

# **EV-COG-AD3029LZ Board Support Pack Users Guide**

# Contents

1	Introduction	3
1.1	Purpose	3
1.2	Scope of this Manual	3
1.3	Acronyms and Terms	4
1.4	Conventions	4
1.5	References	6
1.6	Additional Information	6
2	Product Overview	7
3	Installation Components	8
3.1	CCES Installation	8
3.1.1	Web Installation	9
3.1.2	Local Installation	9
4	Using Example Projects	10
4.1	Running Examples on EV-COG-AD3029LZ Board	10
4.2	CCES Example Browser	10
4.3	Example Readme Files	11
4.4	Example Launch Files	12
4.4.1	IAR Embedded Workbench	12
5	Creating New Projects	18
5.1	CCES Project Creation	18
5.2	Run-Time Environment Configuration	18
5.3	Debug Configuration	19
5.4		19
5.5	IAR Project Creation	19
5.6		20
6	Bluetooth Low-Energy Software	23
7	Sensor Software	24

# 1 Introduction

## 1.1 Purpose

This document describes the EV-COG-AD3029LZ Board Support Pack (BSP) for CrossCore Embedded Studio® (CCES) . The EV-COG-AD3029LZ is an evaluation board that contains the ADuCM3029 low-power microcontroller, ADXL362 accelerometer and the ADT7420 temperature sensor. Drivers for the accelerometer and temperature sensor can be found in the Sensor Software Pack.

## 1.2 Scope of this Manual

This document describes how to install and work with the Analog Devices EV-COG-AD3029LZ BSP. It explains what is included with the pack and how to configure the software to run the example applications that accompanies this package.

This document is intended for users who want to write software for the ADuCM3029 processor targeting the EV-COG-AD3029LZ evaluation board. It assumes some familiarity with the ADuCM3029 and the C programming language.

**Note that this document does not cover the IoTNode Android application** that is compatible with the EV-COG-AD3029LZ Evaluation Board. Please see the IoTNode Users Guide for documentation on the Android application.

## 1.3 Acronyms and Terms

<b>ADI</b>	Analog Devices, Inc.
<b>API</b>	Application Programming Interface
<b>BSP</b>	Board Support Pack
<b>CCES</b>	CrossCore Embedded Studio®
<b>CMSIS</b>	Cortex® Microcontroller Software Interface Standard
<b>DFP</b>	Device Family Pack
<b>HRM</b>	Hardware Reference Manual
<b>NoOS</b>	No Operation System
<b>RTE</b>	Run-Time Environment
<b>SoC</b>	System on a Chip

## 1.4 Conventions

Throughout this document, we refer to important installation locations. These locations are defined here.

- **<dfp\_version>**
  - The version of the ADuCM3029 Device Family Pack, e.g. 3.1.0.
- **<bsp\_version>**
  - The version of the EV-COG-AD3029LZ Board Support Pack, e.g. 3.1.0.

- **<cces\_root>**
  - The default CrossCore Embedded Studio installer places the the product at location **C:/Analog Devices/CrossCore Embedded Studio x.y.z**, with **x.y.z** the version number of CrossCore Embedded Studio. Note that this location may vary depending on users' preferences.
  - Analog Devices software packs are installed by default at location **<cces\_root>/ARM/PACKS/AnalogDevices**.
- **<cces\_dfp\_root>**
  - The directory **<cces\_root>/ARM/PACKS/AnalogDevices/ADuCM4x50\_DFP/<dfp\_version>**.  
The content of a specific Analog Devices ADuCM3029 Device Family Pack, version **<dfp\_version>**, is installed at this location by CrossCore Embedded Studio.
- **<cces\_bsp\_root>**
  - The directory **<cces\_root>/ARM/PACKS/AnalogDevices/EV-COG-AD3029LZ\_BSP/<bsp\_version>**.  
The content of a specific Analog Devices EV-COG-AD3029LZ Board Support Pack, version **<bsp\_version>**, is installed at this location by CrossCore Embedded Studio.
- **<cces\_user\_space>**
  - The directory **C:/Users/<user\_name>/cces/x.y.z**, with **x.y.z** the version number of CrossCore Embedded Studio.  
In this path, **C:/Users/<user\_name>** is the user's home directory
- **.<iar\_packrepo>**
  - The directory **C:/Users/<user\_name>/AppData/Roaming/IAR Embedded Workbench**, where IAR Embedded Workbench installs CMSIS Packs.  
In this path, **C:/Users/<user\_name>** is the user's home directory.
- **<iar\_dfp\_root>**
  - The directory **<iar\_packrepo>/AnalogDevices/ADuCM3029\_DFP/**
- **<dfp\_version>**.
  - The content of a specific Analog Devices ADuCM3029 Device Family Pack, version **<dfp\_version>**, is installed at this location by IAR Embedded Workbench.

- `<iar_bsp_root>`
  - The directory `<iar_packrepo>/AnalogDevices/EV-COG-AD3029LZ_BSP/<bsp_version>`. The content of a specific Analog Devices EV-COG-AD3029LZ Board Support Pack, version `<bsp_version>`, is installed at this location by IAR Embedded Workbench.
- `<ARM_CMSIS_version>`
  - the version of the ARM CMSIS Pack, e.g. 5.0.1.
- `<cces_arm_cmsis_root>`
  - The directory `<cces_root>/ARM/PACKS/ARM/CMSIS/<ARM_CMSIS_version>`. ARM CMSIS Pack content is installed at this location.

## 1.5 References

1. CrossCore Embedded Studio® (CCES) [<http://www.analog.com>]
2. ARM CMSIS PACK [<http://www.keil.com/cmsis/pack>]

## 1.6 Additional Information

For more information on the latest ADI processors, silicon errata, code examples, development tools, system services and devices drivers, technical support and any other additional information, please visit our website at [www.analog.com/processors](http://www.analog.com/processors).

## 2 Product Overview

The EV-COG-AD3029LZ Board Support Package (BSP) provides the drivers for off-chip peripherals which are on the EV-COG-AD3029LZ Evaluation Board and examples for peripherals on the ADUCM3029 processor. The drivers and examples in the BSP are designed to work with CrossCore Embedded Studio® and the ADuCM302x Device Family Pack or with IAR Embedded Studio and the ADuCM302x Device Family Pack. For specific tools and packs revisions see the Release Notes. This pack also has example support for the BLE Software Pack 1.0.0 and the Sensor Software Pack 1.1.0.

## 3 Installation Components

Before installing the EV-COG-AD3029LZ BSP, the following should be installed.

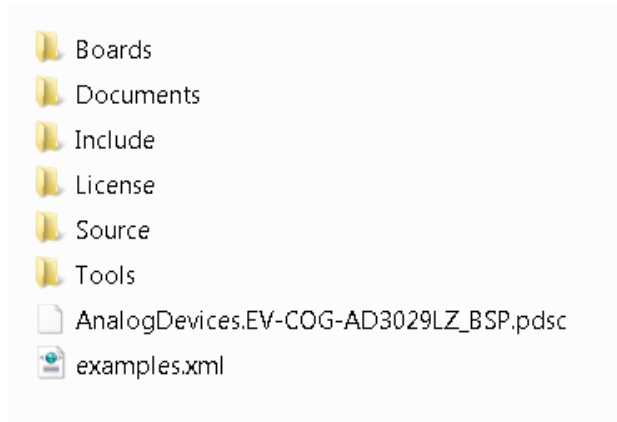
- CrossCore Embedded Studio ® or IAR Embedded Workbench
- ADuCM302x Device Family Pack
- ADI-SensorSoftware pack (for some examples)
- ADI-BleSoftware (for some examples)

For specific tools and packs revisions see the Release Notes.

