files are downloaded, review the user guide in the bundle. The user guide includes setup instructions, BOM and schematics. Jump start bundles are available on each tool summary page with the most relevant and current information. The information includes everything needed for design.

## 4.3 System requirements

The kit requires the following to function properly with the software:

- USB enabled computer running Windows XP, Vista, 7, 8, or 10 (32-bit or 64-bit)
- Terminal emulation software (such as HyperTerminal)

# 5 Getting to know the hardware

## 5.1 Board overview

The OM2385/SF001 consists of a base board (the OL2385 shield board) with a permanently attached daughter board (the OL2385 reference design board). The combination—along with the attached FRDM-KL43Z board—serves as a development platform that provides wireless modem access to the SIGFOX network. Once properly registered, the board allows users to send and receive messages across the network.

## 5.2 Board features

The board features:

- Arduino connector compatibility with other Freedom boards
- Support for UART, SPI, MDI and GPIO communication
- SIGFOX Communication Library

## 5.3 Block diagram

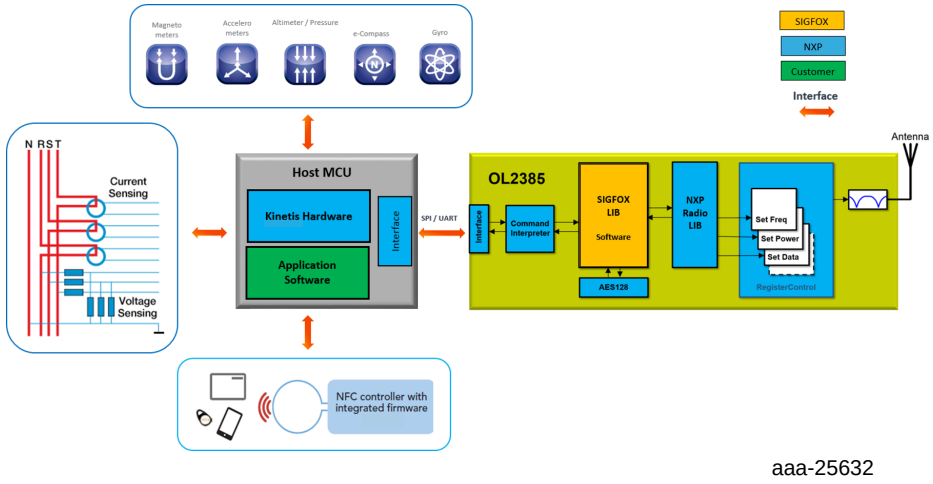


**Figure 1. Block diagram**

## 5.4 Device features

This OM2385/SF001 reference board features the following NXP product:

**Table 1. Device features**

| Device | Description | Features |
|---|---|---|
| OL2385 | Low-Power Multi-Channel UHF RF Wireless Platform | • Single IC for bands (160 to 960 MHz)<br>• Ulltra-low RX power below 11 mA<br>• Up to +14 dBm output power at 29 mA<br>• Sensitivity –128 dBm at 4 kHz<br>• 400 kbps 4(G)FSK, 200 kbps 2(G)FSK, ASK, OOK<br>• Excellent Phase Noise<br>• Supported Software Standards:<br>– Supports SIGFOX in FCC and ETSI modes (RCZ1-4)<br>– WMBus2013, KNX, 802.15.4, T108, sub-GHz ZigBee<br>• SIGFOX P1 certified<br>• VQFN48 package (7 X 7 $mm^2$)<br>• Operating temperature range: –40 °C |

## 5.5 Board description

Figure 2 describes the main elements on the OM2385/SF001 board.

