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ADF4360 - Microcontroller No-OS Driver

Supported Devices

- ADF4360-0
- ADF4360-1
- ADF4360-2
- ADF4360-3
- ADF4360-4
- ADF4360-5
- ADF4360-6
- ADF4360-7
- ADF4360-8
- ADF4360-9

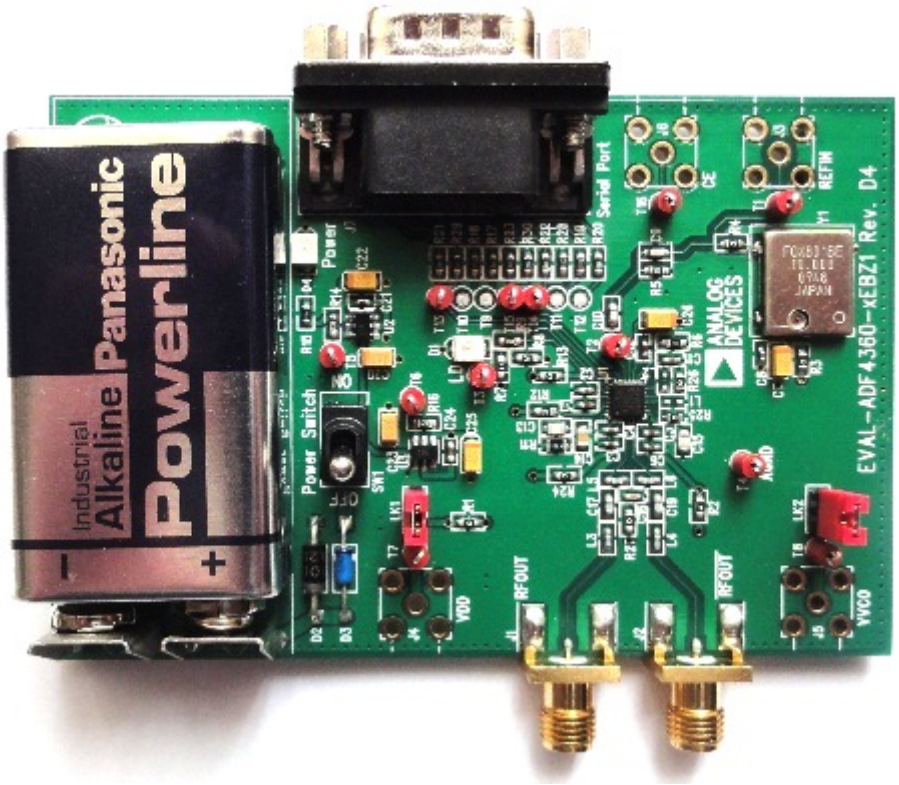
Evaluation Boards

- EVAL-ADF4360-0EBZ1
- EVAL-ADF4360-1EBZ1
- EVAL-ADF4360-2EBZ1
- EVAL-ADF4360-3EBZ1
- EVAL-ADF4360-4EBZ1
- EVAL-ADF4360-5EBZ1
- EVAL-ADF4360-6EBZ1
- EVAL-ADF4360-7EBZ1
- EVAL-ADF4360-8EBZ1
- EVAL-ADF4360-9EBZ1

Overview

The ADF4360-0, ADF4360-1, ADF4360-2, ADF4360-3, ADF4360-4, ADF4360-5, ADF4360-6, ADF4360-7, ADF4360-8 and ADF4360-9 are fully integrated integer-N synthesizers and voltage controlled oscillators (VCOs). The ADF4360-0, ADF4360-1, ADF4360-2, ADF4360-3, ADF4360-4, ADF4360-5, ADF4360-6, ADF4360-7, ADF4360-8 and ADF4360-9 are designed for a center frequency of 2600 MHz (ADF4360-0), 2250 MHz (ADF4360-1), 2000 MHz(ADF4360-2), 1750 MHz(ADF4360-3), 1600 MHz(ADF4360-4), 1300 MHz(ADF4360-5), 1150 MHz (ADF4360-6) or a frequency which is set by external inductors between 350 MHz to 1800 MHz(ADF4360-7) or 65 MHz to 400 MHz (ADF4360-8 and

ADF4360-9) . In addition, a divide option is available. Control of all the on-chip registers is through a simple 3-wire interface. The devices operate with a power supply ranging from 3.0 V to 3.6 V and can be powered down when not in use.



The goal of this project (Microcontroller No-OS) is to be able to provide reference projects for lower end processors, which can't run Linux, or aren't running a specific operating system, to help those customers using microcontrollers with ADI parts. Here you can find a generic driver which can be used

as a base for any microcontroller platform and also specific drivers for Renesas platforms.

HW Platform(s):

- EVAL-ADF4360-0EBZ1 (ADI)
- EVAL-ADF4360-1EBZ1 (ADI)
- EVAL-ADF4360-2EBZ1 (ADI)
- EVAL-ADF4360-3EBZ1 (ADI)
- EVAL-ADF4360-4EBZ1 (ADI)
- EVAL-ADF4360-5EBZ1 (ADI)
- EVAL-ADF4360-6EBZ1 (ADI)
- EVAL-ADF4360-7EBZ1 (ADI)
- EVAL-ADF4360-8EBZ1 (ADI)
- EVAL-ADF4360-9EBZ1 (ADI)
- Renesas Demo Kit for RL78G13 (Renesas)
- Renesas Demo Kit for RX62N (Renesas)

Driver Description

The driver contains two parts:

- The driver for the ADF4360-x part, which may be used, without modifications, with any microcontroller.
- The Communication Driver, where the specific communication functions for the desired type of processor and communication protocol have to be implemented. This driver implements the communication with the device and hides the actual details of the communication protocol to the ADI driver.

The Communication Driver has a standard interface, so the ADF4360-x driver can be used exactly as it is provided. There are three functions which are called by the ADF4360-x driver:

- SPI_Init() – initializes the communication peripheral.
- SPI_Write() – writes data to the device.
- SPI_Read() – reads data from the device.

Driver architecture

The implementation of these three functions depends on the used microcontroller.

The following functions are implemented in this version of ADF4360 driver:

Function	Description
unsigned char ADF4360_Init(unsigned char adf4360Version)	Initialize the device.
void ADF4360_Write(unsigned long data)	Write data into a register.
void ADF4360_Power(unsigned char powerMode)	Powers down or powers up the device.
unsigned long long ADF4360_SetFrequency(unsigned long long frequency)	Sets the ADF4360 frequency.

Downloads

- ADF4360 Generic Driver
- ADF4360 RL78G13 Driver
- ADF4360 RX62N Driver

Renesas RL78G13 Quick Start Guide

This section contains a description of the steps required to run the ADF4360 demonstration project on a Renesas RL78G13 platform.

Required Hardware

- Renesas Demo Kit for RL78G13 (Renesas)
- EVAL-ADF4360-0EBZ1 (ADI)
- EVAL-ADF4360-1EBZ1 (ADI)
- EVAL-ADF4360-2EBZ1 (ADI)
- EVAL-ADF4360-3EBZ1 (ADI)
- EVAL-ADF4360-4EBZ1 (ADI)
- EVAL-ADF4360-5EBZ1 (ADI)
- EVAL-ADF4360-6EBZ1 (ADI)
- EVAL-ADF4360-7EBZ1 (ADI)
- EVAL-ADF4360-8EBZ1 (ADI)
- EVAL-ADF4360-9EBZ1 (ADI)

Required Software

- IAR Embedded Workbench for Renesas RL78 Kickstart

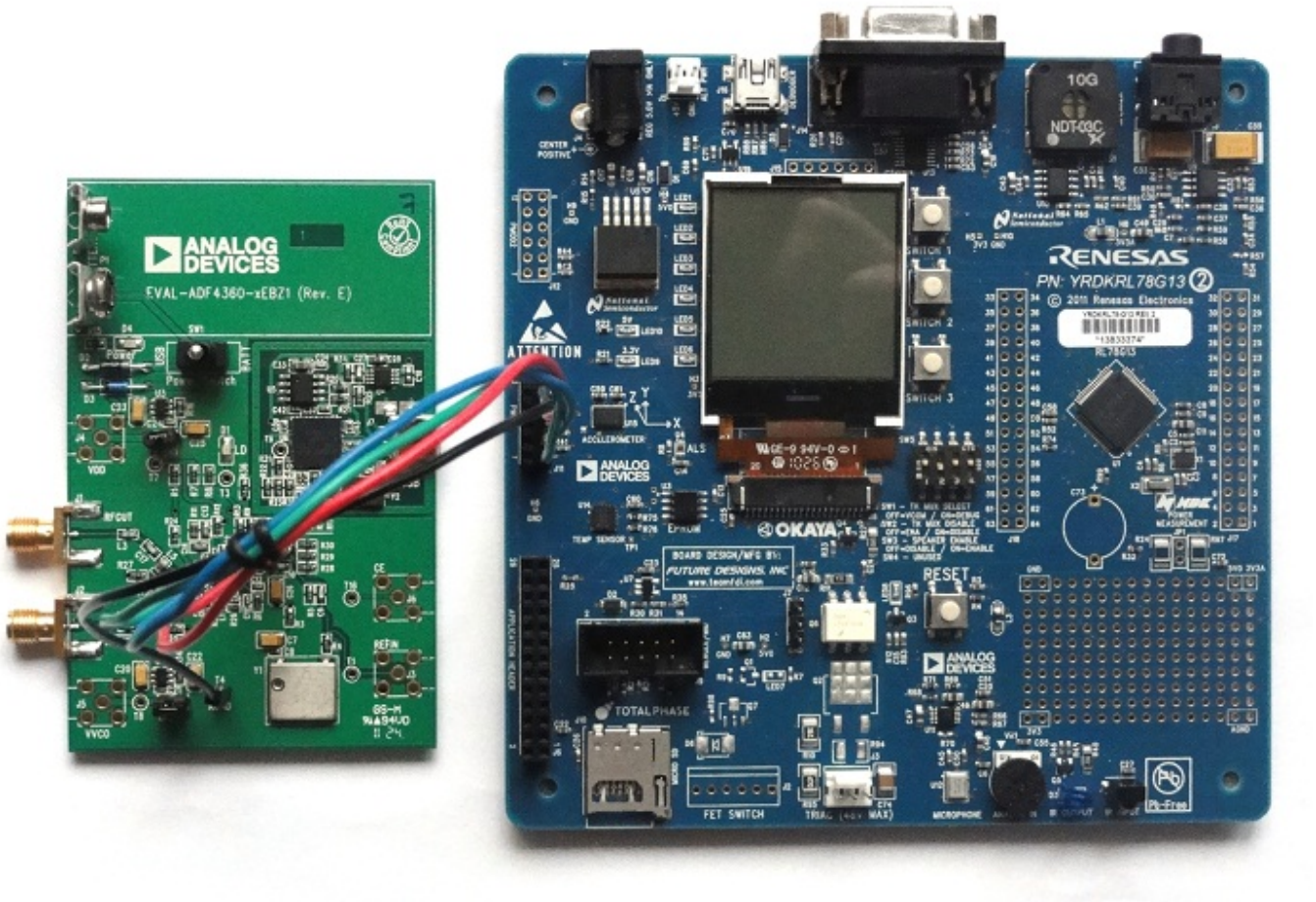
Hardware Setup

An EVAL-ADF4360-xEBZ1 board has to be interfaced with the Renesas Demonstration Kit (RDK) for RL78G13.