This software is released in the form of a CMSIS Pack file. CCES will extract the contents of the Pack file into the CCES installation directory. This allows for a clean partitioning of software delivered by ADI and software created by the user. The EV-COG-AD3029LZ BSP contents (device drivers, examples, documentation, etc.) are placed at the following location

- CrossCore Embedded Studio® : **<cces\_root>/ARM/packs/AnalogDevices/EV-COG-AD3029LZ\_BSP/x.y.z**

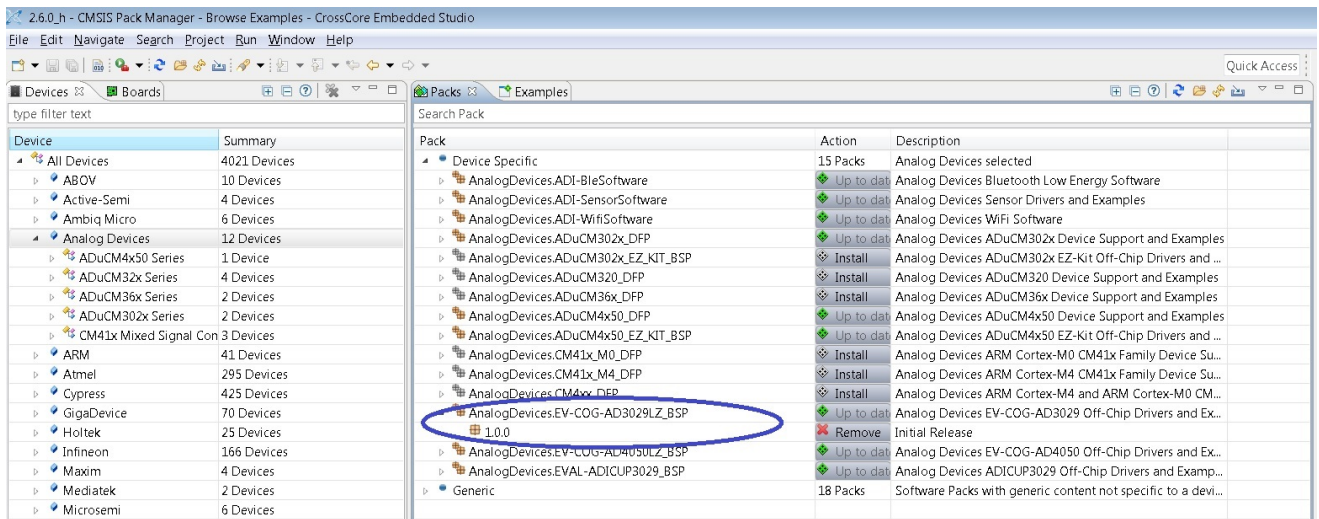
where **x.y.z** is the installed pack version number. Figure 1 shows the contents that will be placed at this location after the installation has completed.



**Figure 1. Installation Directory Structure**

### 3.1 CCES Installation

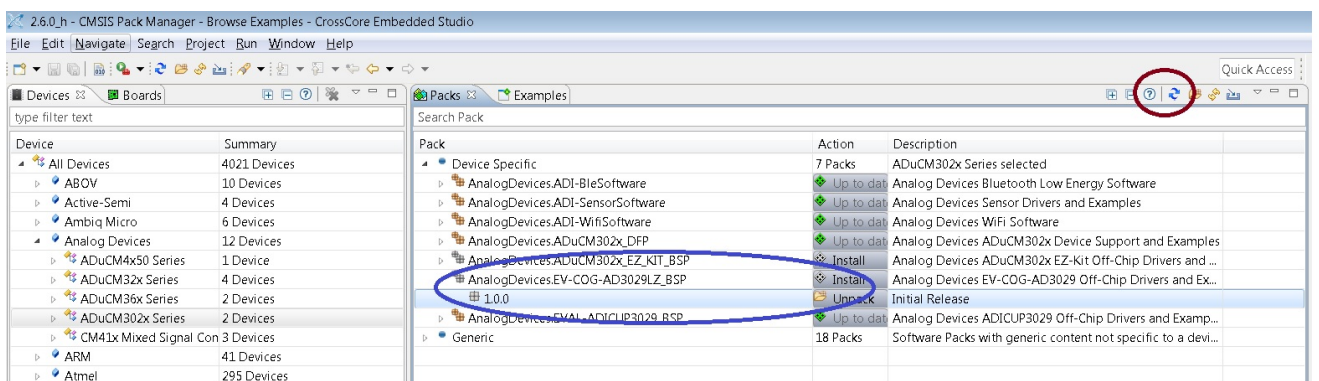
To install a new BSP or update an existing BSP go to CMSIS Pack Manager perspective, shown in Figure 2. If the Pack Manager perspective was not opened previously, the CMSIS Pack Manager icon may not be present on the toolbar as shown below. In that case, the Pack Manager perspective can be opened by clicking *Window Perspective Open Perspective Other Pack Manager*. There are two methods that can be used to install the BSP described below.



**Figure 2. CMSIS Pack Manager Perspective**

### 3.1.1 Web Installation

The BSP can be installed directly from the web using CCES, the user does not need to download the file and open it with CCES. This can be done by first refreshing the CMSIS Pack Manager (the blue arrows in the top left of the *Pack* tab). This will display a list of available Pack files as shown in Figure 3. Clicking on the "ADuCM302x Series" will show the BSP in the *Pack* tab as "AnalogDevices.EV-COG-AD3029LZ\_BSP". Click "Install" and accept the license agreement in order to install the BSP.



**Figure 3. Available Pack Files**

### 3.1.2 Local Installation

If the user has already obtained the Pack file, it can be installed without using the method described above. Click "Import Existing Packs" (the folder icon in the *Pack* tab) and then browse to the Pack file.

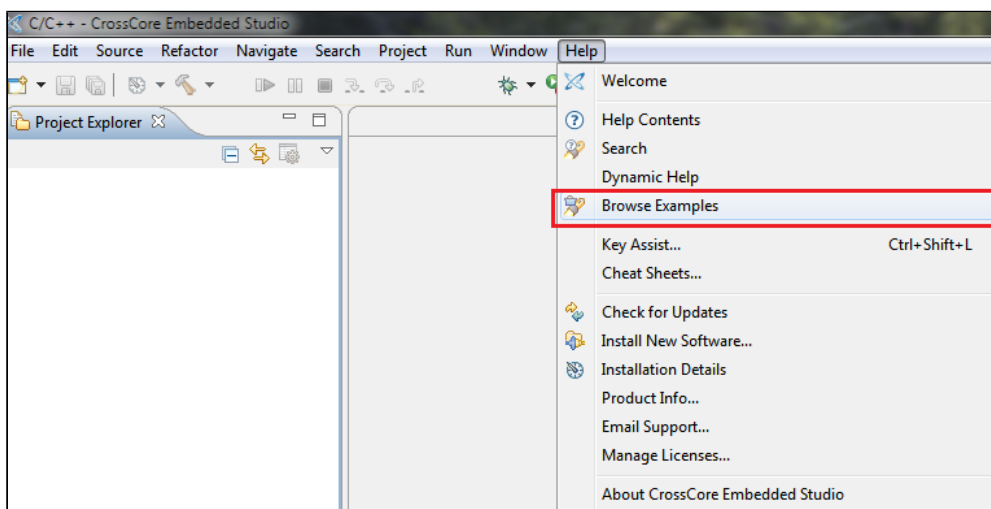
## 4 Using Example Projects

The recommended way of getting familiar with the software in the BSP is by using the example projects. These example projects show the user how to use the on-chip drivers in the ADuCM302x Device Family Pack, the off-chip drivers in the EV-COG-AD3029LZ BSP, and how to configure the CCES environment to build and run applications on the EV-COG-AD3029LZ Evaluation Board. To open and/or run the examples, the examples should be copied to a workspace (i.e. a location on the user's machine that is different than the installation). This allows users to alter the sources if needed and keep the original sources safe. The next section will explain how to do this in CCES and IAR Embedded Workbench version 8.x or later.