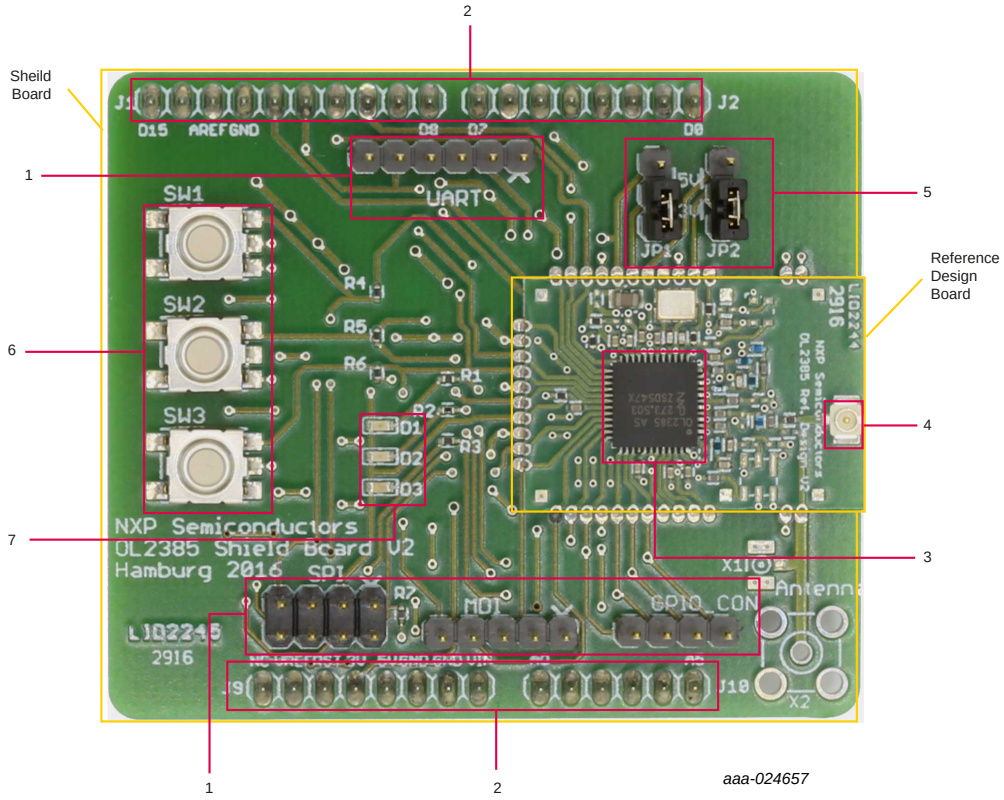


**Figure 2. Board description**

**Table 2. Board description**

| Number | Name | Description |
|---|---|---|
| 1 | Communication connectors | Provide connectivity for SPI, MDI, GPIO and UART support |
| 2 | Arduino™ connectors | Provide connectivity to FRDM-KL43Z and other Freedom boards |
| 3 | OL2385 | Low-Power Multi-Channel UHF RF Wireless Platform |
| 4 | SMA connector | Provides connectivity to UHF antenna |
| 5 | Jumpers | Select board voltage levels |
| 6 | Button switches | Control digital inputs to Arduino™ connectors |
| 7 | LEDs | Indicate status |

## 5.6 LED display

The board contains the following LED:

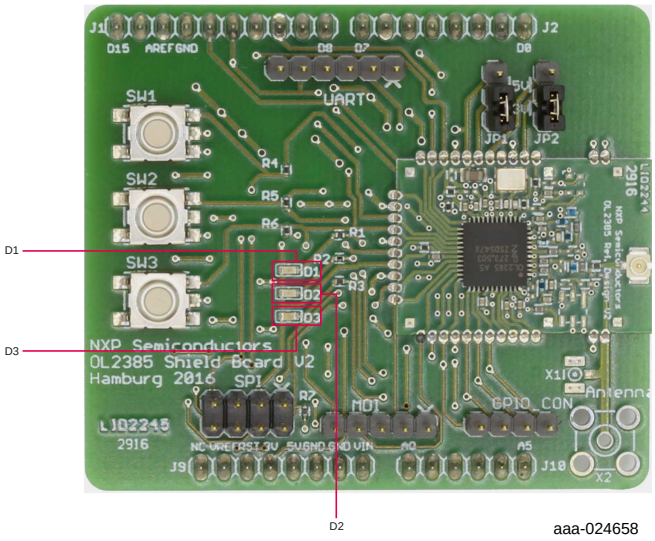


**Figure 3. LED locations**

**Table 3. LED locations**

| LED ID | Description |
|---|---|
| D1 | LED Green. Not used |
| D2 | LED Yellow. On by default. Blinks to indicate the transmission of a single frame. |
| D3 | LED Red. On by default. Blinks six times to indicate an error in initialization. Blinks 20 times to indicate a Watchdog timeout |

## 5.7 Jumper definitions

Figure 4 shows the location of jumpers and switches on the OM2385/SF001 evaluation board.

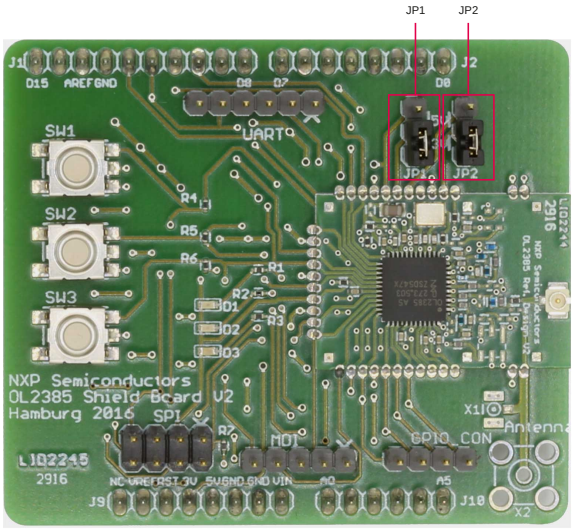


**Figure 4. Jumper locations**

By default both board jumpers are set to the 1-2 position. Because the board only functions at 3.3 V, the jumpers must remain set to the 1-2 position. Do no move the jumpers to the 2-3 position.