There are two types of boards: with USB connector or with DB9 connector.

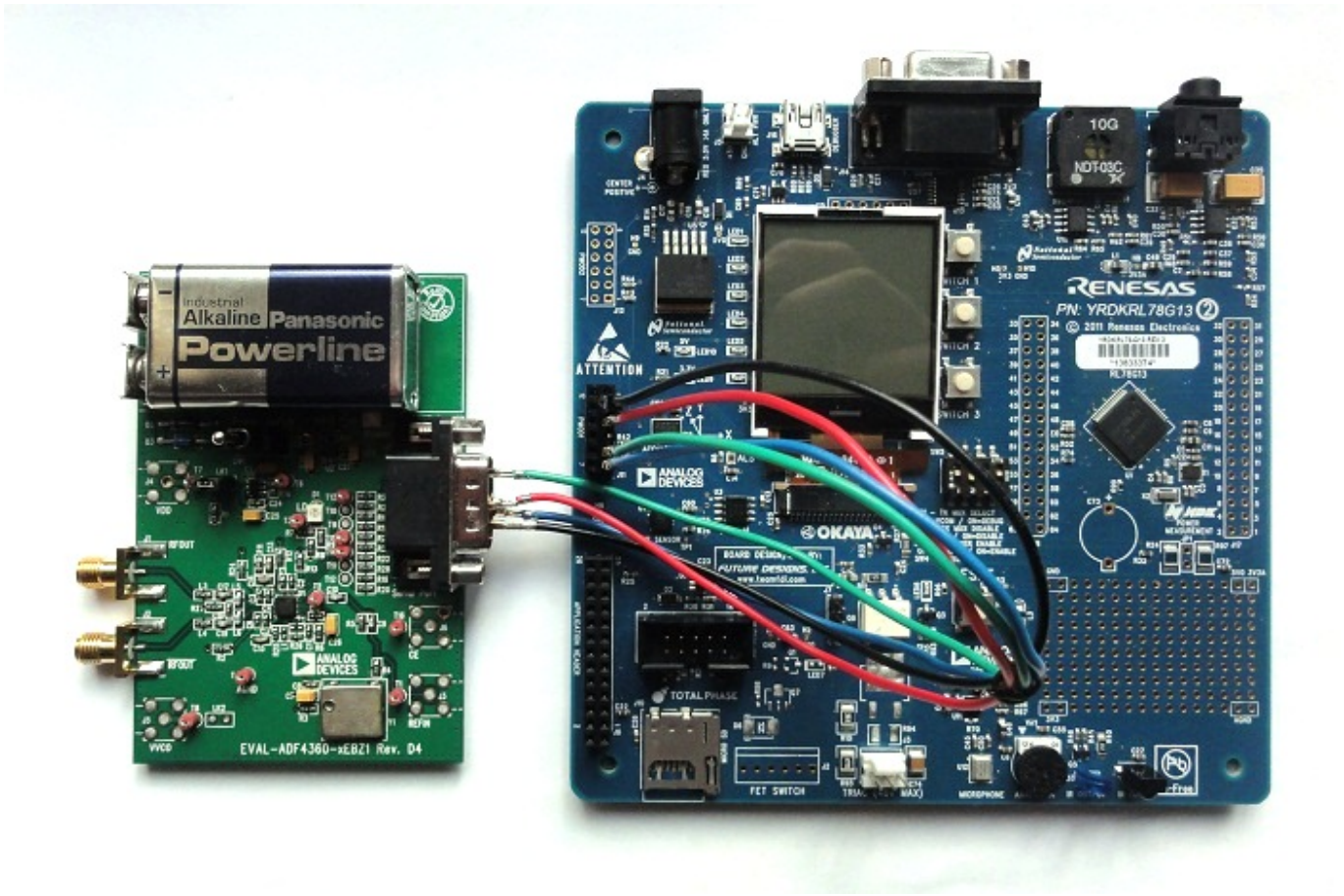
Eval board with USB connector:

```
T4  (GND)  → RL78G13 J11 connector Pin 5
T13 (DATA) → RL78G13 J11 connector Pin 2
T14 (LE)   → RL78G13 J11 connector Pin 1
T15 (CLK)  → RL78G13 J11 connector Pin 4
```



Eval board with DB9 connector:

```
9 Way D-Type connector Pin 3 (CLK)  → RL78G13 J11 connector Pin 4
9 Way D-Type connector Pin 5 (DATA) → RL78G13 J11 connector Pin 2
9 Way D-Type connector Pin 6 (GND)  → RL78G13 J11 connector Pin 5
9 Way D-Type connector Pin 7 (LE)   → RL78G13 J11 connector Pin 1
```



Reference Project Overview

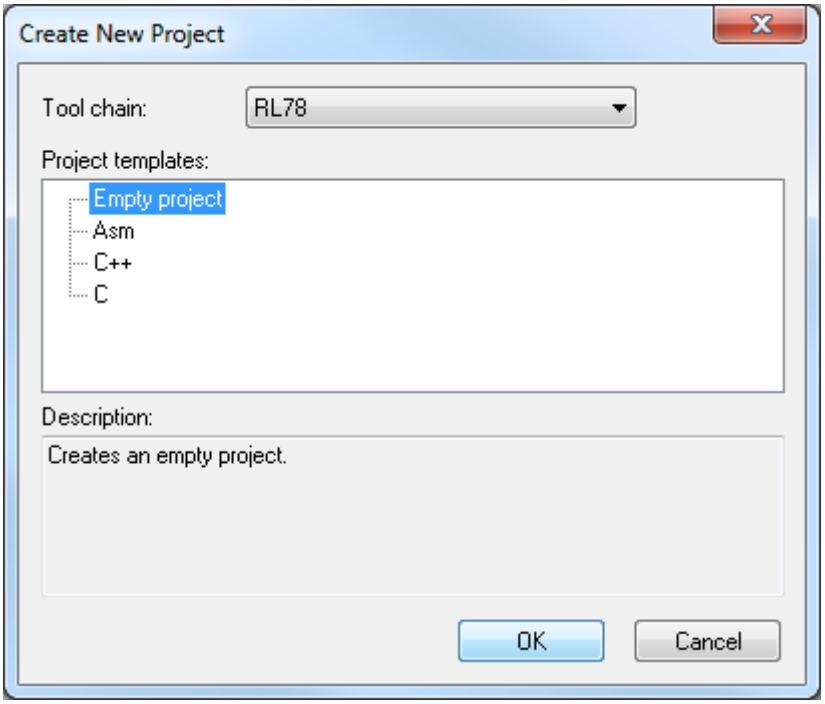
In this example the output frequency of the device is set to 900 MHz.

Software Project Tutorial

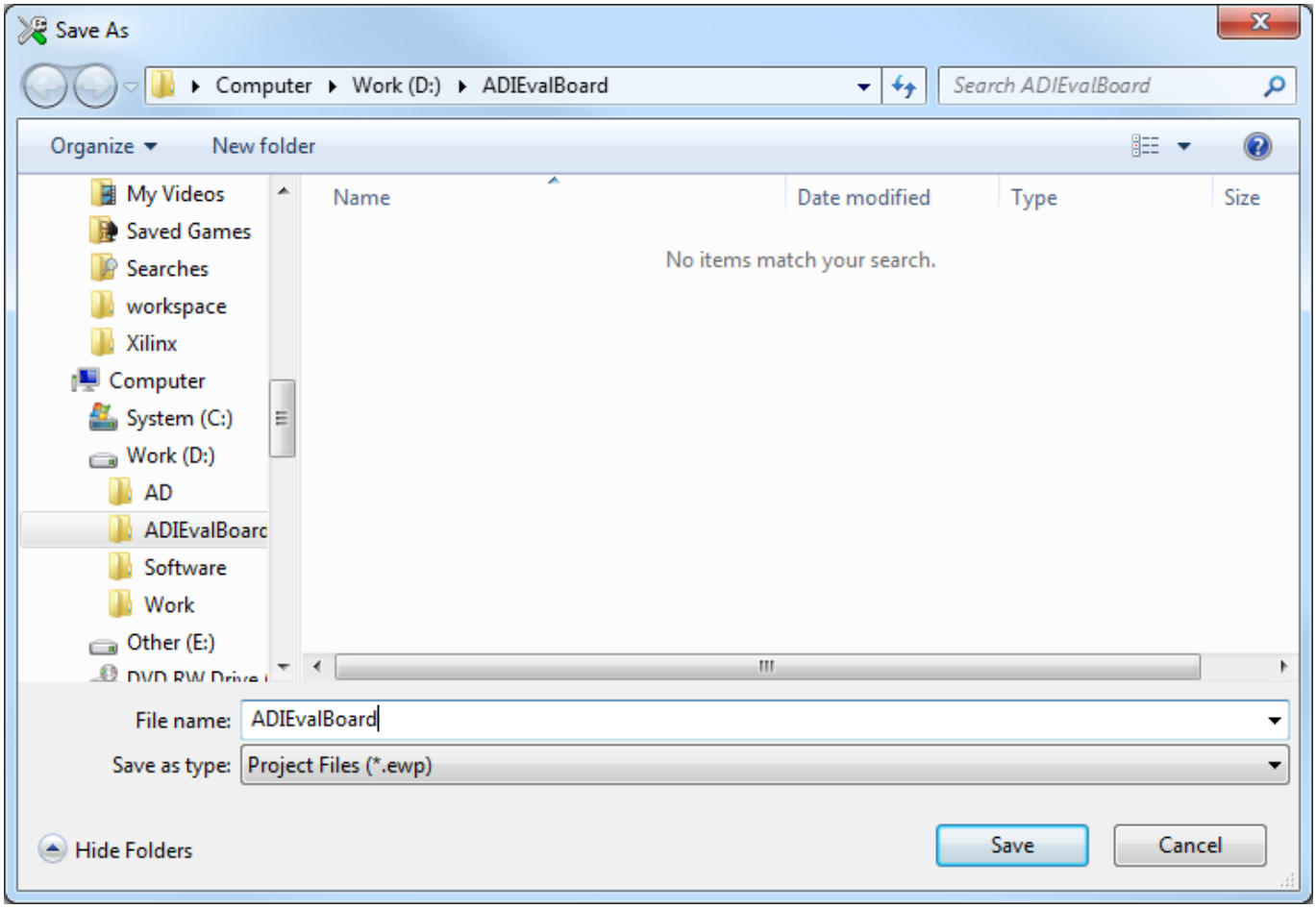
This section presents the steps for developing a software application that will run on the ***Renesas***

Demo Kit for RL78G13 for controlling and monitoring the operation of the ***ADI*** part.