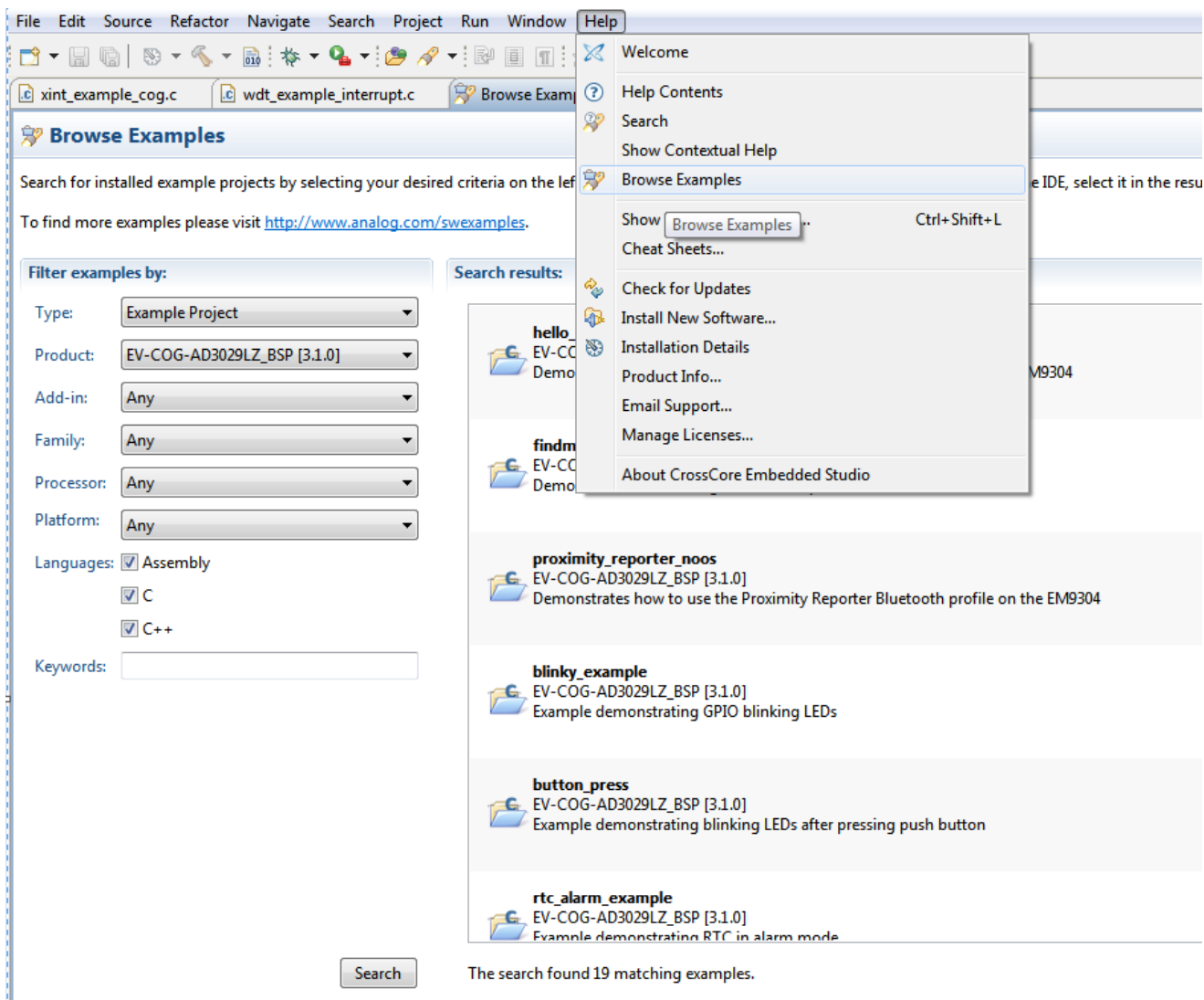
### 4.1 Running Examples on EV-COG-AD3029LZ Board

### 4.2 CCES Example Browser

The CCES "Example Browser" allows the user to easily survey the example projects delivered in the BSP. *Help > Browse Examples* opens the Example Browser as shown below.



Next, choose "Example Project" as "Type" and "EV-COG-AD3029LZ\_BSP[version]" as "Product". Select an example and then press "Open example".



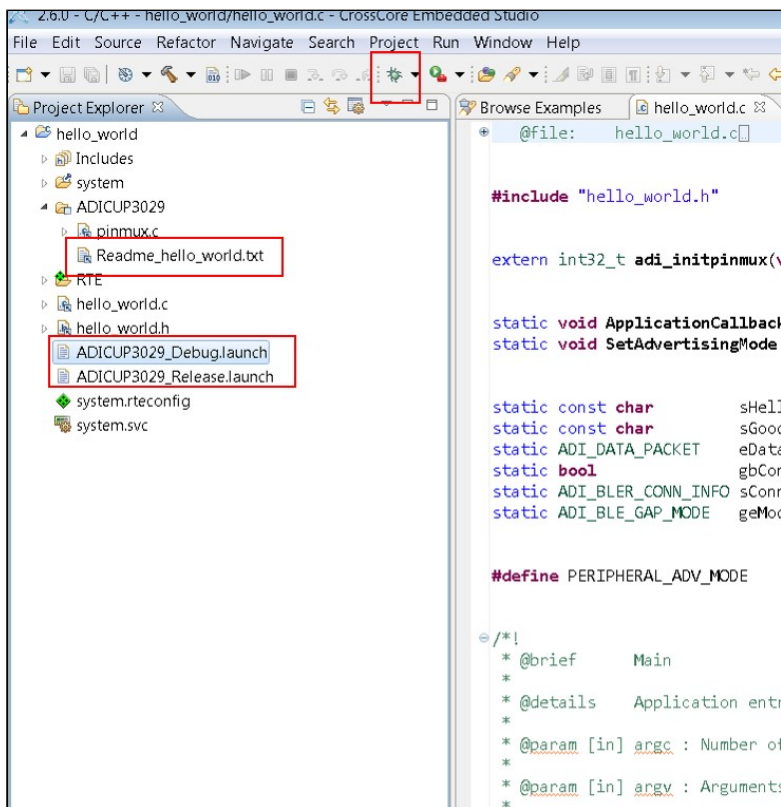
This will copy the example project to your CCES workspace. This is generally located in `C:\Users\username\cces\<version>\` but may vary depending on the system. The example project will be added to the "Project Explorer" window in CCES and the user can build and run the project. Note that only the top-level application C and header files will be copied into the user's workspace, along with any static configuration header files. The peripheral drivers are not copied and remain in the CCES installation. Any modification to these will impact the actual installation files.

## 4.3 Example Readme Files

Each example contains a readme file explaining the operation of the example the expected outcome. The file is located in the CCES project explorer. Please see this file for details about each example project. Figure 6 shows the readme file in the Hello World example project.