**Table 4. Jumper definitions**

| Jumper/Switch | Description | Setting | Connection/Result |
|---|---|---|---|
| JP1 | Supply voltage setting | **[1–2]** | 3.0 V selected |
| | | [2–3] | 5.0 V selected. DO NOT USE |
| JP2 | Supply voltage setting | **[1–2]** | 3.0 V selected |
| | | [2–3] | 5.0 V selected. DO NOT USE |

## 5.8 Switch definitions

Figure 5 shows the location of switches on the OM2385/SF001 Shield Board.

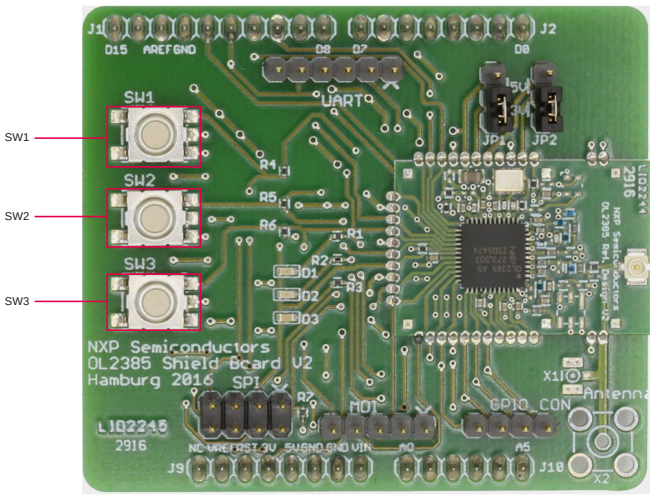


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**Figure 5. Switch locations**

Table 5 describes the function of the three switches.

**Table 5. Switch definitions**

| Switch | Description | Function |
|---|---|---|
| SW1 | Can be used to drive host pins | Open to customer use |
| SW2 | Can be used to drive host pins | Open to customer use |
| SW3 | Can be used to drive host pins | Open to customer use |

## 5.9 Connectors

The board has the following connectors:

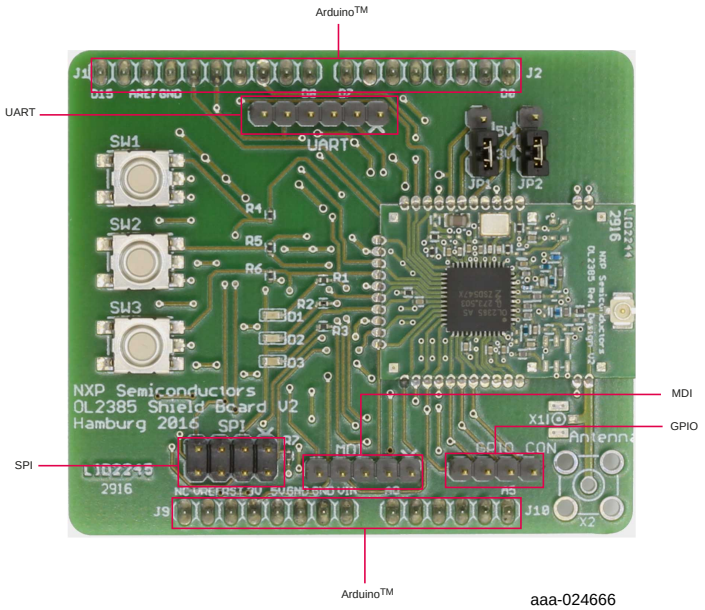



**Figure 6. Connector locations**

**Table 6. Connectors**

| Banana connector name | Description |
|---|---|
| Arduino™ | Arduino connections to FRDM-KL43Z board |
| UART | Universal Asynchronous Receiver/Transmiter (UART) port |
| SPI | Serial-Parallel Interface (SPI) port |
| MDI | Monitor and Debug Interface (MDI) port |
| GPIO | General Purpose Input/Output (GPIO) port |

# 6 FRDM-KL43Z

The NXP Freedom development platform is a set of software and hardware tools supporting evaluation and development. It is ideal for rapid prototyping of microcontroller-based applications. The NXP Freedom KL43Z hardware is a simple, yet sophisticated design featuring a Kinetis L series microcontroller, the industry's first microcontroller built on the ARM® Cortex™-M0+ core.

Figure 7 shows a top view of the FRDM-KL43Z and highlights its main components.

