Sigfox_Silica Documentation

Release 0

Silica

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Contents

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Sigfox's Long Range Low Power End Node solution

CHAPTER 2
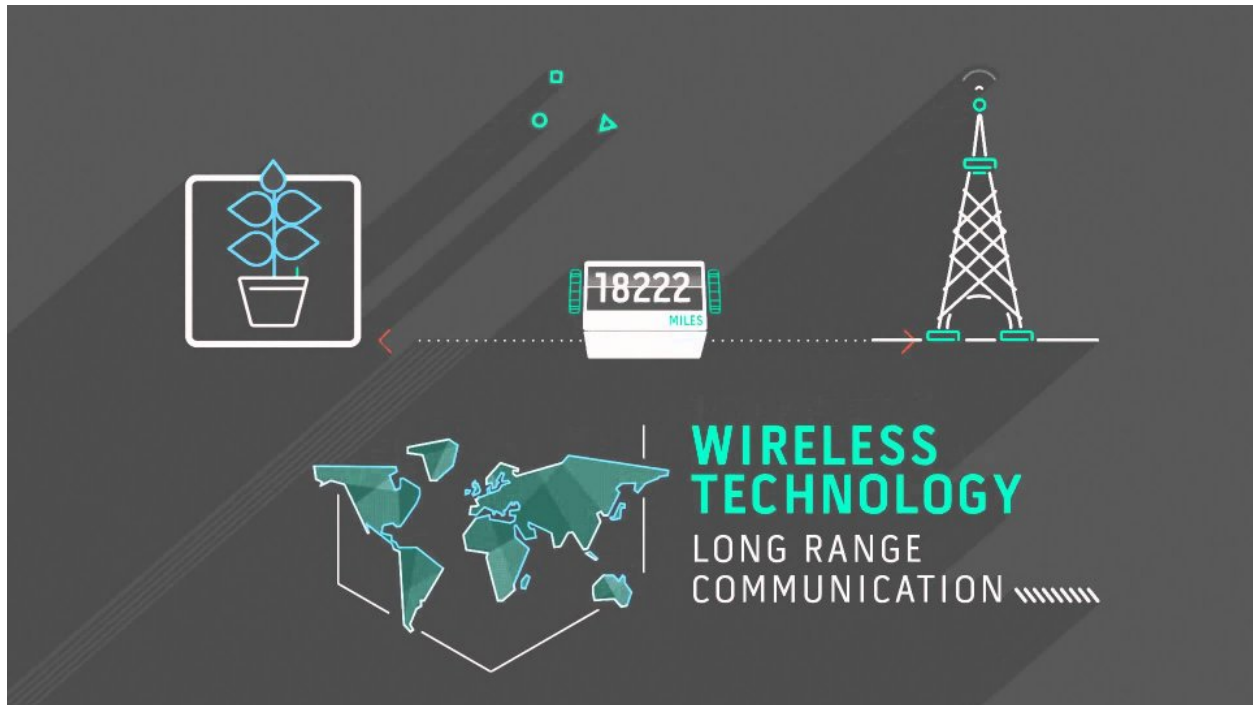
INTRODUCTION

Telecom Design's **TD1207** devices are high performance, low current SIGFOXTM gateways. The combination of a powerful radio transceiver and a state-of-the-art ARM Cortex M3 baseband processor achieves extremely high performance while maintaining ultra-low active and standby current consumption. The **TD1207** device offers an outstanding RF sensitivity of – 126 dBm while providing an exceptional output power of up to +14 dBm with unmatched TX efficiency. The **TD1207** device versatility provides the gateway function from a local Narrow Band ISM network to the long-distance Ultra Narrow Band SIGFOXTM network with no additional cost. The broad range of analog and digital interfaces available in the **TD1207** module allows any application to interconnect easily with the SIGFOXTM network. The LVTTL low- energy UART, along with the numerous GPIOs can control any kind of external sensors or activators. Featuring an AES encryption engine and a DMA controller, the powerful 32-bit ARM Cortex-M3 baseband processor can implement highly complex and secure protocols in an efficient environmental and very low consumption way.

Features:

- SIGFOX READY

- Frequency range = ISM 868 MHz

- Receive sensitivity =-126 dBm

- **Modulation:**

    - (G)FSK, 4(G)FSK, GMSK,

    - OOK

- Max output power: +14 dBm

- **Low active radio power consumption:**

    - 13/16 mA RX,

    - 37 mA TX @ +10 dBm

- Power supply = 2.3 to 3.3 V

Developement tools

Firmware developed using: NXP Codewarrior. For installation and configuration of the project, follow instruction inside *Developing guide*

Document references

The board reference documentation is available on the architech-board website.