## 4.4 Example Launch Files

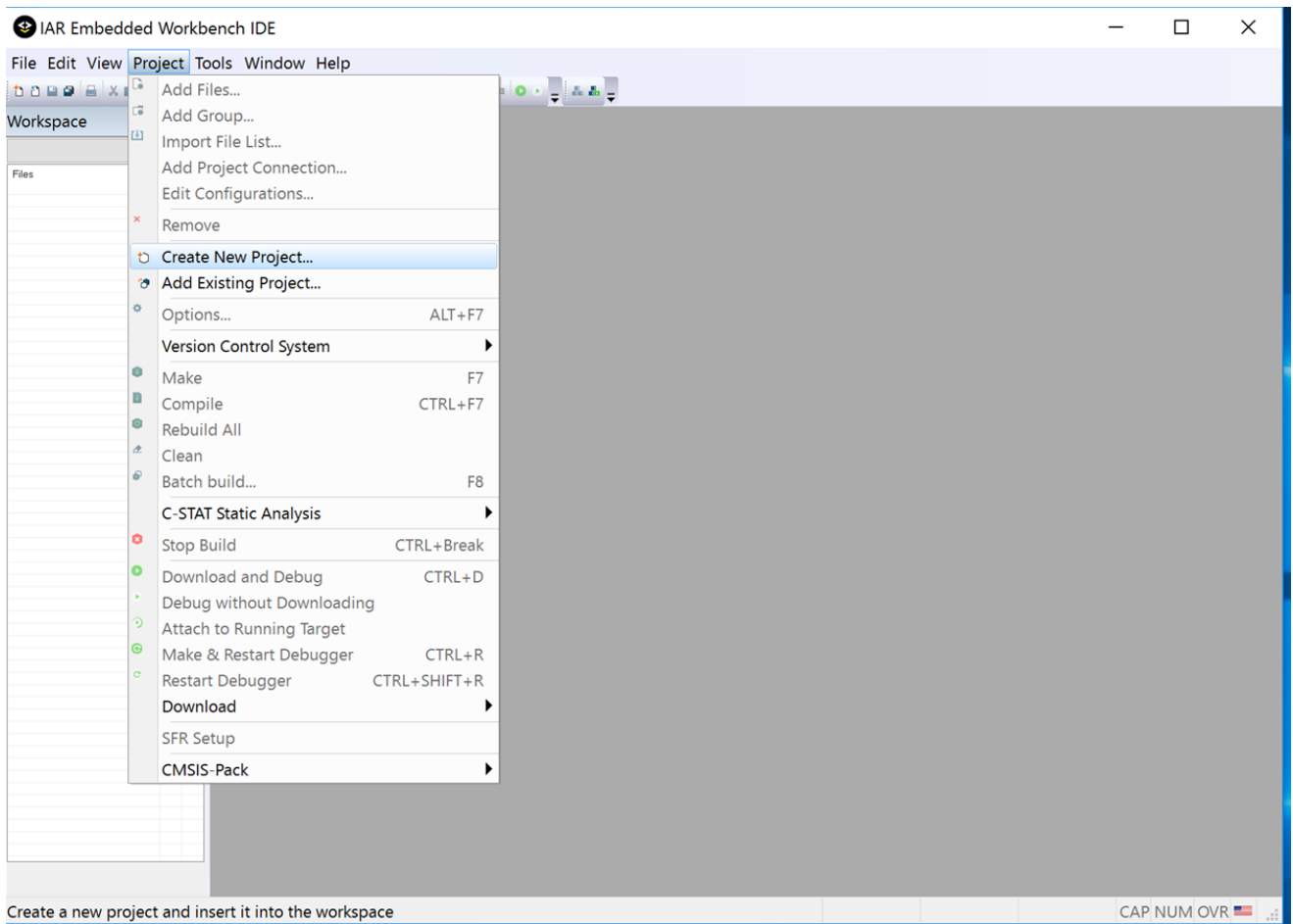
The example projects can be run on the EV-COG-AD3029LZ Evaluation Board using the CMSIS DAP debugger interface located on the board. To save the user the hassle of creating debugger configurations in CCES, each example project comes with a *.launch* file for each build configuration, which contains the correct debugger settings for the EV-COG-AD3029LZ Evaluation Board. Please note the exception to this is the driver examples. For those the user will need to create the debug configuration themselves. After building the example project, click this file (located in the Project Explorer) and then click the "Debug" (the bug icon) or press F5. See Figure 6 for more details.



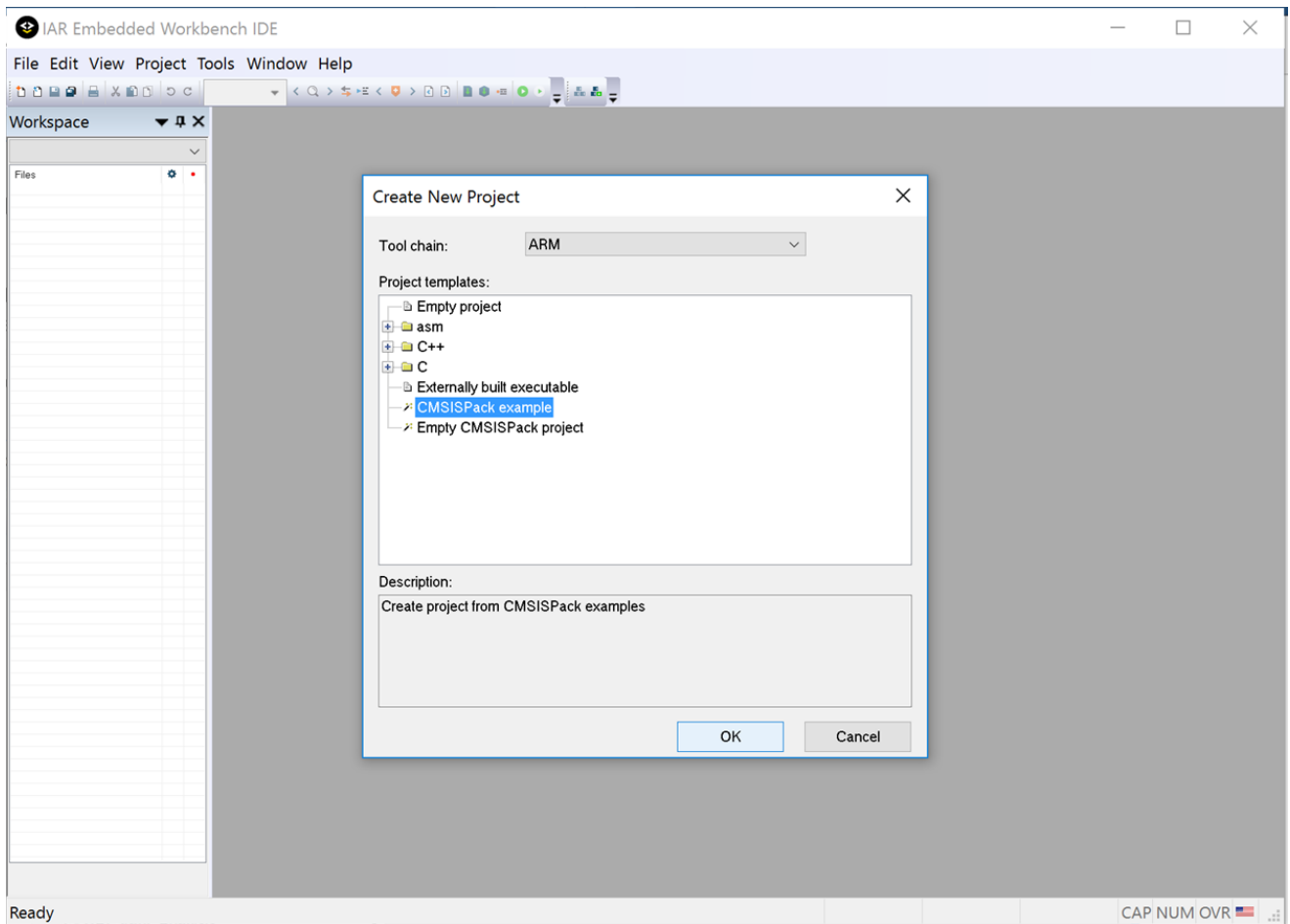
### 4.4.1 IAR Embedded Workbench

Examples from the EV-COG-AD3029LZ Board Support Package 3.1.0 can be run by following below steps