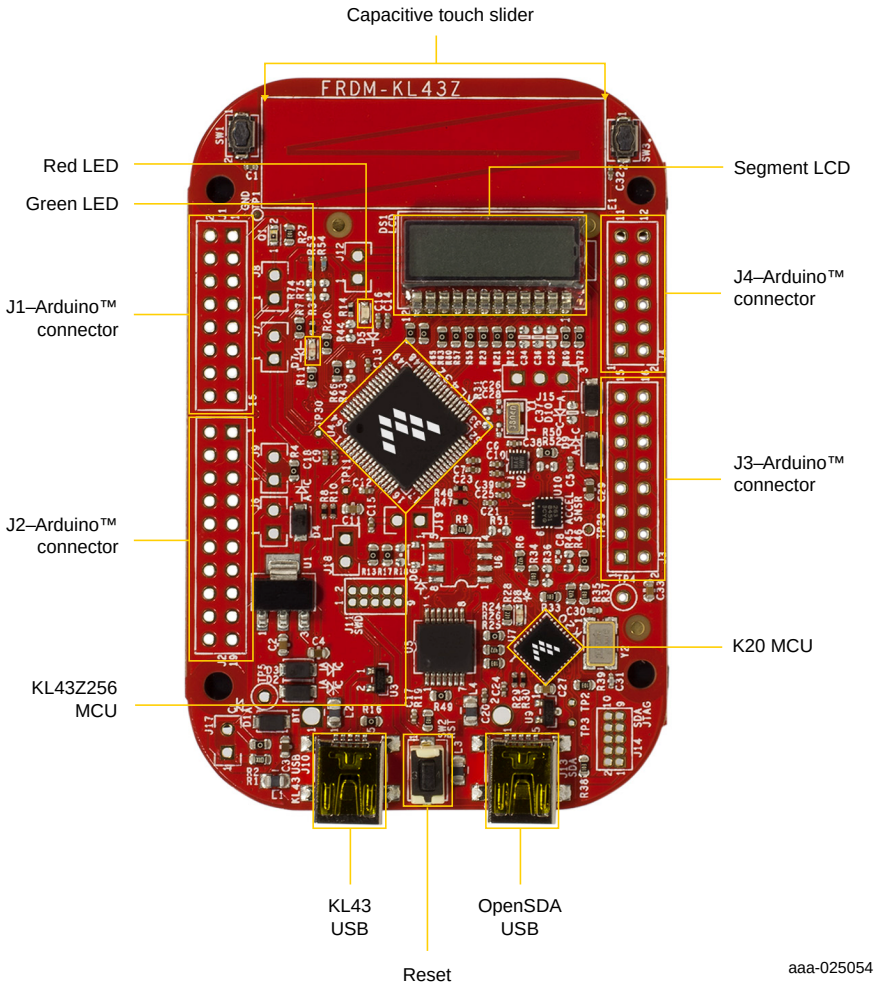



**Figure 7. FRDM-KL43Z**

A single row of Arduino™ connectors on the OM2385/SF001 connects to the outer row (even numbers) of the Arduino™ connectors on the FRDM-KL43Z. Table 7 describes the connections between the two boards.

**Table 7. OM2385/SF001 to FRDM-KL43Z connections**

| OM2385/SF001 | | FRDM-KL43Z | | Pin hardware name | | Description |
|---|---|---|---|---|---|---|
| Header | Pin | Header | Pin | OM2385/SF001 | FRDM-KL43Z | OM2385/SF001 |
| J2 | Not used | J1 | 1 | Not used | PTB18 | Not used |
| J2 | 1 | J1 | 2 | D00 | PTA1 | GPIO (UART0_RX) |
| J2 | Not used | J1 | 3 | Not used | PTB19 | Not used |

| OM2385/SF001 | | FRDM-KL43Z | | Pin hardware name | | Description OM2385/SF001 |
|---|---|---|---|---|---|---|
| Header | Pin | Header | Pin | OM2385/SF001 | FRDM-KL43Z | |
| J2 | 2 | J1 | 4 | D01 | PTA2 | GPIO (UART1_TX) |
| J2 | Not used | J1 | 5 | Not used | PTC0 | Not used |
| J2 | 3 | J1 | 6 | D02 | PTD3 | GPIO |
| J2 | Not used | J1 | 7 | Not used | PTC4 | Not used |
| J2 | 4 | J1 | 8 | D03 | PTA12 | Digital input (SW1), connects Switch 1 |
| J2 | Not used | J1 | 9 | Not used | PTC6 | Not used |
| J2 | 5 | J1 | 10 | D04 | PTA4 | Digital input (SW2), connects Switch 2 |
| J2 | Not used | J1 | 11 | Not used | PTC7 | Not used |
| J2 | 6 | J1 | 12 | D05 | PTA5 | Digital input (SW3), connect Switch 3 |
| J2 | Not used | J1 | 13 | Not used | N/C | Not used |
| J2 | 7 | J1 | 14 | D06 | PTE29 | GPIO (I2C0_SCL) |
| J2 | Not used | J1 | 15 | Not used | PTC5 | Not used |
| J2 | 8 | J1 | 16 | D07 | PTE30 | GPIO (2C0_SDA) |
| J1 | Not used | J2 | 1 | Not used | N/C | Not used |
| J1 | 1 | J2 | 2 | D08 | PTA13 | GPIO |
| J1 | Not used | J2 | 3 | Not used | N/C | Not used |
| J1 | 2 | J2 | 4 | D09 | PTD2 | Digital input (SPI_ACK) |
| J1 | Not used | J2 | 5 | Not used | N/C | Not used |
| J1 | 3 | J2 | 6 | D10 | PTD4 | Digital output (SPI_CS), required for SPI communication |
| J1 | Not used | J2 | 7 | Not used | N/C | Not used |
| J1 | 4 | J2 | 8 | D11 | PTD6 | SPI0_MOSI, required for SPI communication (MISO expected on FRDM-KL43Z side) |
| J1 | Not used | J2 | 9 | Not used | N/C | Not used |
| J1 | 5 | J2 | 10 | D12 | PTD7 | SPI0_MISO, required for SPI communication (MISO expected on FRDM-KL43Z side |
| J1 | Not used | J2 | 11 | Not used | N/C | Not used |
| J1 | 6 | J2 | 12 | D13 | PTD5 | SPI0_SCK, required for SPI communication |
| J1 | Not used | J2 | 13 | Not used | N/C | Not used |
| J1 | 7 | J2 | 14 | GND | GND | Ground |
| J1 | Not used | J2 | 15 | Not used | N/C | Not used |
| J1 | 8 | J2 | 16 | AREF | VREFH | Voltage reference |
| J1 | Not used | J2 | 17 | Not used | PTB17 | Not used |
| J1 | 9 | J2 | 18 | D14 | PTE0 | GPIO (UART1_TX) |
| J1 | Not used | J2 | 19 | Not used | PTB16 | Not used |
| J1 | 10 | J2 | 20 | D15 | PTE1 | GPIO (UART1_RX) |
| J10 | Not used | J4 | 1 | Not used | PTE20 | Not used |