Contents:

Developing guide

This guide will provide instructions to install the development environment needed to compile and debug the demo firmware of the PMOD-Sigfox. The development system is built for Windows. The main steps are:

- Install Codewarrior Special Edition Software
- Import build & debug the source project

Hardware required:

- PMOD-Sigfox
- RSR1066 board
- FRDM-KL26Z board by Freescale
- Mini-USB cable
- PC with Windows

Install Codewarriror

Special Editions are fully functional free download versions of the CodeWarrior Development Studio with code size restrictions on the build chain. Special Editions are pre-licensed, not bound to a single machine and are not time restricted. You do not need to register the tools or ask for a license.
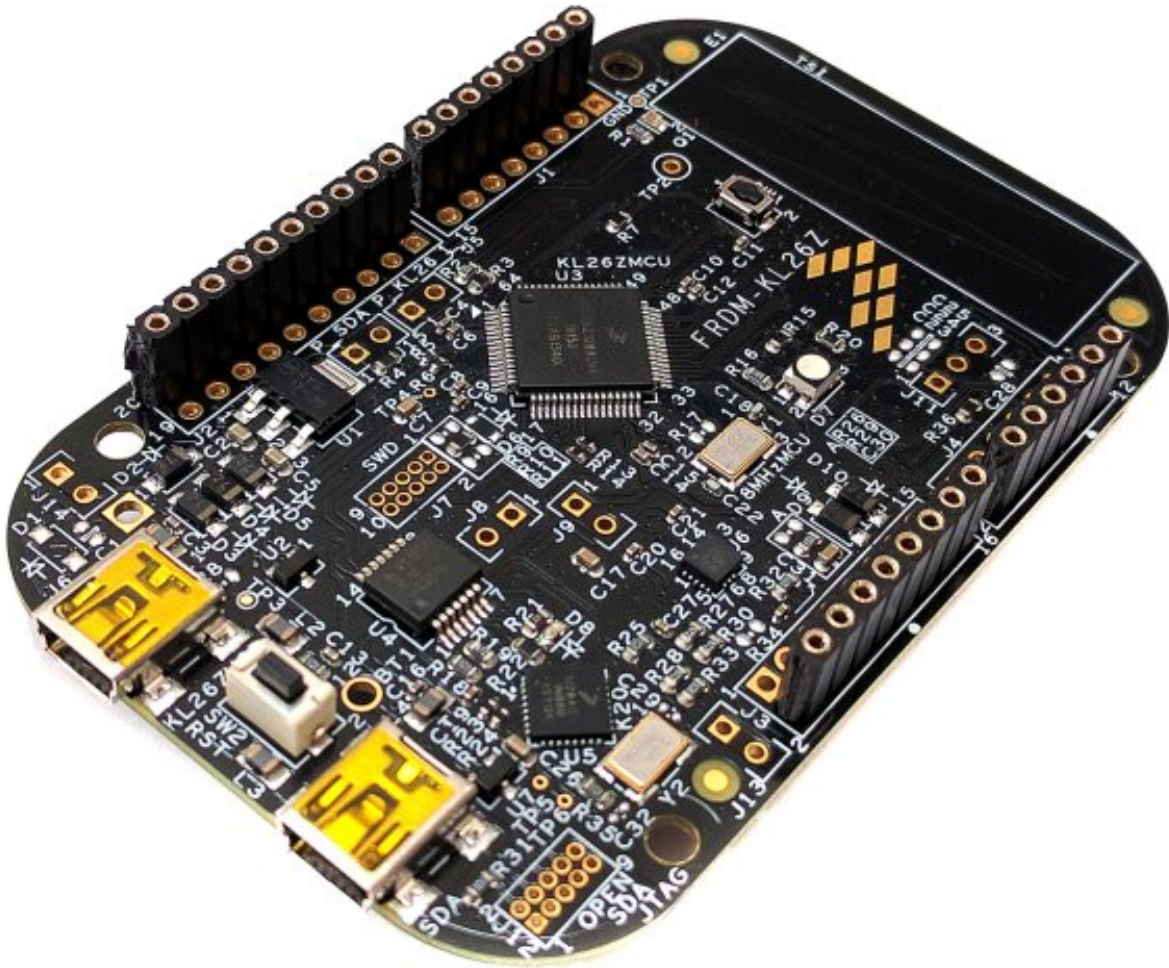
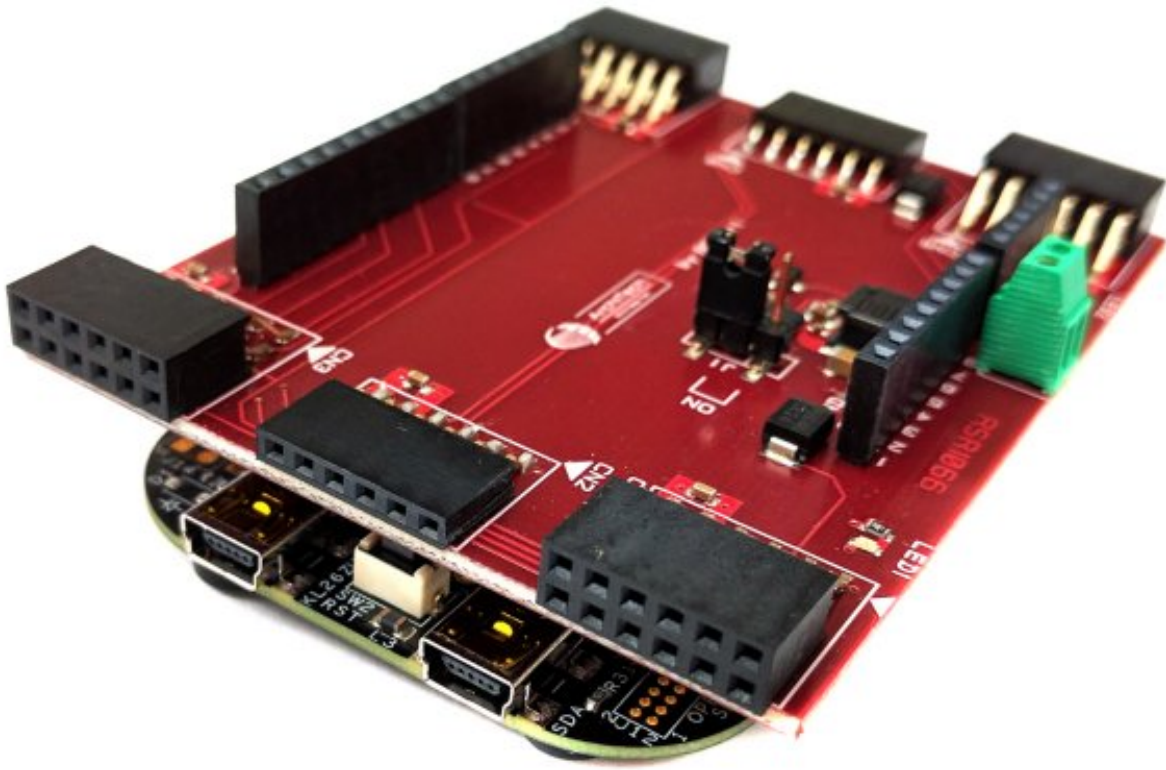Download the IDE from this page, we used Codewarriror for Microcontrollers **v10.6.4**.