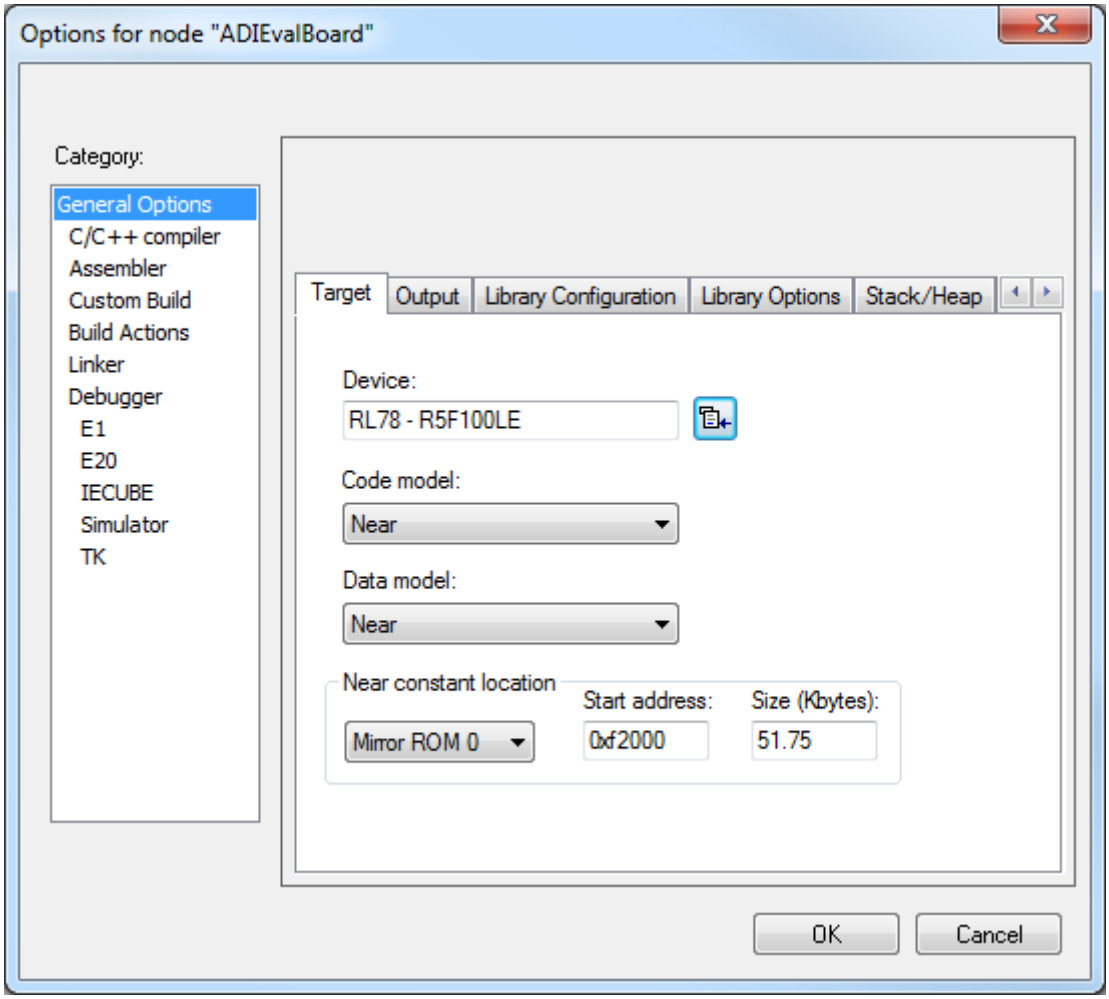
- Run the ***IAR Embedded Workbench for Renesas RL78*** integrated development environment.
- Choose to create a new project (***Project – Create New Project***).
- Select the ***RL78*** tool chain, ***the Empty project*** template and click ***OK***.



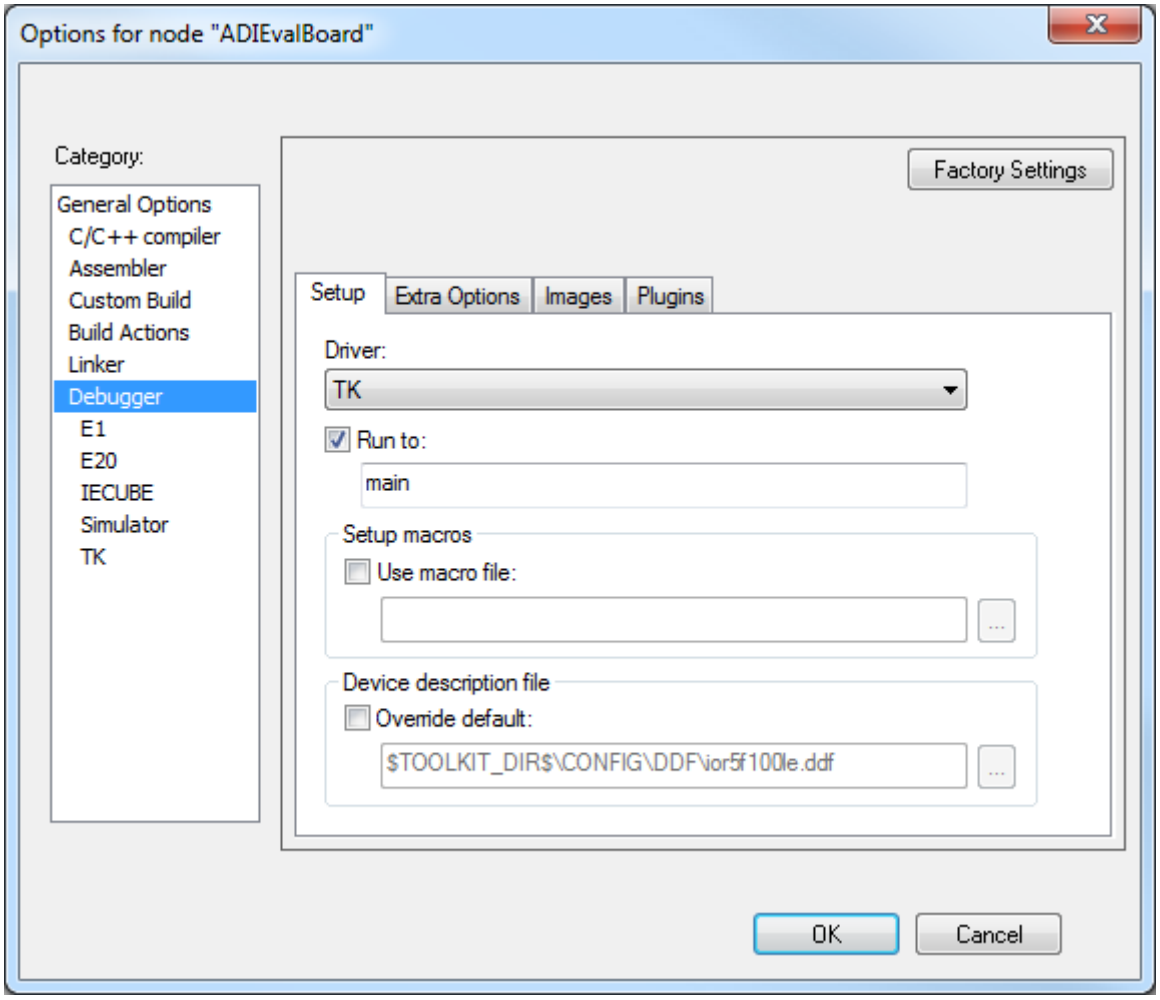
- Select a location and a name for the project (***ADIEvalBoard*** for example) and click ***Save***.



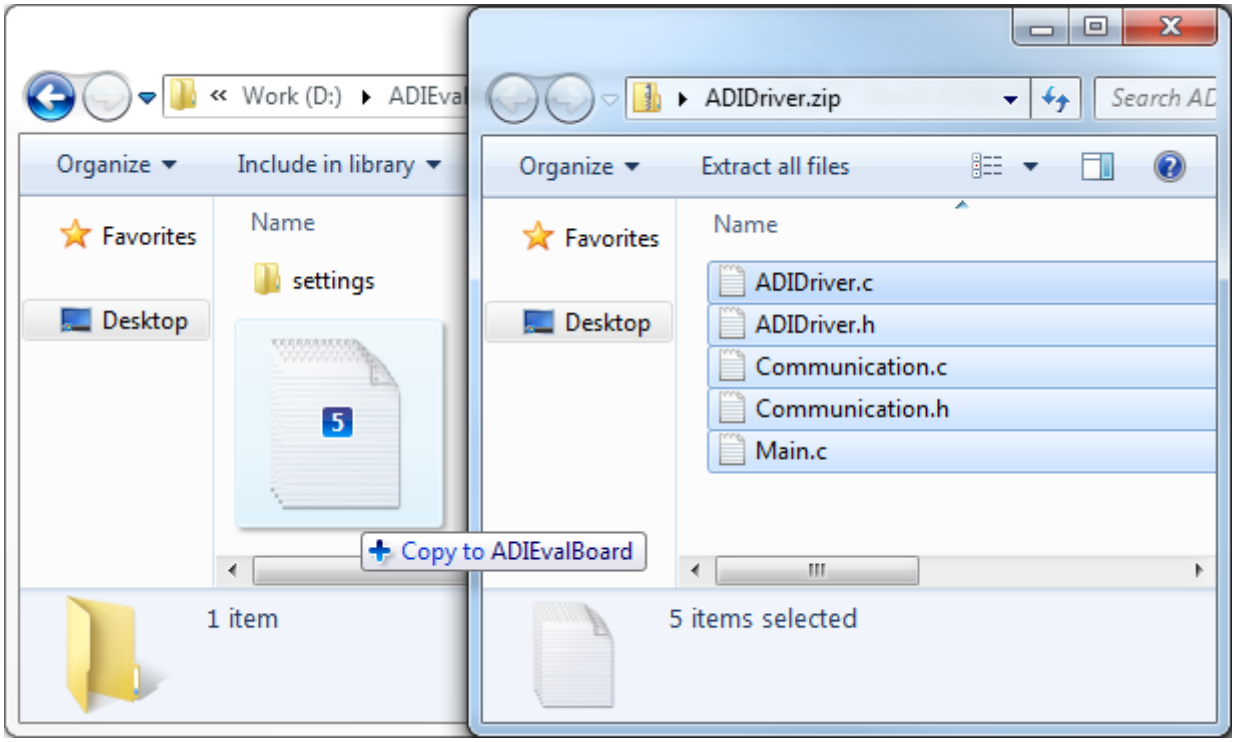
- Open the project's options window (***Project – Options***).
- From the ***Target tab*** of the ***General Options*** category select the ***RL78 – R5F100LE*** device.



- From the ***Setup*** tab of the ***Debugger*** category select the ***TK*** driver and click ***OK***.