| OM2385/SF001 | | FRDM-KL43Z | | Pin hardware name | | Description OM2385/SF001 |
|---|---|---|---|---|---|---|
| Header | Pin | Header | Pin | OM2385/SF001 | FRDM-KL43Z | |
| J10 | 1 | J4 | 2 | A0 | PTB0 | GPIO (ADC0 / I2C0_SCL) |
| J10 | Not used | J4 | 3 | Not used | PTE21 | Not used |
| J10 | 2 | J4 | 4 | P11 (A1) | PTB1 | GPIO (P11) |
| J10 | Not used | J4 | 5 | Not used | PTE22 | Not used |
| J10 | 3 | J4 | 6 | MSCL (A2) | PTB2 | GPIO (MSCL) |
| J10 | Not used | J4 | 7 | Not used | PTE23 | Not used |
| J10 | 4 | J4 | 8 | MSDA (A3) | PTB3 | GPIO (MSDA) |
| J10 | Not used | J4 | 9 | Not used | PTE0 | Not used |
| J10 | 5 | J4 | 10 | A4 | PTC2 | GPIO (ADC4 / I2C1_SDA) |
| J10 | Not used | J4 | 11 | Not used | PTE30 | Not used |
| J10 | 6 | J4 | 12 | A5 | PTC1 | GPIO (ADC5 / I2C1_SCL) |
| J9 | Not used | J3 | 1 | Not used | N/C | Not used |
| J9 | 1 | J3 | 2 | N/C | SDA_PTD5 | No Connection |
| J9 | Not used | J3 | 3 | Not used | N/C | Not used |
| J9 | 2 | J3 | 4 | IOREF | P3V3 | IO reference voltage |
| J9 | Not used | J3 | 5 | Not used | N/C | Not used |
| J9 | 3 | J3 | 6 | RESET | RST | Reset |
| J9 | Not used | J3 | 7 | Not used | N/C | Not used |
| J9 | 4 | J3 | 8 | V+ | P3V3 | Voltage reference |
| J9 | Not used | J3 | 9 | Not used | N/C | Not used |
| J9 | 5 | J3 | 10 | 5V_USB | P5V_USB | USB voltage |
| J9 | Not used | J3 | 11 | Not used | N/C | Not used |
| J9 | 6 | J3 | 12 | GND | GND | Ground |
| J9 | Not used | J3 | 13 | Not used | N/C | Not used |
| J9 | 7 | J3 | 14 | GND | GND | Ground |
| J9 | Not used | J3 | 15 | Not used | N/C | Not used |
| J9 | 8 | J3 | 16 | VIN | P5-9V | VIN |

# 7 Configuring the hardware

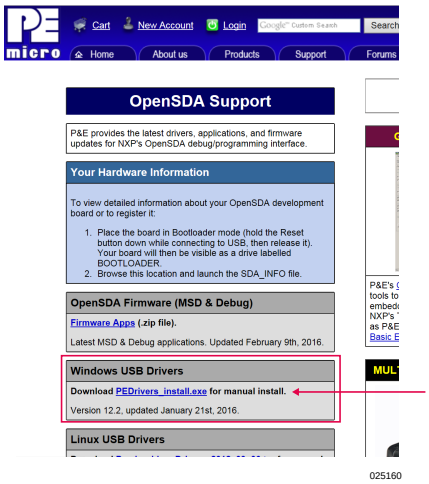
To configure the OM2385/FS001, the user must:

1. Download drivers for the FRDM-KL43Z (first time only).
2. Connect the hardware for use with the SIGFOX network.

## 7.1 Downloading and installing the driver for the FRDM-KL43Z

This procedure involves downloading the FRDM-KL43Z driver from the P & E Microcomputer Systems website and installing it on the host PC.

1. Go to the P & E Microcomputer Systems OpenSDA page at http://www.pemicro.com/opensda and, in the **Windows USB Drivers** box, click to download the **PEDrivers_install.exe** file to a location on the host PC.