Next, launch the downloaded file **CW_MCU_v10.6.4_Special_Edition.exe** following all the default options and selecting **Kinetis** as platform. Once it is installed will be created its icon on the desktop.
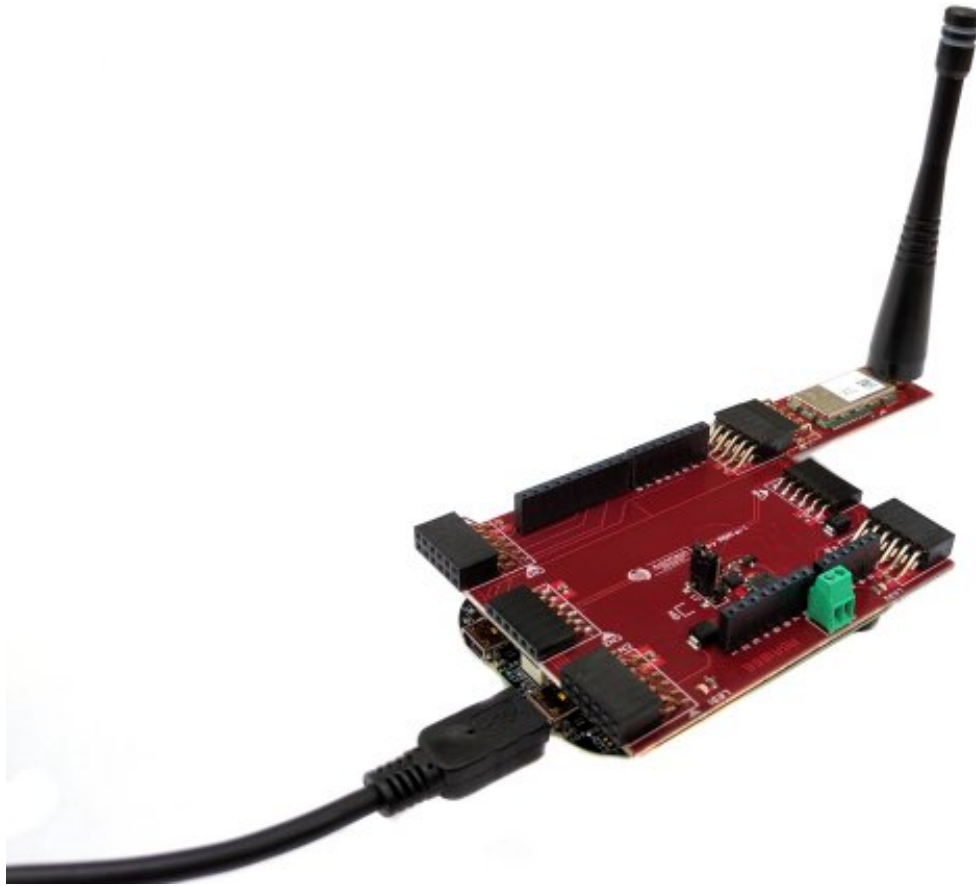