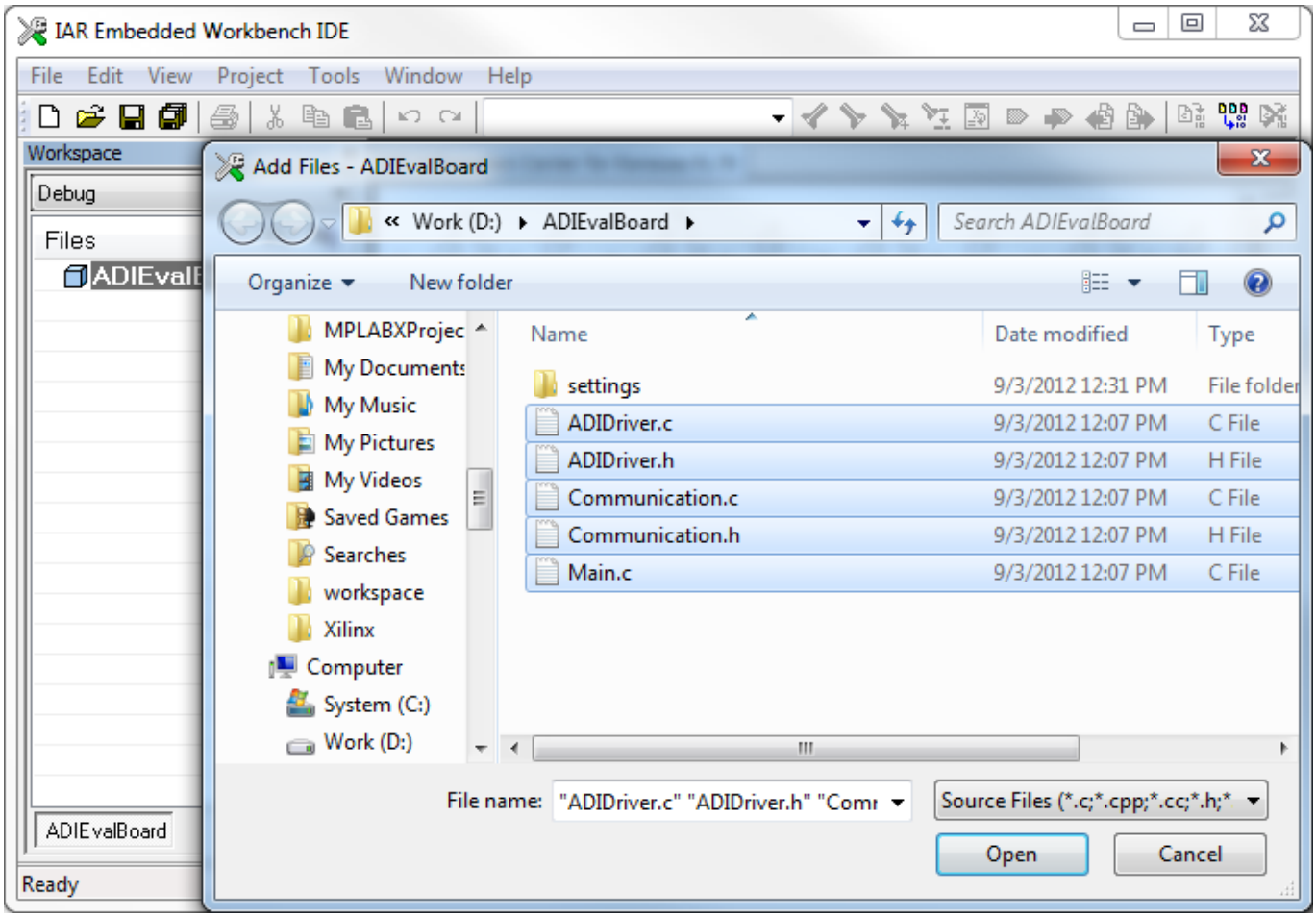


- Extract the files from the lab .zip archive and copy them into the project's folder.

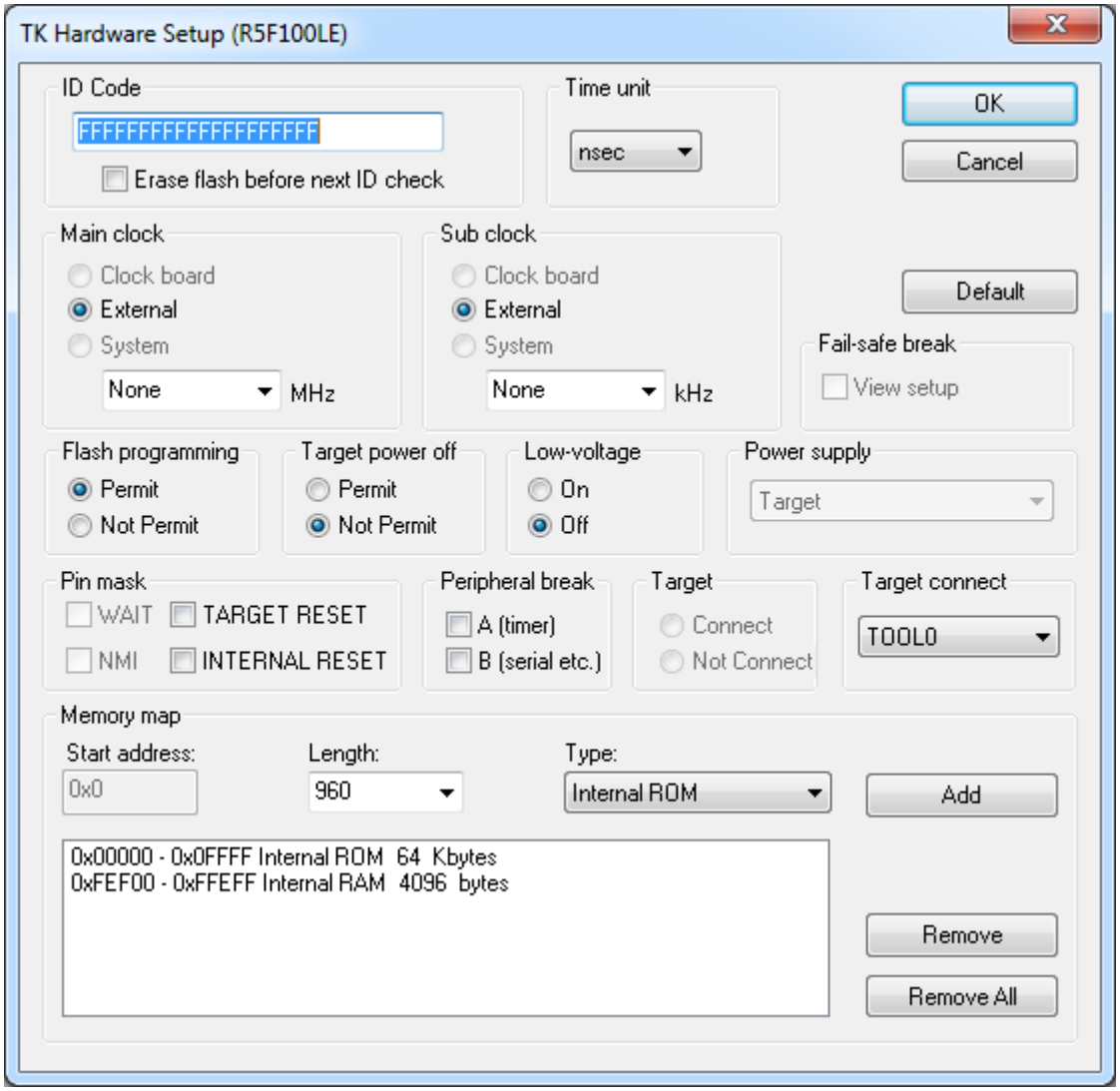


- The new source files have to be included into the project. Open the ***Add Files…*** window (***Project –***

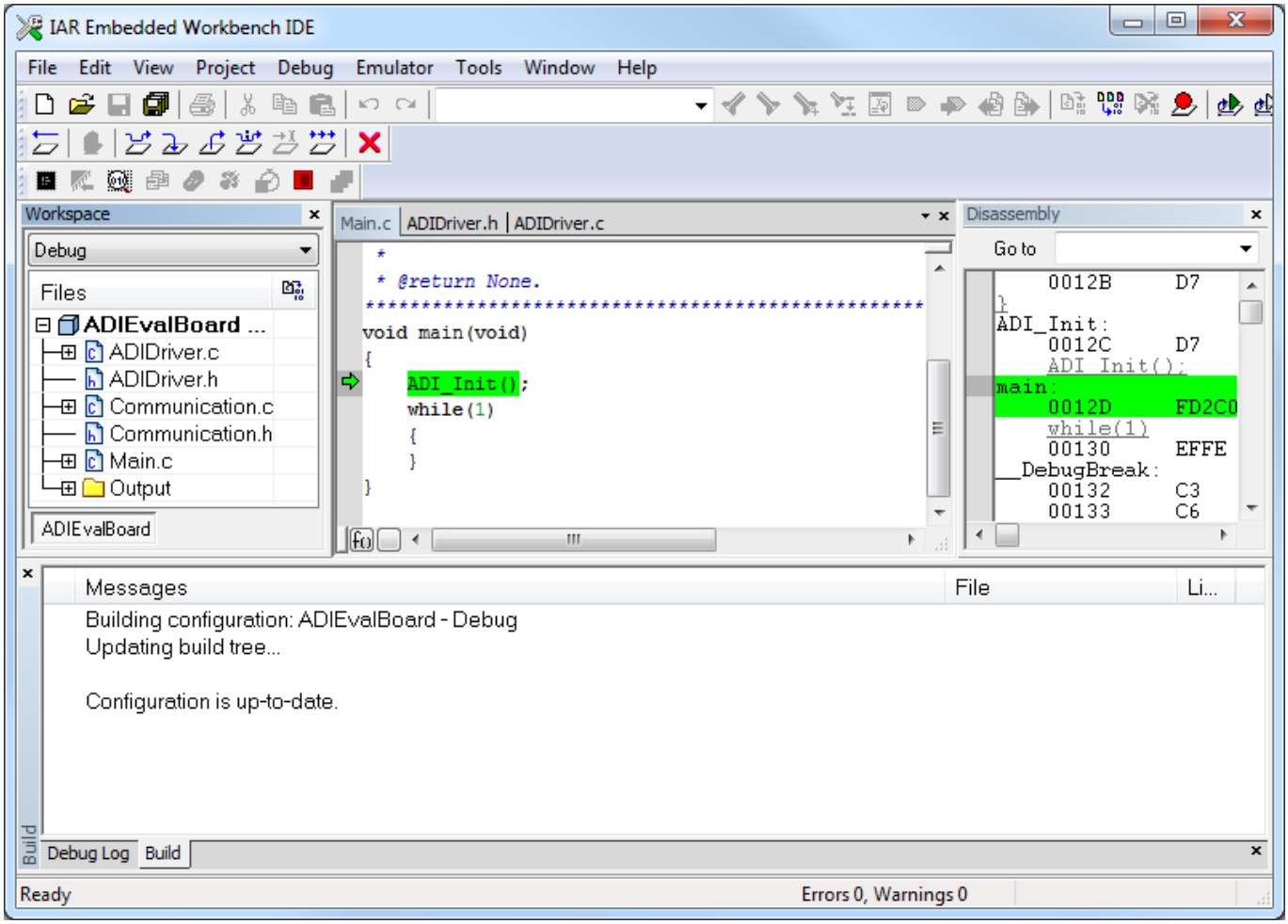
Add Files…), select all the copied files and click open.