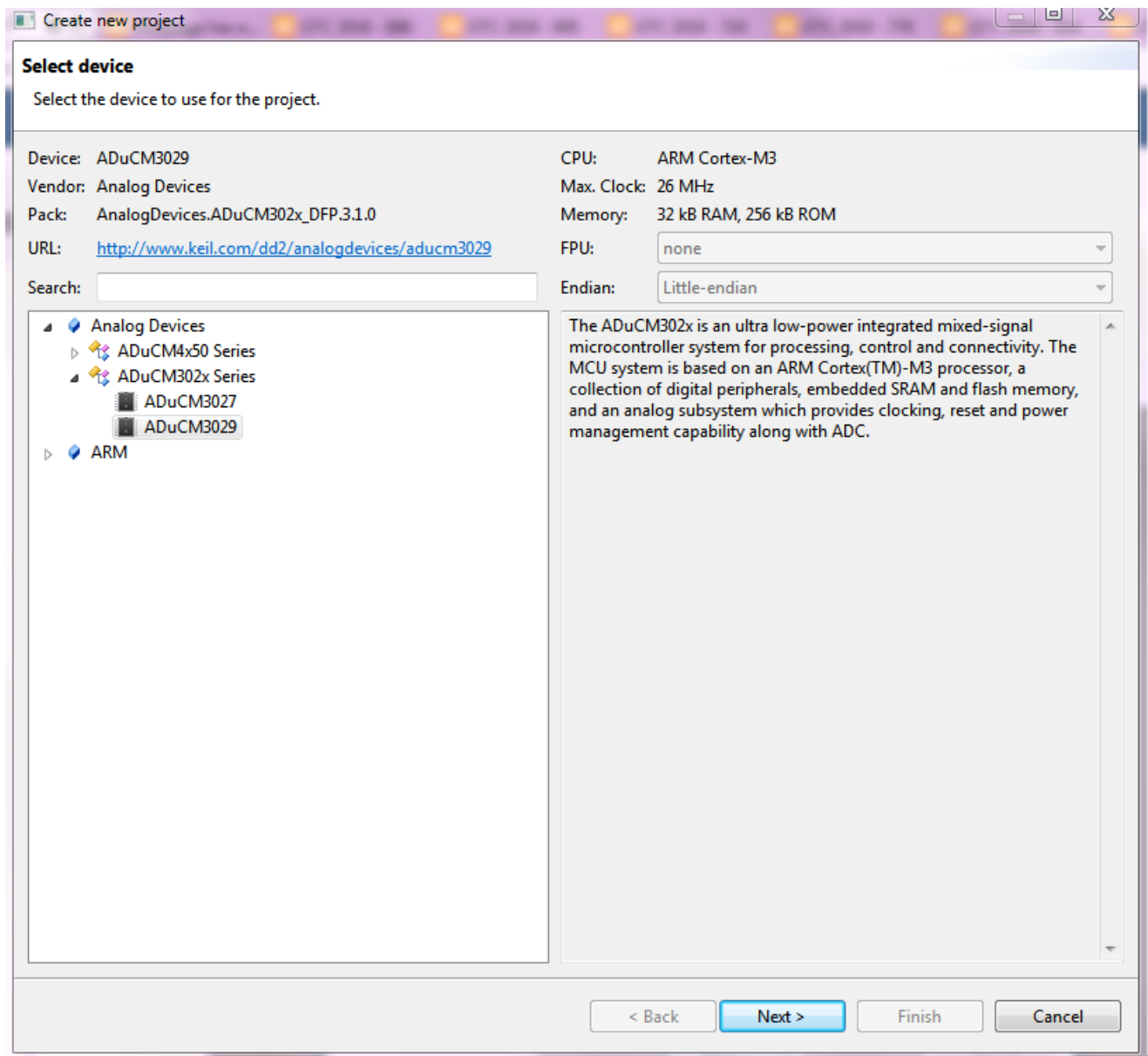
- Click on Project Create New Project



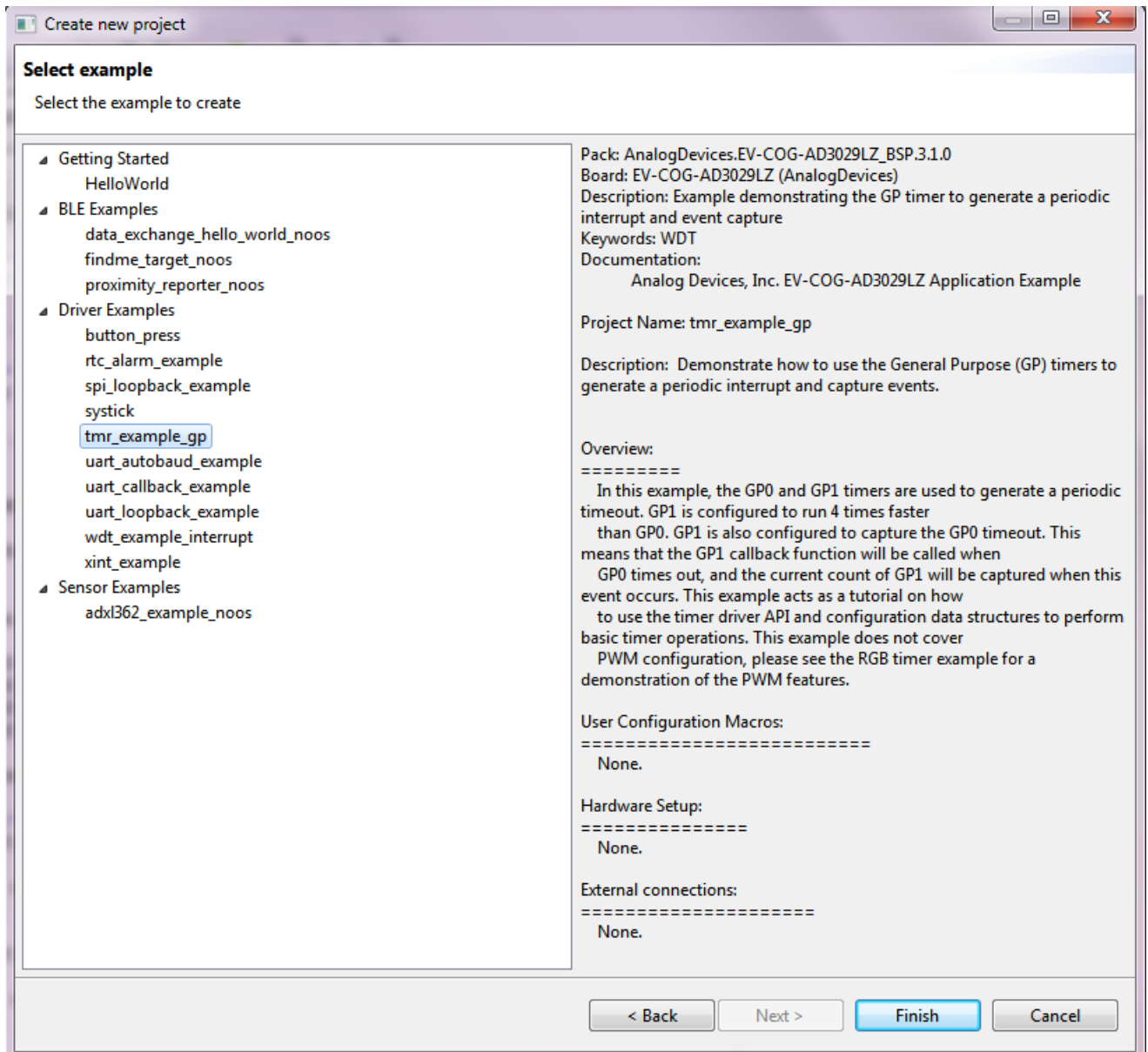
- Select CMSIS Pack Examples and click "OK".