Prepare the Hardware

Here you will see all the messages sent by your device. Now take the FRDM-KL26Z board and connect it to the RSR1066 board. It is required mount the strip connectors:

Connect the PMOD module to the CN7 then power supply the FRDM board via mini USB connection.
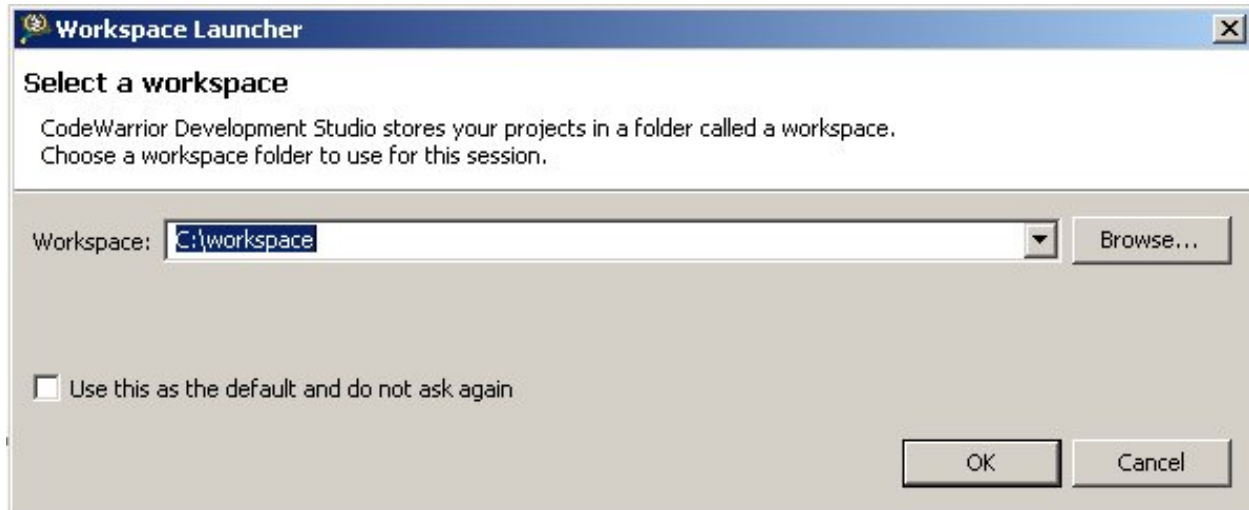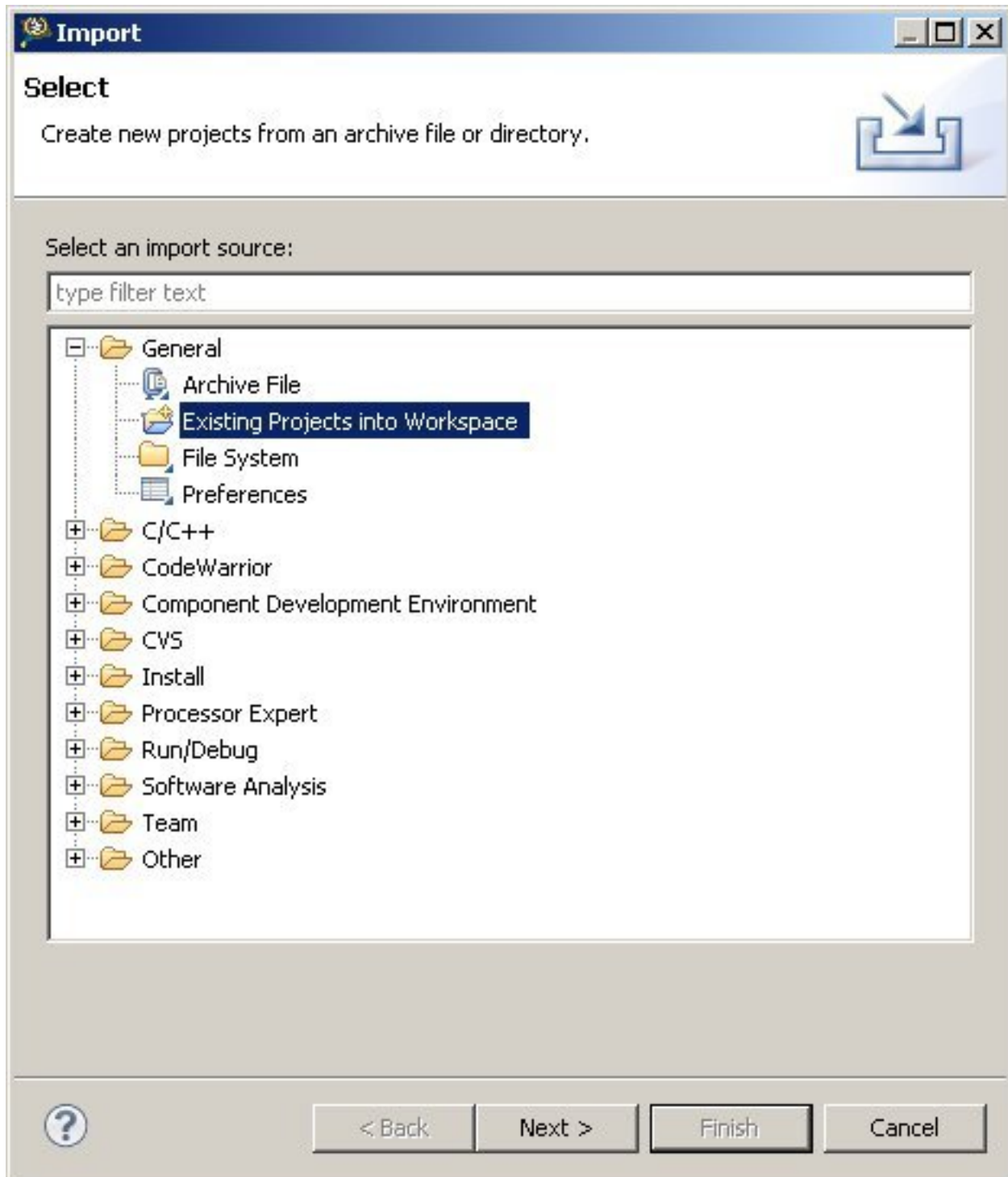
Configure the FRDM-KL26Z with OpenSDA interface