- At this moment, all the files are included into the project.
- The project is ready to be compiled and downloaded on the board. Press the F7 key to compile it. Press CTRL + D to download and debug the project.
- A window will appear asking to configure the emulator. Keep the default settings and press OK.



- To run the project press F5.



03 Sep 2012 12:02 · Dragos Bogdan

Renesas RX62N Quick Start Guide

This section contains a description of the steps required to run the ADF4360 demonstration project on a Renesas RX62N platform.

Required Hardware

- Renesas Demo Kit for RX62N (Renesas)
- EVAL-ADF4360-0EBZ1 (ADI)
- EVAL-ADF4360-1EBZ1 (ADI)
- EVAL-ADF4360-2EBZ1 (ADI)
- EVAL-ADF4360-3EBZ1 (ADI)
- EVAL-ADF4360-4EBZ1 (ADI)
- EVAL-ADF4360-5EBZ1 (ADI)
- EVAL-ADF4360-6EBZ1 (ADI)
- EVAL-ADF4360-7EBZ1 (ADI)
- EVAL-ADF4360-8EBZ1 (ADI)

- EVAL-ADF4360-9EBZ1 (ADI)

Required Software

- High-performance Embedded Workshop for RX62N family
- Renesas Peripheral Driver Library for RX62N family

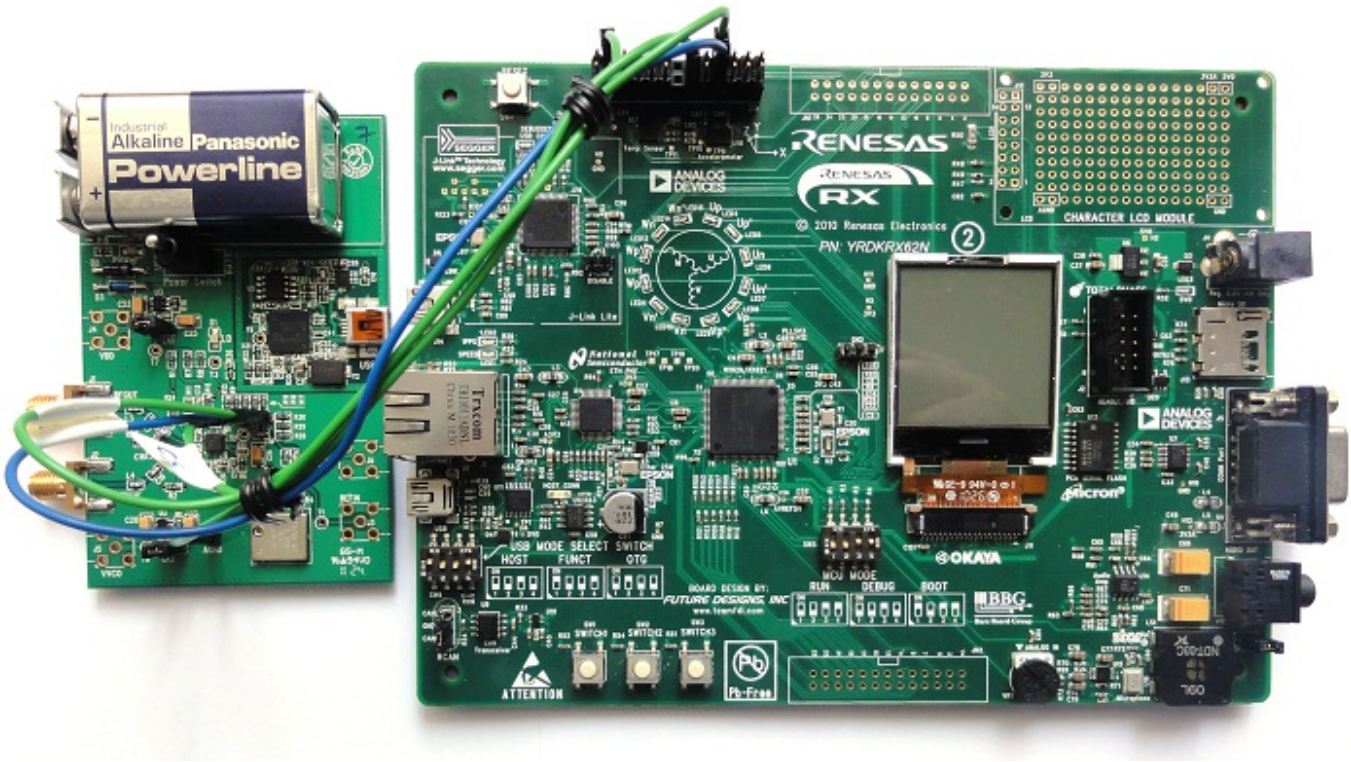
Hardware Setup

An EVAL-ADF4360-xEBZ1 board has to be interfaced with the Renesas Demonstration Kit (RDK) for RX62N.

There are two types of boards: with USB connector or with DB9 connector.

Eval board with USB connector:

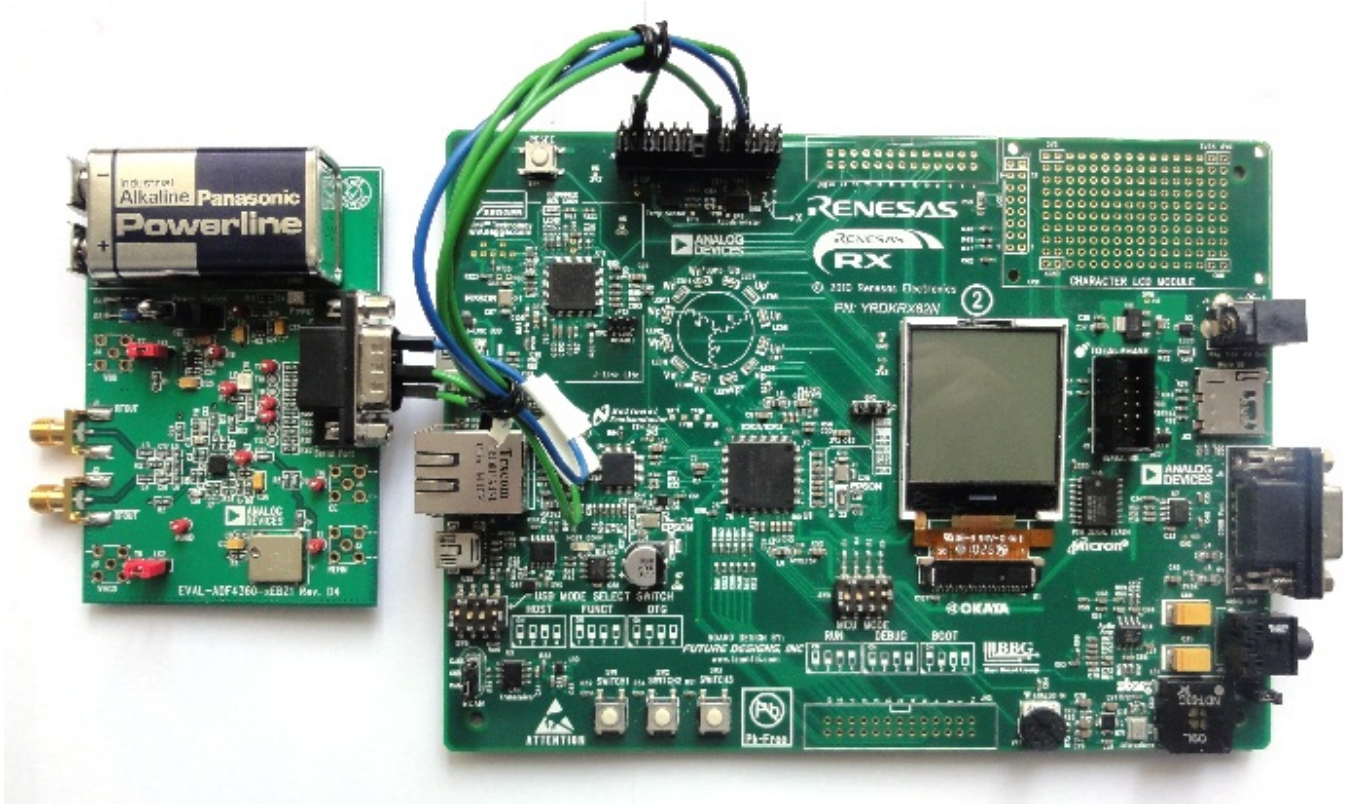
```
T4 (GND)   → RDKRX62N J8 connector Pin 4
T13 (DATA) → RDKRX62N J8 connector Pin 19
T14 (LE)   → RDKRX62N J8 connector Pin 15
T15 (CLK)  → RDKRX62N J8 connector Pin 20
```



Eval board with DB9 connector:

```
9 Way D-Type connector Pin 3 (CLK)  → RDKRX62N J8 connector Pin 20
```

```
  9 Way D-Type connector Pin 5 (DATA) → RDKRX62N J8 connector Pin 19
  9 Way D-Type connector Pin 6 (GND)  → RDKRX62N J8 connector Pin 4
  9 Way D-Type connector Pin 7 (LE)   → RDKRX62N J8 connector Pin 15
```