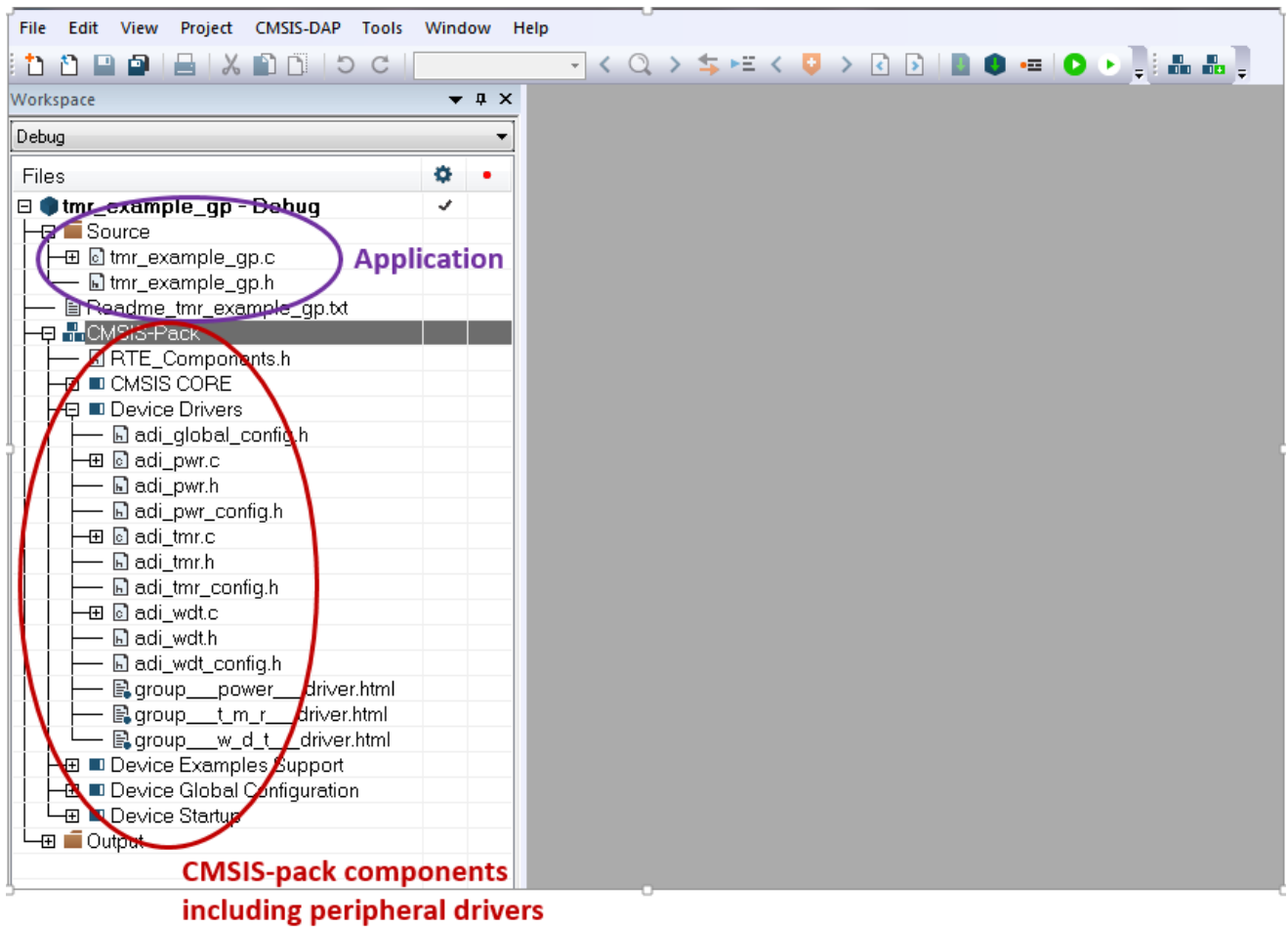
- Select Analog Devices ADuCM3x29 Series ADuCM3029 and click "Next".



- Select the example you want to use, e.g. tmr\_example\_gp: a description appears, then click "Finish".



- Choose the directory where you want the example to be copied.
- The example is loaded into IAR Embedded Workbench



- Build and run the example

## 5 Creating New Projects

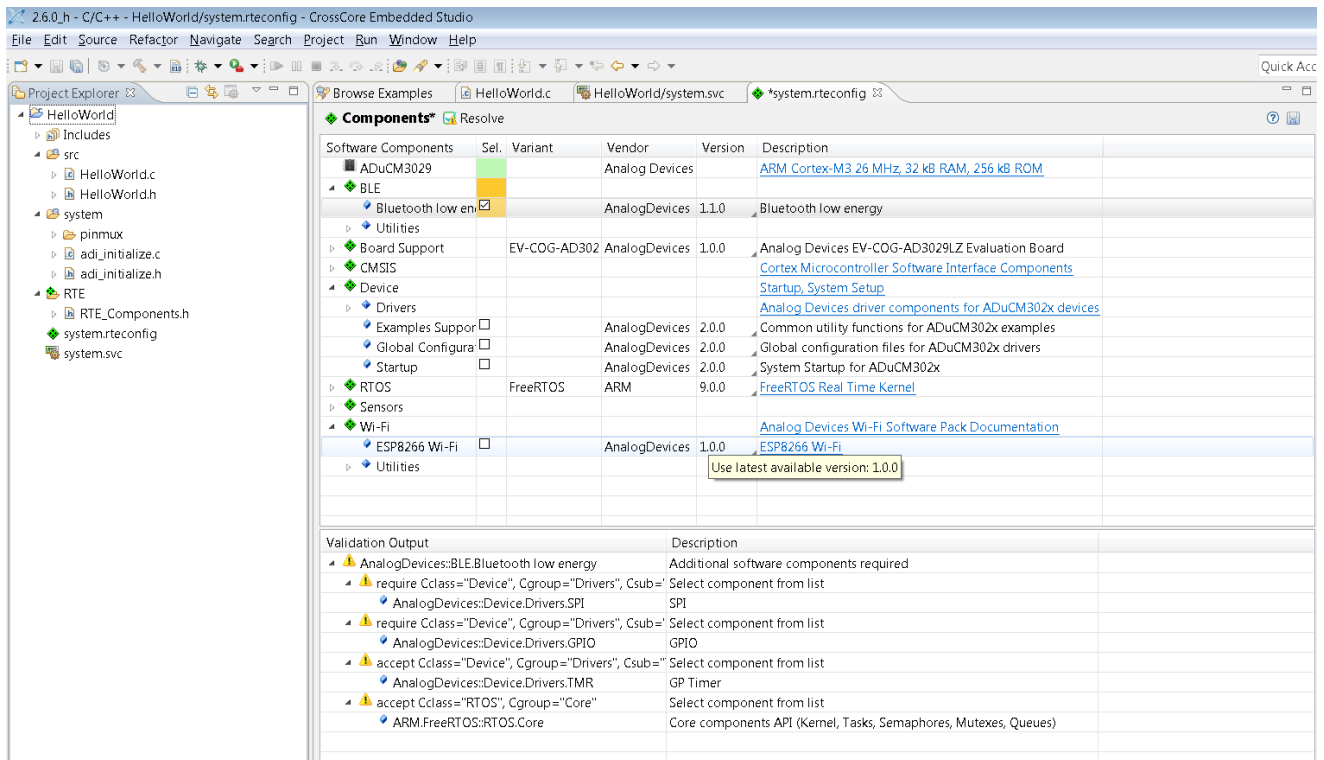
New projects can easily be created that use the on-chip drivers delivered in the ADuCM302x Device Family Pack and the off-chip drivers delivered in the EV-COG-AD3029LZ BSP.