2. When the download completes, click on the **PEDrivers_install.exe** file and follow the instructions to install the driver.
3. Connect a USB cable between the host PC and the FRDM-KL43Z USB port labeled **SDA** (J13).
4. Open Windows Explorer on the host PC. An icon labeled **FRDM-KL43Z** appears as a removable drive on the PC.

The FRDM-KL43Z is now ready for use with the OM2385/SF001 development kit.

## 7.2 Connecting the hardware for use with the SIGFOX network

To connect the hardware to send messages across the SIGFOX network, do the following:

1. Check to assure that the OM2385 board is firmly attached to the FRDM-KL43Z. When connecting the boards, the three switches on the shield board should be on the same side as the USB ports on the FRDM-KL43Z board.
2. Attach the PCB antenna (included with the kit) by snapping the uFL connector on the antenna to the uFL connector on the shield board.
3. Connect the Standard A end of the supplied USB cable to a Windows host PC. Connect the Mini B to the FRDM-KL43Z USB port labeled **SDA** (J13).

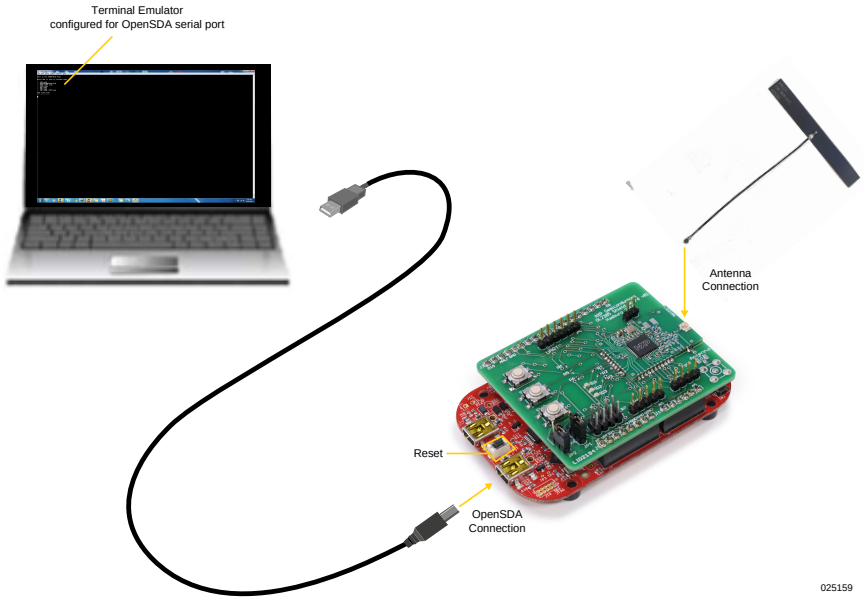



**Figure 8. OM2385SF001 development kit hardware configuration**

The OM2385/SF001 is now ready to be configured for use with the SIGFOX network.

# 8 Setting up the software

Prior to using the OM2385/FS001, the designer must:

- Configure the terminal emulator.
- Get the Device ID and the Portable Access Code (PAC) for the modem.
- Activate a SIGFOX account and register the device
- Verify that the board is successfully sending and receiving messages on the SIGFOX network

The following sections describe the process for each of the above steps.

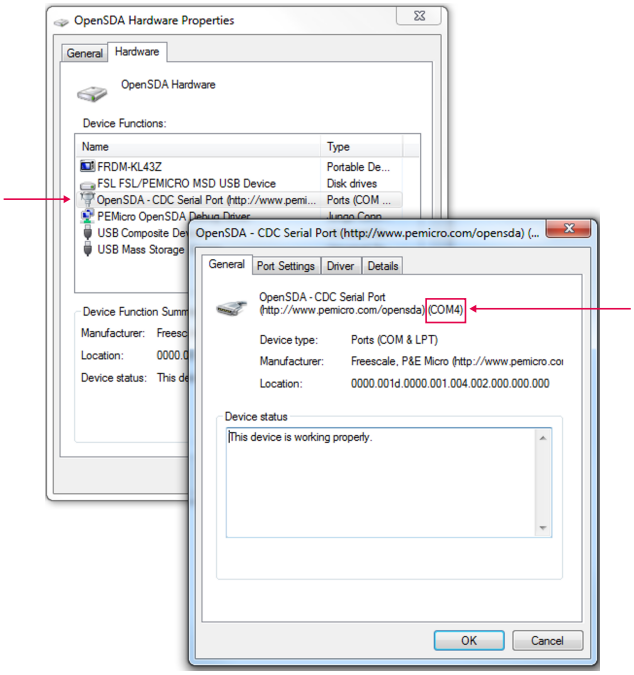
## 8.1 Configuring the terminal emulator

Prior to communicating with the SIGFOX network, the terminal emulator must be properly configured for serial communication. The process is as follows:

### 8.1.1 Getting the COM port number for the FRDM-KL43Z

Windows automatically assigns a COM port number to the FRDM-KL43Z OpenSDA port (**SDA**). This COM port number is required when connecting a terminal to the demo. To retrieve this number, do the following:

1. Assure that the USB cable is connected to the host PC through the **SDA** port on the FRDM-KL43Z.
2. From the Windows Control Panel under **Hardware and Sound** -> **Devices and Printers**, open the **Device Manager**.
3. In the Device Manager, click on **Ports (COM & LPT)**. Under **OpenSDA – CDC Serial Port**, note the COM port number.