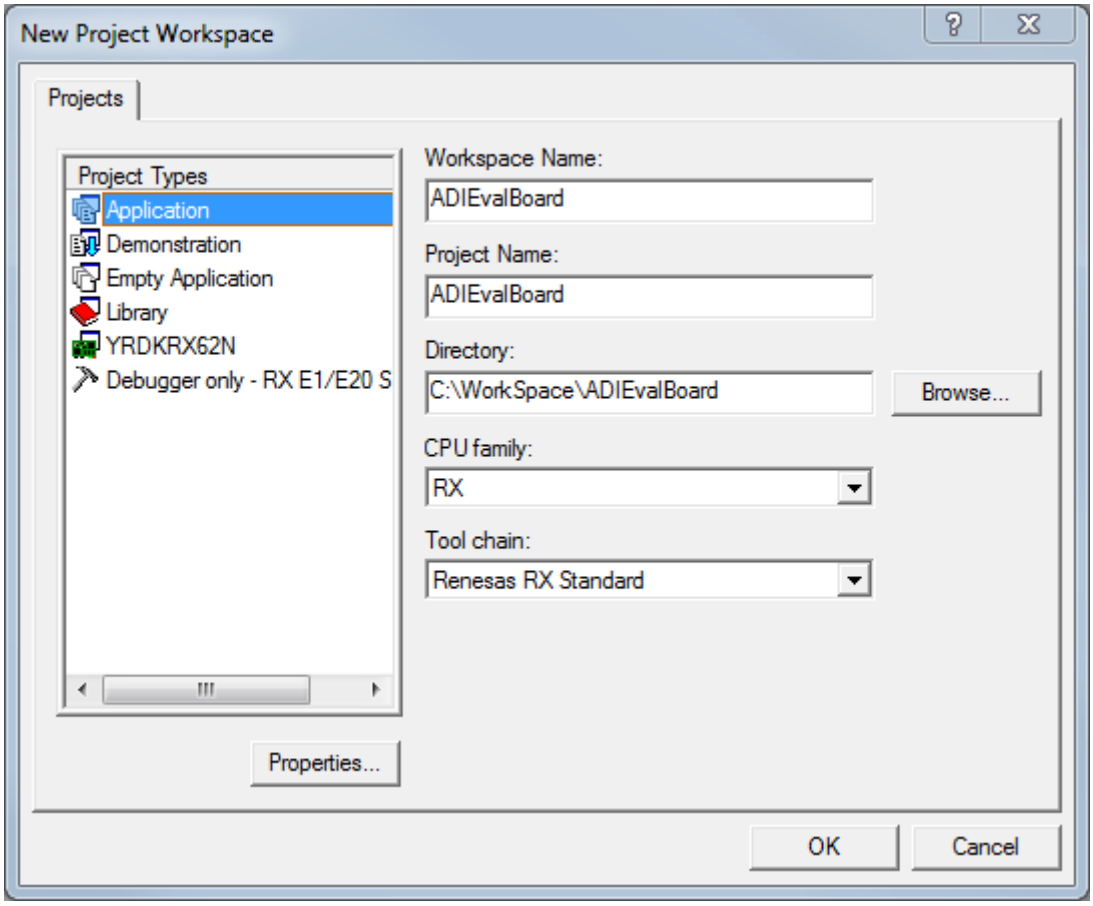
Reference Project Overview

In this example, two values are loaded into R and N Counters and the MUXOUT is configured to be connected to the R Divider output.

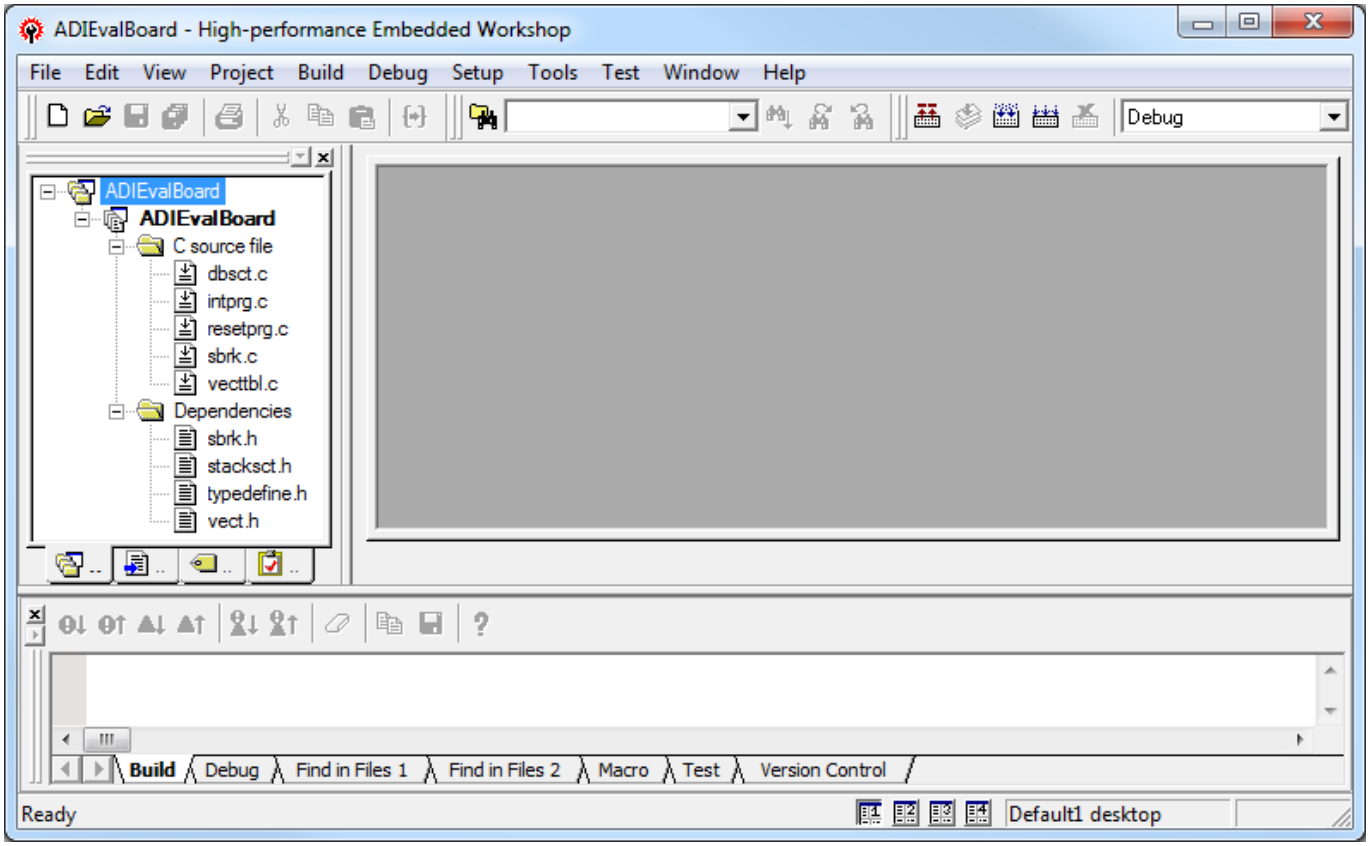
Software Project Setup

This section presents the steps for developing a software application that will run on the ***Renesas Demo Kit for RX62N*** for controlling and monitoring the operation of the ADI part.

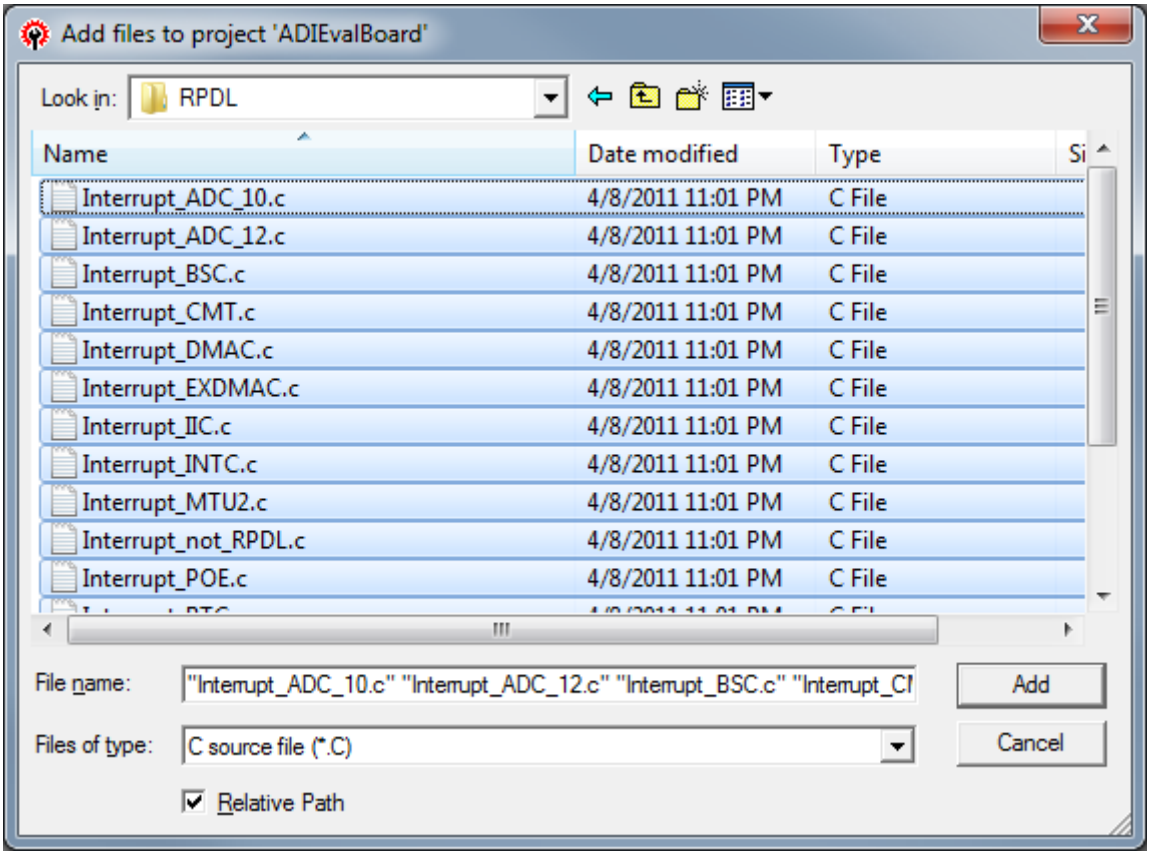
- Run the ***High-performance Embedded Workshop*** integrated development environment.
- A window will appear asking to create or open project workspace. Choose "Create a new project workspace" option and press *OK*.
- From "*Project Types*" option select "*Application*", name the Workspace and the Project "*ADIEvalBoard*", select the "*RX*" CPU family and "*Renesas RX Standard*" tool chain. Press *OK*.



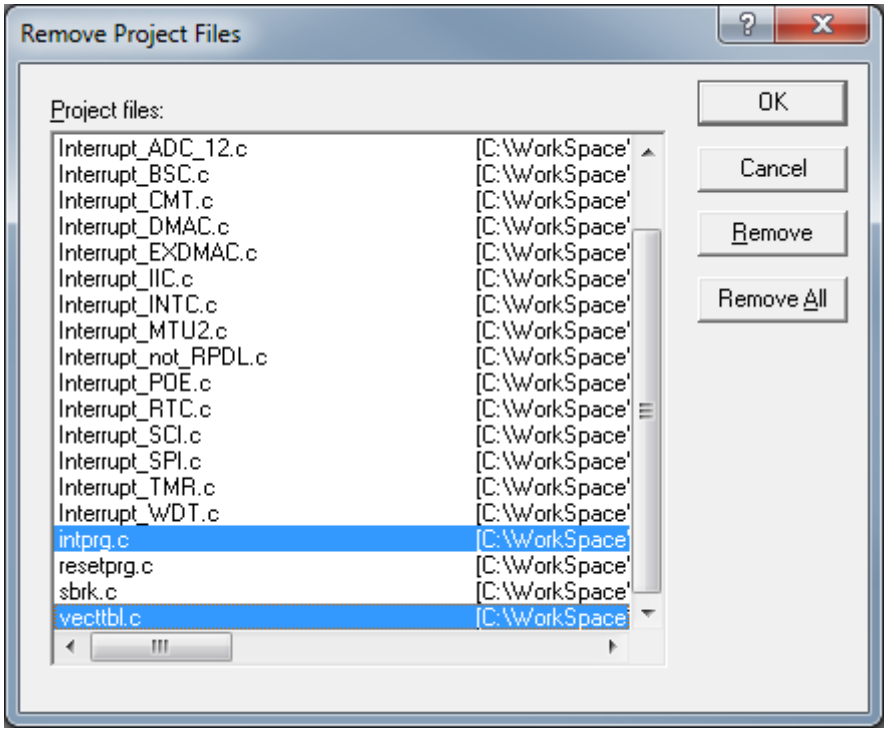
- A few windows will appear asking to configure the project:
  - In the "*Select Target CPU*" window, select "*RX600*" CPU series, "*RX62N*" CPU Type and press *Next*.
  - In the "*Option Setting*" windows keep default settings and press *Next*.
  - In the "*Setting the Content of Files to be generated*" window select "*None*" for the "*Generate main() Function*" option and press *Next*.
  - In the "*Setting the Standard Library*" window press "Disable all" and then *Next*.
  - In the "*Setting the Stack Area*" window check the "*Use User Stack*" option and press *Next*.
  - In the "*Setting the Vector*" window keep default settings and press *Next*.
  - In the "*Setting the Target System for Debugging*" window choose "*RX600 Segger J-Link*" target and press *Next*.
  - In the "*Setting the Debugger Options*" and "*Changing the Files Name to be created*" windows keep default settings, press *Next* and *Finish*.
- The workspace is created.