1. In order to install the lastest firmware go to the webpage OpenSDA Support.

2. Download and install **Windows USB Drivers Download PEDrivers_install.exe** from pemicro website. It is required to register in the website.

3. Then download the lastest Firmware Apps (.zip file).

4. Finally connect the FRDM-KL26Z board to the PC via mini-USB connector **OpenSDA**, remove the 1066 board and set the board in Bootloader mode (hold the Reset button down while connecting to USB, then release it). Your board will then be visible as a drive labelled **BOOTLOADER**. From the **Firmware Apps** zip copy into the BOOTLOADER disk the file **MSD-DEBUG-FRDM-KL26Z_Pemicro_vXXX.SDA** (where XX is the lastest version). Now unplag the USB cable.
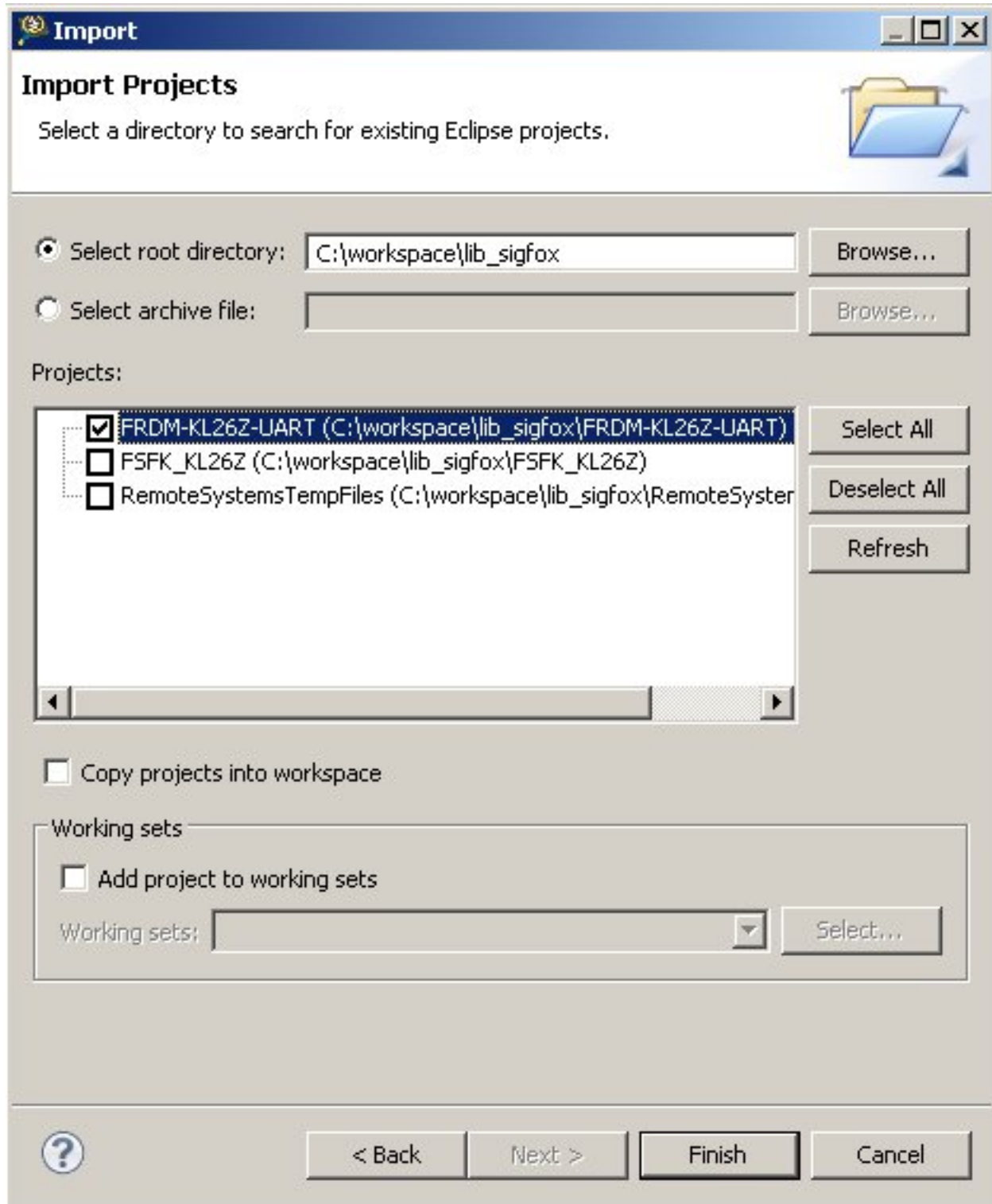
Import Project