### 5.1 CCES Project Creation

To create a new project in CCES targeting the EV-COG-AD3029LZ board, select *File New CrossCore Project* and then provide a name for the project. In the "Processor Type" dialog, select the ADuCM3029 and choose a silicon revision (choose "any" if it does not matter). In the "Project configuration" window, select any Add-ins or template code you may want for your new project and then select "Finish".

### 5.2 Run-Time Environment Configuration

The new project will be added to the "Project Explorer". The software to interface with the on and off-chip peripherals on the ADICUP3029 Evaluation Board are organized as "components" in the Run-Time Environment. Within the context of this product, a component contains one or more source files, and can also contain a static configuration header file. To add components to the Run-Time Environment for your new project, open the *system.rteconfig* file in the "Project Explorer". The off-chip drivers for the EV-COG-AD3029LZ Evaluation Board are located in the "Board Support" class and the on-chip drivers for the ADuCM302x are located in the "Device" class. Bluetooth Low Energy component is under "BLE". Sensor components can be found under "Sensors". Click these components to add them to the project. Components will have dependencies on other components. If these dependencies are not met, the needed component will be highlighted in yellow. Note that the most minimal project will *Device Startup*, *Device Global Configuration*, and *CMSIS Core*. The components in the "Board Support" class will be explained in greater detail in the next section. For more information about the components in the "Device" class, please see the ADuCM302x Device Family Pack.



## 5.3 Debug Configuration

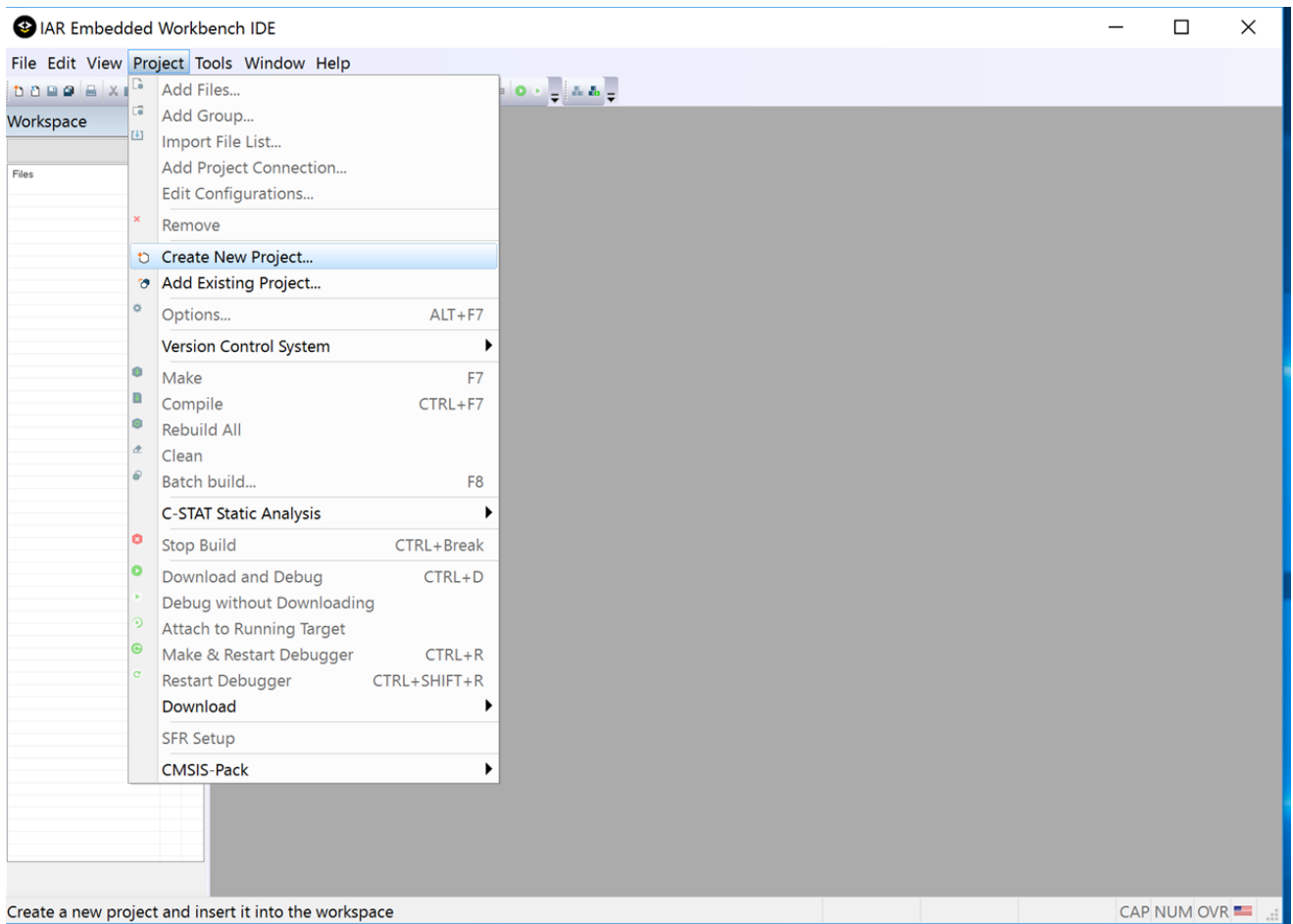
Since no *.launch* files will be available when creating a new project, the user will need to create a debug configuration from scratch. Go to *Run Debug Configurations* to create a configuration. Click "Emulator" and then click the "New" (small white page icon in top left corner). Configure the settings to match the following figure.

## 5.4

## 5.5 IAR Project Creation

To create a new project in a version of IAR Embedded Workbench which support CMSIS-Pack (8.x or later) targeting the EV-COG-AD3029LZ board, select *File New CrossCore Project* and then provide a name for the project. In the "Processor Type" dialog, select the ADuCM3029 and choose a silicon revision (choose "any" if it does not matter). In the "Project configuration" window, select any Add-ins or template code you may want for your new project and then select "Finish".