### 8.1.2 Setting up the serial port

The terminal emulator must be configured to support serial port communication. The procedure differs depending on the type of terminal emulator in use. However, all terminal emulators must be configured with the following settings.

- The terminal must be set up to use the COM port assigned to the OpenSDA port on the FRDM-KL43Z. (See Section 8.1.1 "Getting the COM port number for the FRDM-KL43Z".)
- The COM port must be configured with the following parameters:
  - 9600 baud rate
  - 8-bit word length
  - No parity bit
  - One stop bit

Figure 9 "Serial port configuration screen" shows the setup when the Tera Term emulator is used.

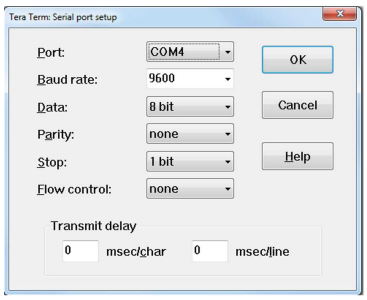
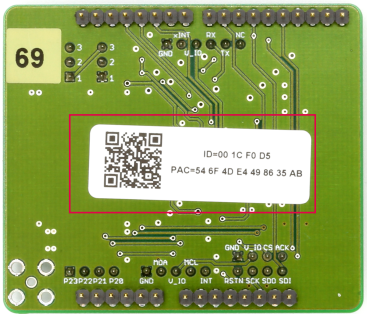



**Figure 9. Serial port configuration screen**

## 8.2 Getting the Device ID and PAC

To get the 8-digit hexadecimal Device ID and 16-digit hexadecimal Portable Access Code (PAC), proceed as follows :

1. Detach the OM2385 shield board from the FRDM-KL43Z board. Locate the sticker on the back surface of the shield board and make a note of the 8-digit hexadecimal Device ID and the 16-digit hexadecimal Portable Access Code (PAC) (shown below).

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2. Assuming that the board is configured as described in Section 7 "Configuring the hardware", connect the USB cable from the **SDA** port on the FRDM-KL43Z to the PC.
3. Activate the terminal emulator and press the reset button (**RST**) on the FRDM-KL43Z to display a numbered menu of commands. If the list of commands does not appear, the FRDM-KL43Z microcode may need to be reloaded (see Section 10 "Appendix A—Downloading microcode to the FRDM-KL43Z")
4. From the command list, select command **0** and press **Enter**.
5. The Device ID and PAC displays as shown above. The the Device ID number should be identical to the number on the board label.

## 8.3 Activating a SIGFOX account

To activate a SIGFOX account, do the following:

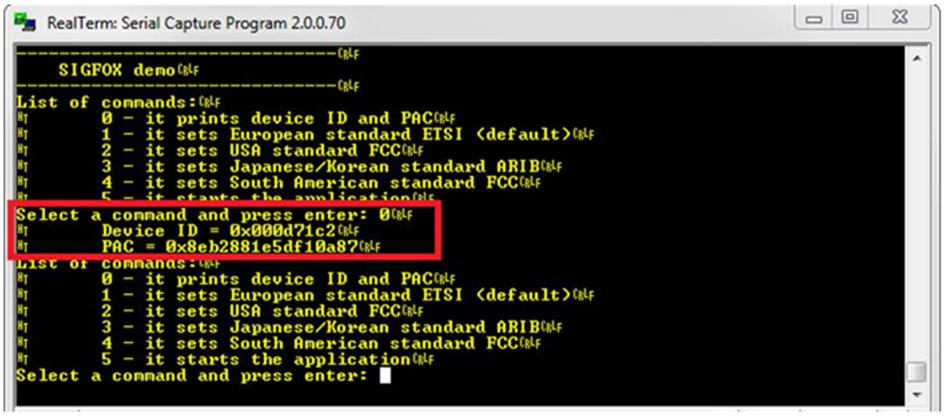
1. Go to backend.sigfox.com/activate. On the **Choose your kit provider** page, select **NXP** as the kit provider.
2. On the upper right side of the page, select **Account details**. When the **Device Kit Activation** page displays, enter the appropriate account information. Then click **SUBSCRIBE**.

3. When the **Pick Your Country** page displays, select the appropriate country and Secondary Network Operator (SNO).
4. In the page that displays, enter the Device ID and the PAC. Then click **NEXT**.