1. Create a folder named "workspace"

2. Download the project file form architechboards website and unzip it into the new folder.

3. Launch Codewarrior and select a folder for the workspace. Our project will be imported in this directory. In this guide we used this path:

4. Go to **File -> Import...**

5. Select **General -> Existing Projects into Workspace** and click on **Next >** button.
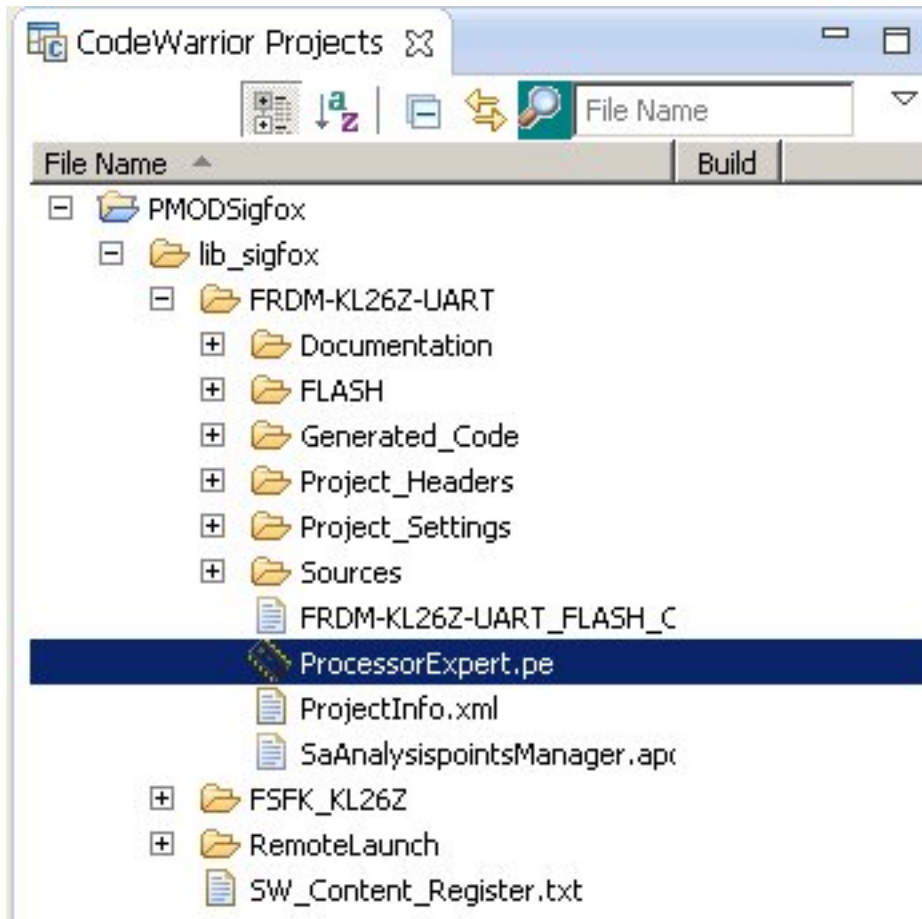
6. Select the folder where is locate the project **lib_sigfox** and select **FRDM-KL26Z-UART**. Then click on **Finish**.
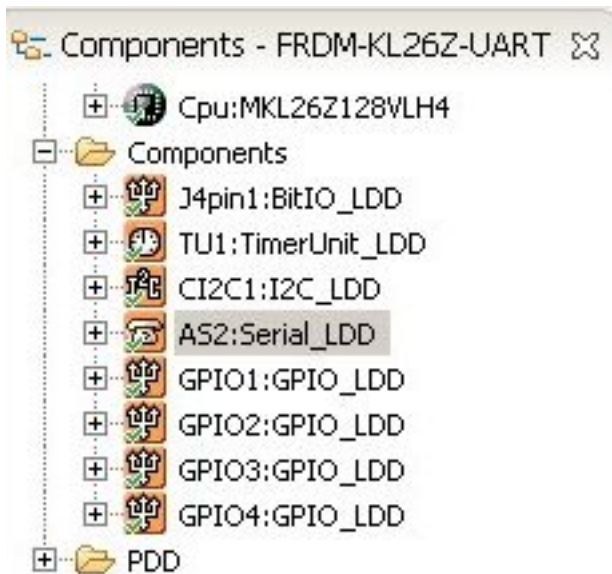
Build & Debug