- The RPDL (Renesas Peripheral Driver Library) has to integrated in the project. Unzip the RPDL files (double-click on the file "*RPDL_RX62N.exe*"). Navigate to where the RPDL files were unpacked and double-click on the "*Copy_RPDL_RX62N.bat*" to start the copy process. Choose the LQFP package, type the full path where the project was created and after the files were copied, press any key to close the window.
- The new source files have to be included in the project. Use the key sequence *Alt, P, A* to open the "*Add files to project 'ADIEvalBoard'*" window. Double click on the RPDL folder. From the "*Files of type*" drop-down list, select "*C source file (*.C)*". Select all of the files and press *Add*.

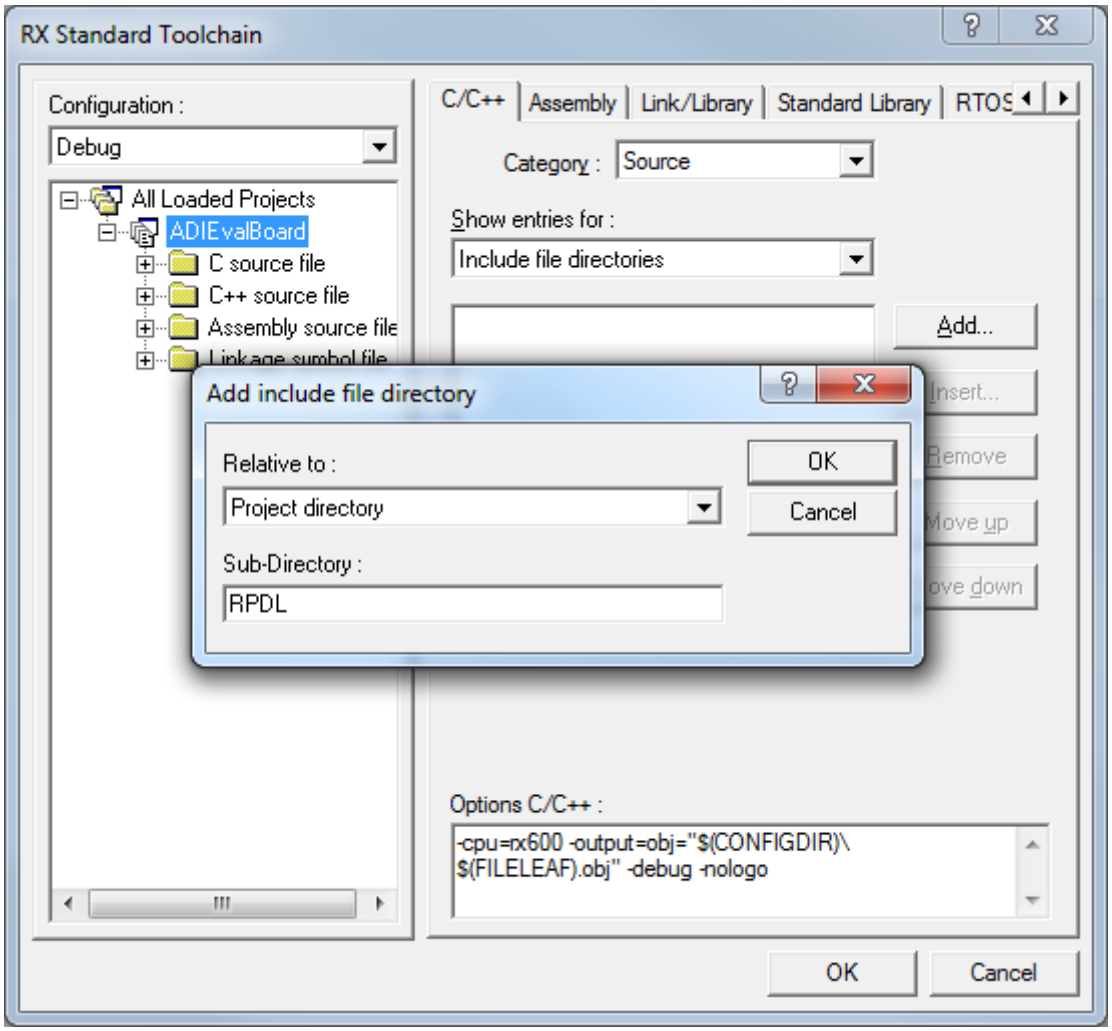


- To avoid conflicts with standard project files remove the files "*intprg.c*" and "*vecttbl.c*" which are included in the project. Use the key sequence *Alt, P, R* to open the "*Remove Project Files*" window. Select the files, click on Remove and press *OK*.

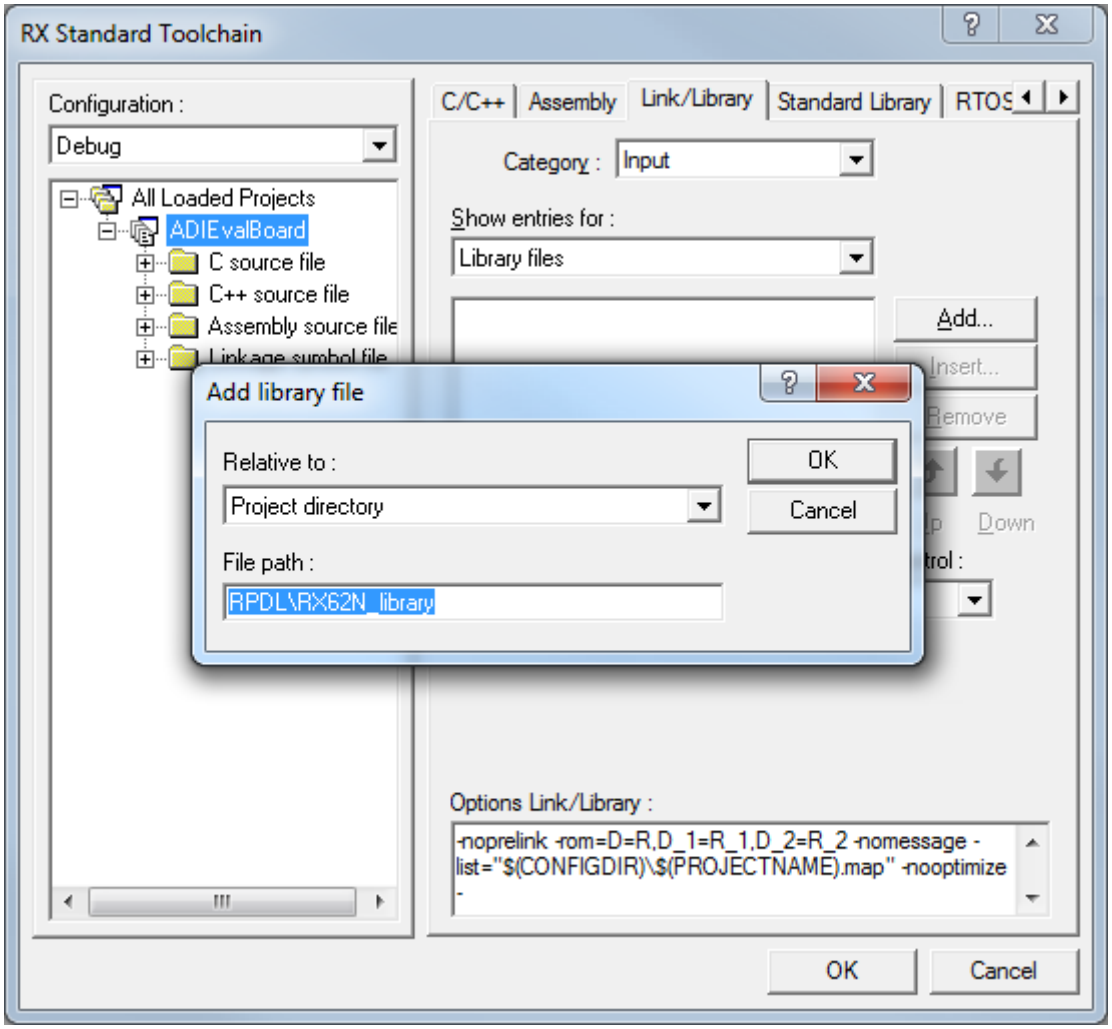


- Next the new directory has to be included in the project. Use the key sequence *Alt, B, R* to open the "*RX Standard Toolchain*" window. Select the C/C++ tab, select "*Show entries for: Include file directories*" and press *Add*. Select "*Relative to: Project directory*", type "*RPDL*" as sub-directory and