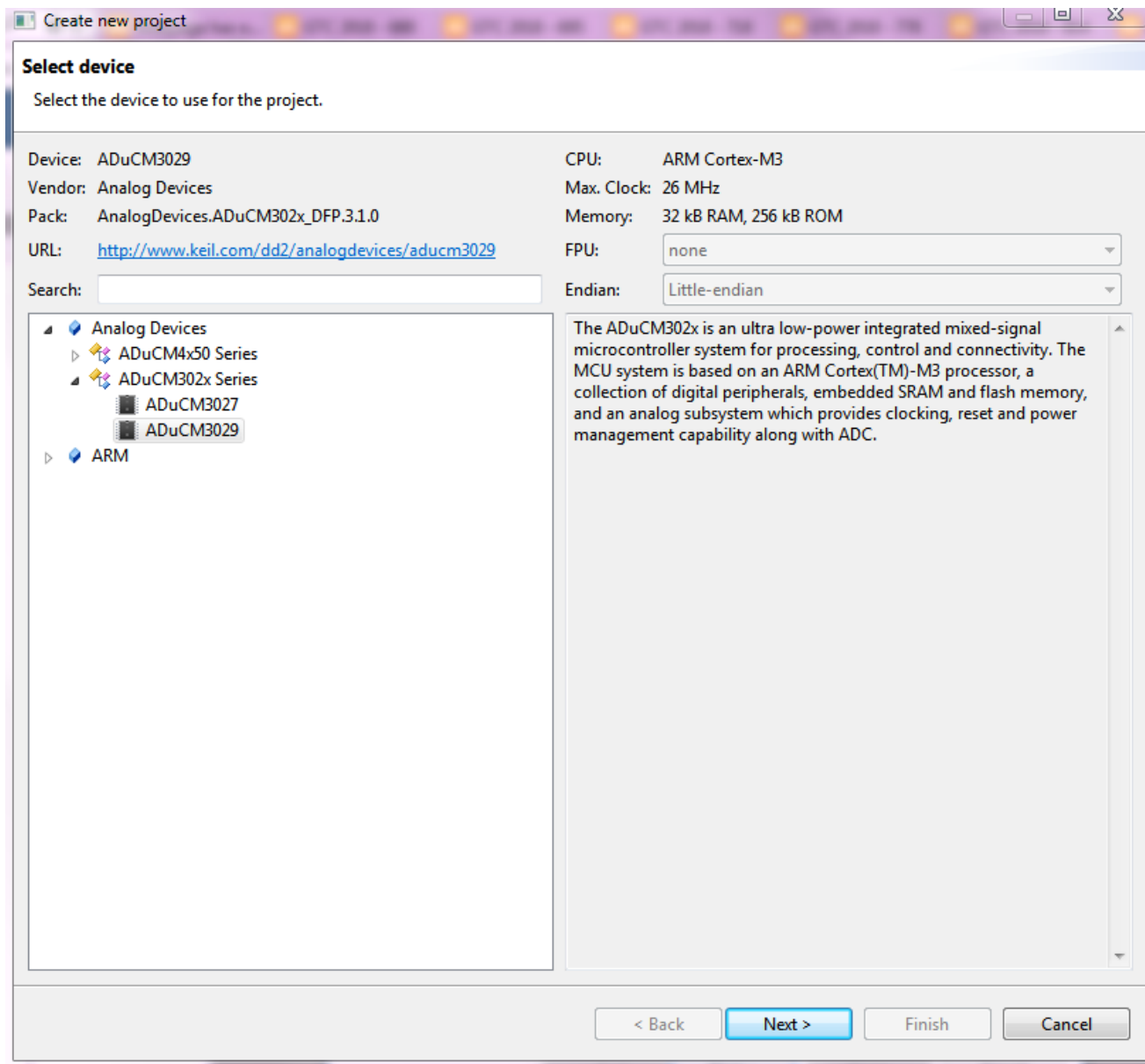
- Click on Project Create New Project



- Select Empty CMSIS Pack Project and click "OK".

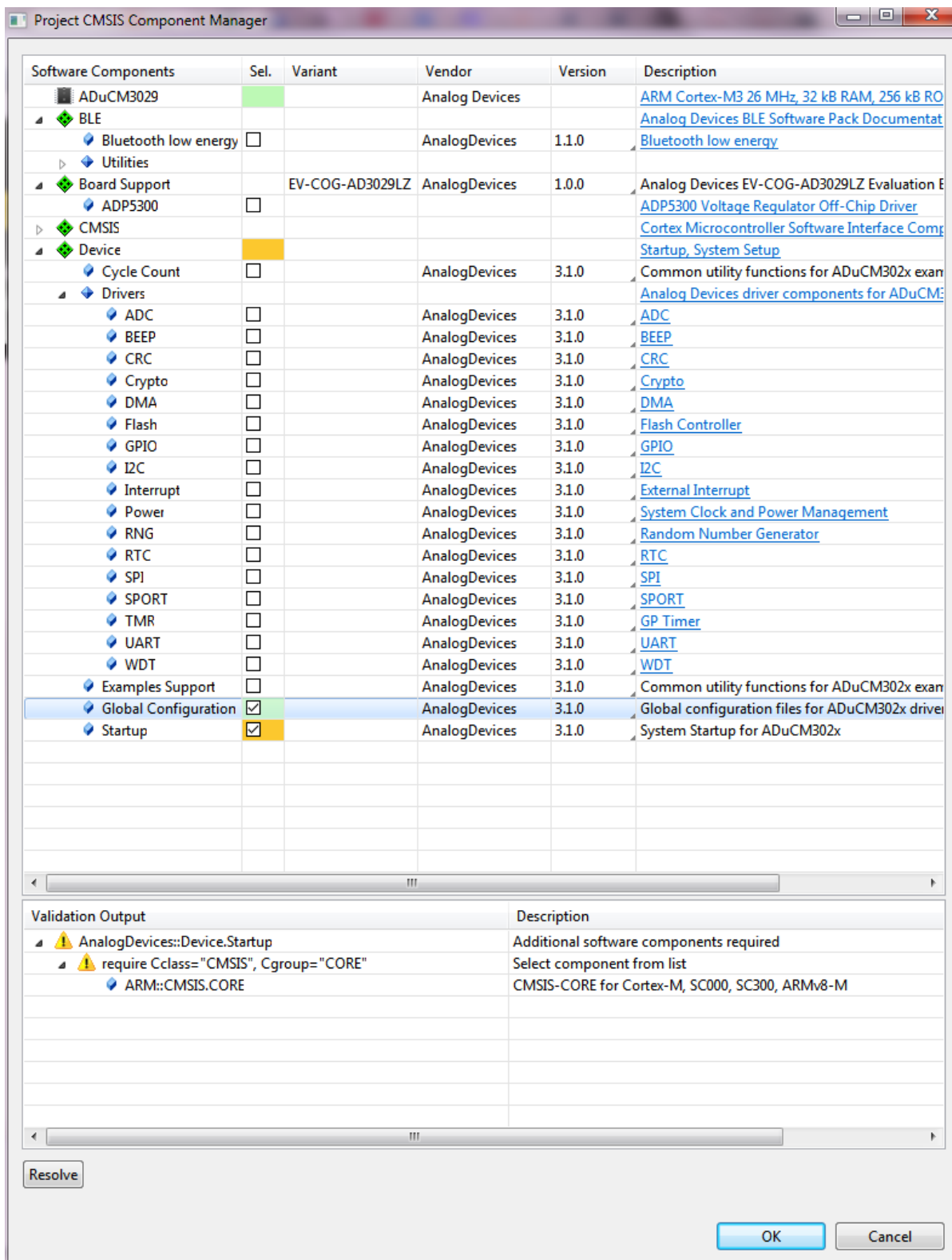
## 5.6

- Select Analog Devices ADuCM3x29 Series ADuCM3029 and click "Next".



- Choose components in the CMSIS Component Manager ensuring that Global Configuration and Startup are selected as a minimum.

The off-chip drivers for the EV-COG-AD3029LZ Evaluation Board are located in the "Board Support" class and the on-chip drivers for the ADuCM302x are located in the "Device" class. Bluetooth Low Energy component is under "BLE". Sensor components can be found under "Sensors". Click these components to add them to the project. Components will have dependencies on other components. If these dependencies are not met, the needed component will be highlighted in yellow. Note that the most minimal project will *Device Startup*, *Device Global Configuration*, and *CMSIS Core*. For more information about the components in the "Device" class, please see the ADuCM302x Device Family Pack.



## 6 Bluetooth Low-Energy Software

For information on the Bluetooth Low Energy software examples please check out the document located in *Documents\BLE\_Software\_Users\_Guide.pdf*

## 7 Sensor Software

For information on the Sensor software examples please check out the document located in *Documents\Sensor\_Software\_Users\_Guide.pdf*