If you want download the firmware in the board without debugging it go to step 5. In order to debug the code you have to change the UART port because **PTA1** and **PTA2** are used for debug purpose from the OpenSDA.

1. Now you have to open **Process Expert Window** double clicking on **ProcessorExpert.pe**

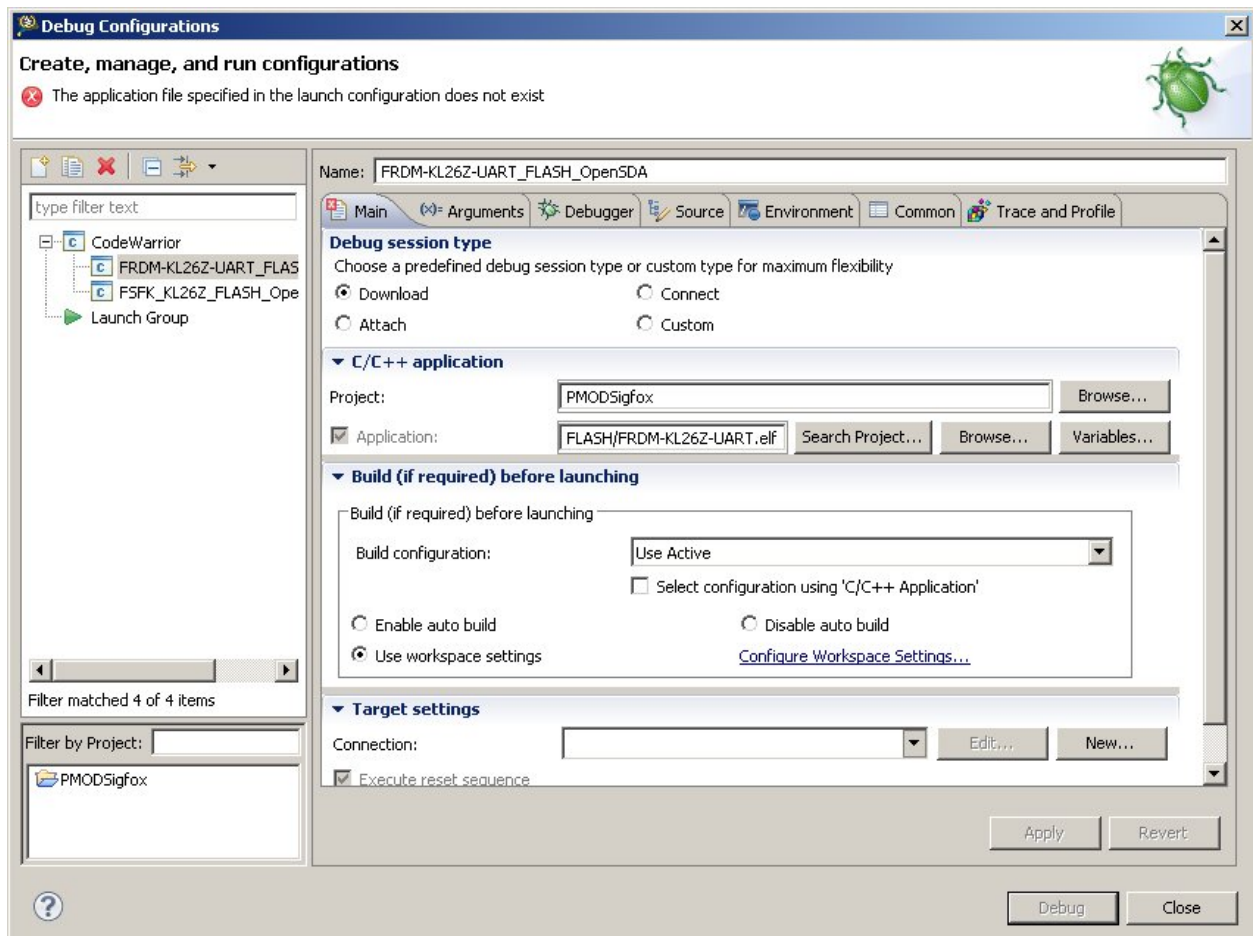2. In **Components - FRDM-KL26Z-UART** tab select **AS2:Serial_LDD** node