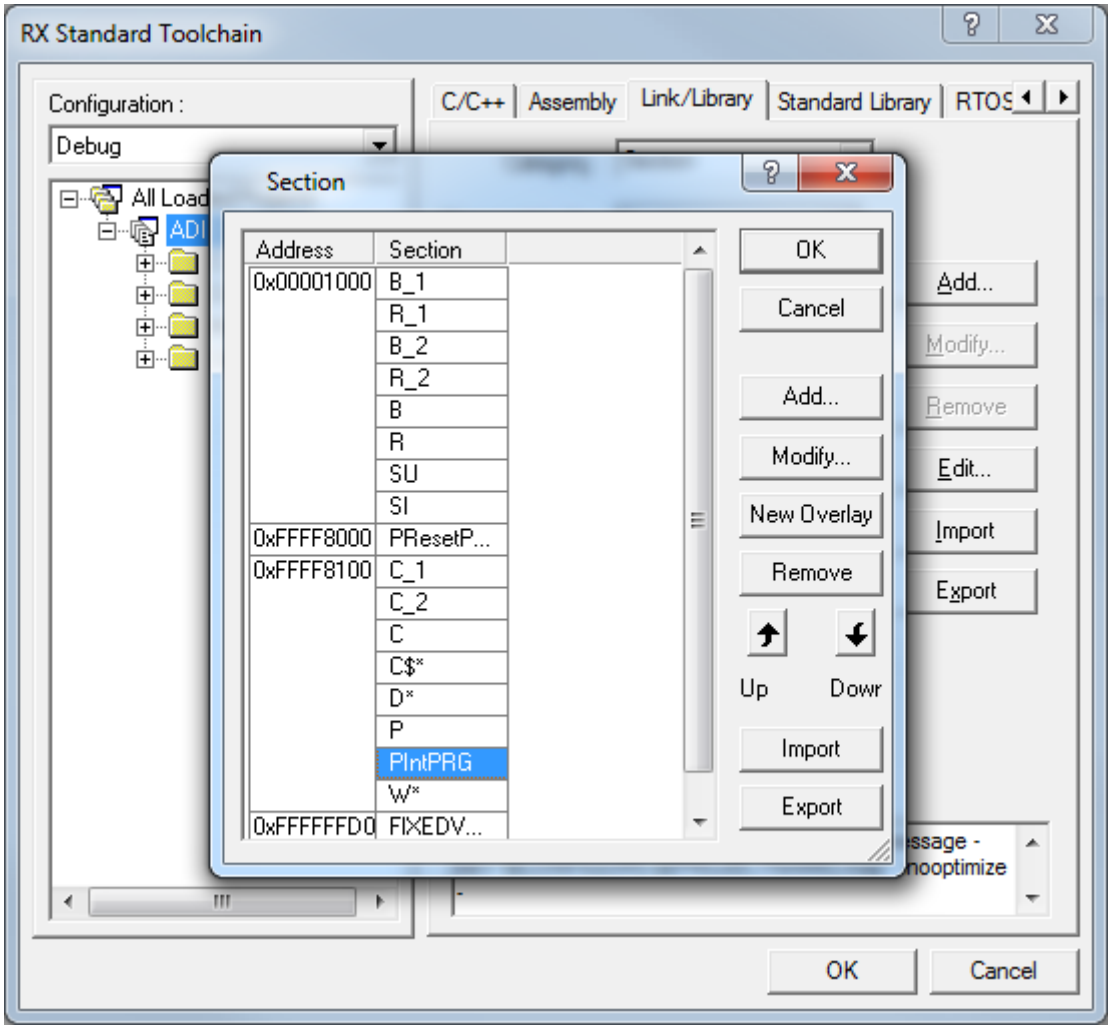
press *OK*.



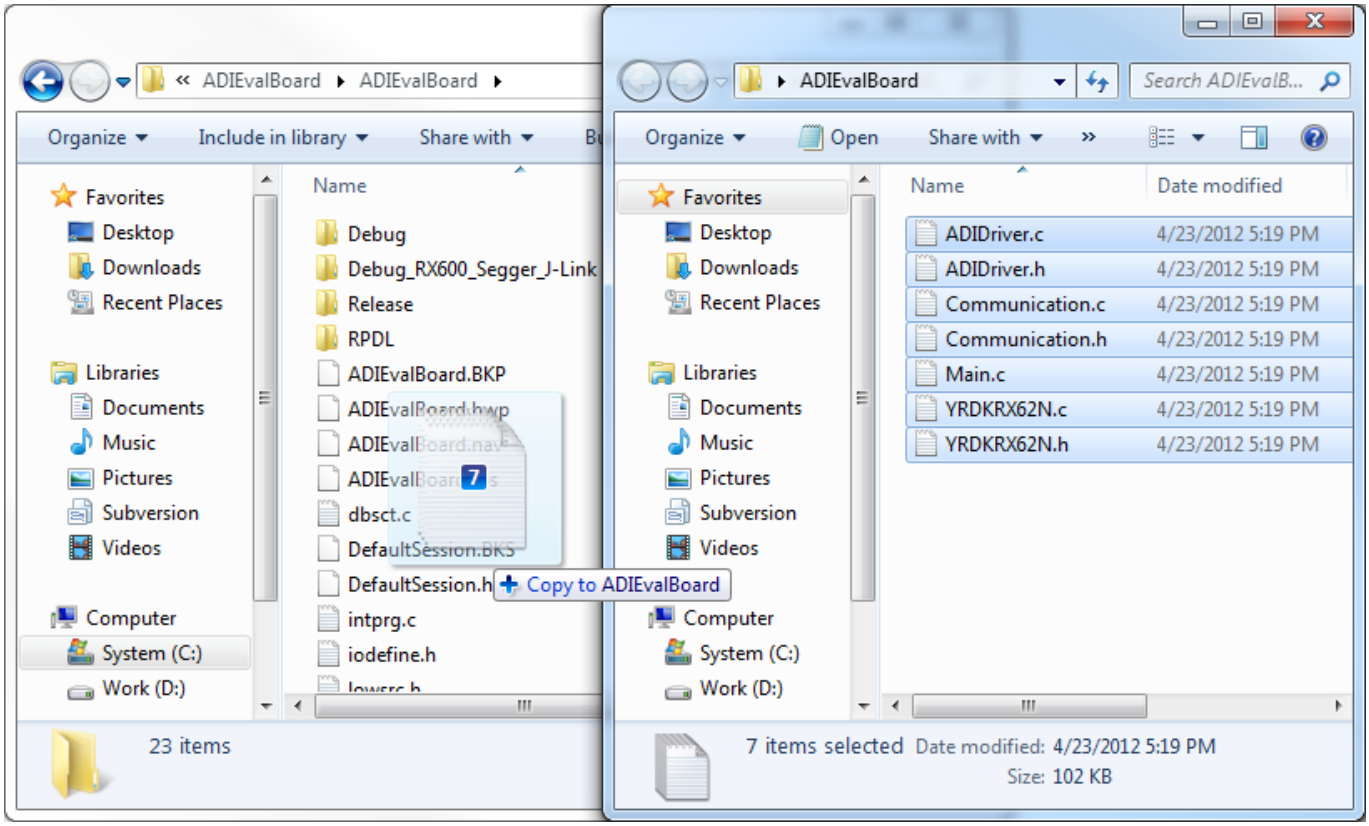
- The library file path has to be added in the project. Select the Link/Library tab, select "*Show entries for: Library files*" and press *Add*. Select "*Relative to: Project directory*", type "*RPDL\RX62N_library*" as file path and press *OK*.



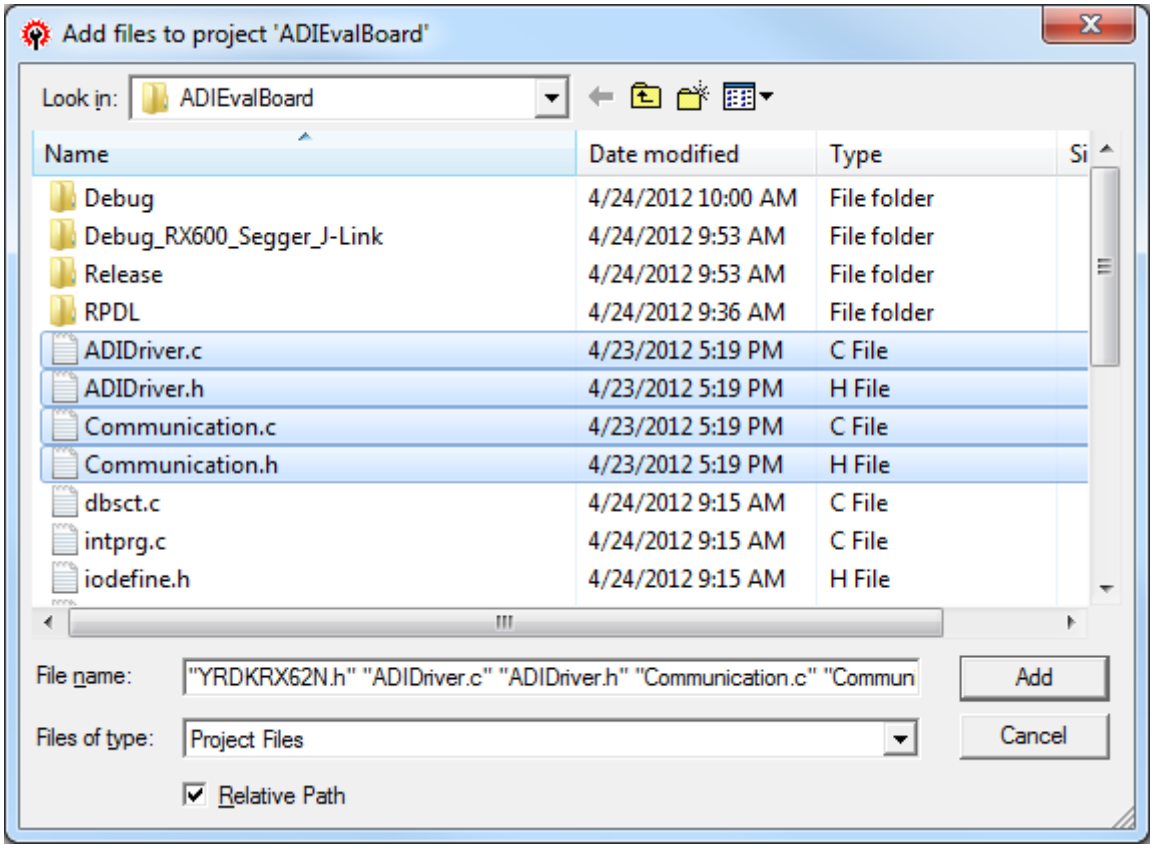
- Because the "*intprg.c*" file was removed the "*PIntPrg*" specified in option "*start*" has to be removed. Change "*Category*" to "*Section*". Press "*Edit*", select "*PIntPRG*" and press "*Remove*". From this window the address of each section can be also modified. After all the changes are made press *OK* two times.



- At this point the files extracted from the zip file located in the "*Software Tools*" section have to be added into the project. Copy all the files from the archive into the project folder.



- Now, the files have to be included in the project. Use the key sequence *Alt, P, A* to open the "*Add files to project 'ADIEvalBoard'*" window. Navigate into ADI folder. From the "*Files of type*" drop-down list, select "*Project Files*". Select all the copied files and press *Add*.



- Now, the project is ready to be built. Press *F7*. The message after the Build Process is finished has to

be “*0 Errors, 0 Warnings*”. To run the program on the board, you have to download the firmware into the microprocessor’s memory.

03 Feb 2012 14:32 · Dragos Bogdan

More information

- ask questions about the Microcontroller no-OS Drivers
- Example questions:
  - Generate initialization script in SPI form for AD9361 by RobertM
  - AD9653 No OS Driver by Emrah
  - AD9361 Gain Mode Data Port Timing Issues by andrew.dickson
  - BBBW vs Fcutoff by rgetz
  - AD9361 Rx Analog Group Delay by jsammy

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