## 8.4 Verifying that the board is sending and receiving messages

To verify that the board is sending and receiving messages on the SIGFOX network, do the following:

1. Connect the **SDA** port on the FRDM-KL43Z to a USB port on the PC.
2. Activate the terminal emulator and press the reset button (**RST**) on the FRDM-KL43Z to see the following menu:




3. In the **List of commands**, select the appropriate region (**1**, **2**, **3** or **4**), then press **Enter**. This configures the device according to the selected regional standards. (This selection will have to be made every time the board is re-connected through the **SDA** port.)
4. To start the application, select the command **5** and press **Enter**.
5. Login to the SIGFOX account created in Section 8.3 "Activating a SIGFOX account".
6. Pick up the OM2385/SF001 board and do one of the following:
   - Using a twisting motion, vigorously shake the board back and forth a few times.
   - Press either the SW1 or the SW2 button on the board

   Both methods generate a message to the SIGFOX network.
7. Return to the SIGFOX page and click on Device's ID. Then click **Messages**. A screen displays showing each message transmitted. The first byte of the message determines data type as follows:

**Table 8. SIGFOX message - first byte format**

| Value (HEX) | Description | Unit of measurement |
|---|---|---|
| 01 | Temperature | Degrees Centigrade |
| 02 | Illuminance | Lumens (lx) |
| 03 | Acceleration | Thousandths of a gravitational field strength units (mg) |

Figure 10 shows a typical SIGFOX message screen.

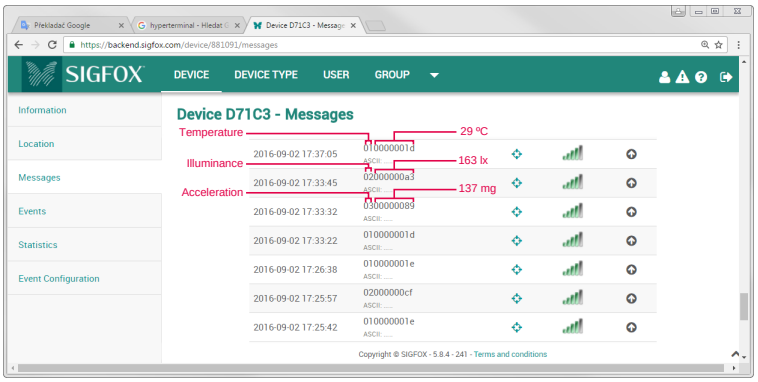



**Figure 10. SIGFOX message screen**

# 9 Schematics, board layout and bill of materials

OM2385/SF001 board schematics, board layout and bill of materials are available in the Jump Start section of the Tool summary page at the following URL: http://www.nxp.com/OM2385

# 10 Appendix A—Downloading microcode to the FRDM-KL43Z

The OM2385/SF001 development kit comes with microcode already loaded on the FRDM-KL43Z. This appendix is intended for use only if the factory installed microcode is no longer functional and a fresh copy needs to be flashed to the board.

The procedure involves downloading the appropriate driver from the P & E Microcomputer Systems website and installing it on the FRDM-KL43Z board.

1. Go to the P & E Microcomputer Systems OpenSDA page at http://www.pemicro.com/opensda and in the **OpenSDA Firmware (MSD & Debug)** box, click to download the **Firmware Apps** zip file.
2. When the download completes, unzip the file contents to a folder on the host PC.
3. Connect the Standard A plug of the USB cable to the host PC.
4. On the FRDM-KL43Z, press and hold down the **Reset** button. With the button held down, attach the mini-B plug of the USB cable to the FRDM_KL43Z USB port labeled **SDA** (J13). Then release the **Reset** button. A blinking LED indicates the board is in Bootloader mode.
5. Open Windows Explorer on the host PC. An icon labeled **BOOTLOADER** appears as a removable drive on the PC.
6. From the files extracted from the PEMicro zip file, locate the driver file named **MSD-DEBUG-FRDM-KL43Z48M_Pemicro_v118.SDA**. Drag and drop this file onto the **BOOTLOADER** icon.
7. Unplug the USB mini-B plug then re-insert the plug back into the SDA port. A blinking LED on the board indicates that the FRDM-KL43Z is in bootload mode.
8. Go to the OM2385/SF001 Tool Summary page at http://www.nxp.com/OM2385 and open the Jump Start page. From the list of items, select and download the microcode file **FRDM_KL43_OL2385_DemoConsole.srec**.

9. Drag and drop the microcode file **FRDM_KL43_OL2385_DemoConsole.srec** onto the **FRDM-KL43Z** icon on the host PC.
10. Unplug the USB mini-B plug from the SDA port. The microcode is now installed and launches automatically each time the board is turned on.

## 11 Revision history

| Revision | Date | Description of changes |
|---|---|---|
| 1.0 | 10/2016 | Initial release |

## 12 References

The following URLs reference related NXP products and application solutions:

| NXP.com support pages | Description | URL |
|---|---|---|
| OM2385/SF001 | Tool summary page | http://www.nxp.com/OM2385 |

## 13 Contact information

Visit http://www.nxp.com/support for a list of phone numbers within your region.
Visit http://www.nxp.com/warranty to submit a request for tool warranty.

# Tables

# Figures

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For more information, please visit: http://www.nxp.com
For sales office addresses, please send an email to: salesaddresses@nxp.com
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