3. In **Component Inspector - A2** select RxD **PTD6** and TxD **PTD7**

⊟ **Receiver**	Enabled	
RxD	ADC0_SE7b/PTD6/LLWU_P15/SPI1_...	ADC0_SE7b/PTD6/LLWU_P15/SPI1_...
⊟ **Transmitter**	Enabled	
TxD	PTD7/SPI1_MISO/UART0_TX/SPI1_M...	PTD7/SPI1_MISO/UART0_TX/SPI1_M...

4. In order to debug you have to connect **PTD6** with **CN7 pin3** and **PTD7** with **CN7 pin2** as in figure. These pin must be disconnected from the board **1066**.

5. Now it's time to compile the sources code, go to **Project -> Build All**

6. Once compiling is finished connect the mini usb from the PC to the FRDM board. Then go to **Run -> Debug configurations...**

7. Finally select FRDM-KL26Z-UART_FLASH_OpenSDA and choose the type of connection **OpenSDA** than click on the **Debug** button.

Processor Expert

Processor Expert Software is a development system to create, configure, optimize, migrate, and deliver software components that generate source code for the microcontroller. For more information please go here,
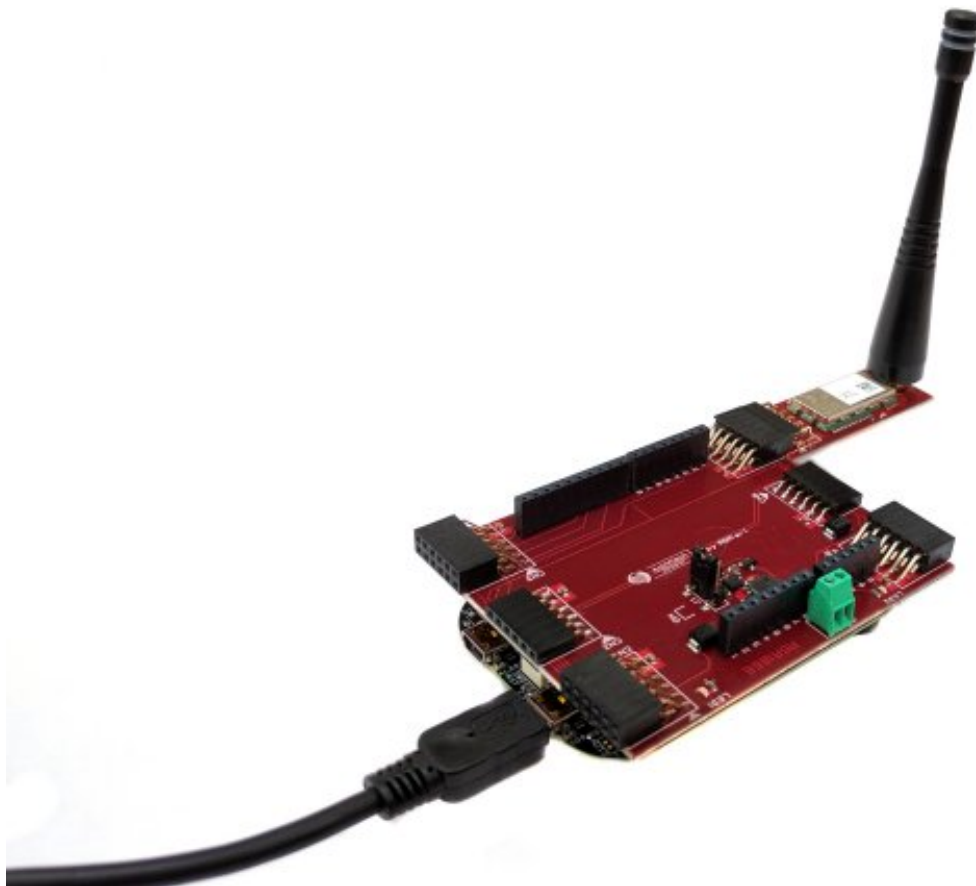
Hardware Guide

The board is provided with:

- NXP KL26Z board
- TD1207 Module Sigfox
- RSR1066 board

The TD1207 module provides a protocol connectivity using a simple UART interface. The NXP **MKLS26Z** is connected to the TD1207 module using the configuration 9600 8N1 without using RTS, CTS lines.

The board

Commands used

The comand to send data in the Lora network is:

- **AT$SS=18 AA BB CC**: used to send the frame *18AABBCC*

Datasheet and more

Please refer to architechboards website.

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