ANALOG DEVICES

EVAL-ADUCM331QSPZ User Guide
UG-718

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EVAL-ADUCM331QSPZ Development System Getting Started Tutorial

DEVELOPMENT SYSTEM KIT CONTENTS

Evaluation board (EVAL-ADUCM331QSPZ) that facilitates evaluation of the device with minimum external components
Analog Devices, Inc., J-Link OB emulator (USB-SWD/UART-EMUZ)
USB cable

INTRODUCTION

The ADuCM330/ADuCM331 are fully integrated, 8 kSPS, data acquisition systems incorporating dual, high performance, Σ-Δ analog-to-digital converters (ADCs), with a 32-bit ARM Cortex™-M3 processor and Flash/EE memory on a single chip.

The ADuCM330/ADuCM331 are complete system solutions for battery monitoring in 12 V automotive applications. The ADuCM330/ADuCM331 integrate all of the required features to precisely and intelligently monitor, process, and diagnose 12 V battery parameters including battery current, voltage, and temperature over a wide range of operating conditions. The ADuCM330 has 96 kB program flash, and the ADuCM331 has 128 kB program flash.

GENERAL DESCRIPTION

The EVAL-ADUCM331QSPZ development system supports both the ADuCM330 and the ADuCM331 and allows a flexible platform for evaluation of the ADuCM330/ADuCM331 silicon. It allows quick removal and insertion of a device via a 32-lead LFCSP socket. It also provides the connections necessary to allow rapid measurement setups. Switches and LEDs are provided on the applications board to assist in debugging and simple code development. Sample code projects are also provided to show key features of each peripheral and examples of how they can be configured.

This user guide provides step-by-step details of how to set up and configure the example software available on the ADuCM33x Design Tools page.

By working through this user guide, users can start to generate and download their own user code for use in their own, unique end-system requirements.

Full specifications on the ADuCM330/ADuCM331 are available in the product data sheet, which should be consulted in conjunction with this user guide when working with the evaluation board.

EVAL-ADUCM331QSPZ SOCKETED EVALUATION BOARD SETUP

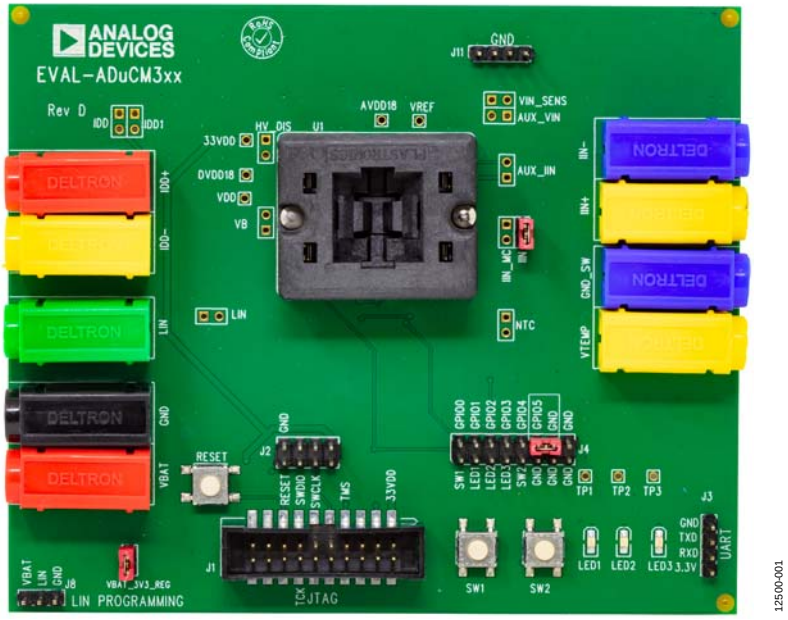

Figure 1.

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REVISION HISTORY

1/2019—Rev. 0 to Rev. A

Change to Figure 1 1
Changes to Figure 3, Figure 4, and Table 1 4

7/2015—Revision 0: Initial Version

GETTING STARTED

SOFTWARE INSTALLATION PROCEDURE

Items required to get started are as follows:

- Keil µVision v5 or higher
- CMSIS pack for ADuCM330/ADuCM331
- Segger debugger interface driver and utilities

Complete the steps described in this section before plugging any of the USB devices into the PC.

Support files for Keil are provided at the ADuCM33x Design Tools page. For Keil v5 upwards, CMSIS packs are required and are available on the ADuCM330/ADuCM331 product pages.

INSTALLING

To install the software, take the following steps:

1. Close all open applications.
2. Download and install Keil µVision v5 (or higher) from the Keil website.
3. From the Segger website, download and install the latest **J-Link software & documentation pack for Windows**.
4. From the ADuCM330/ADuCM331 product page, download the CMSIS pack for the ADuCM330/ADuCM331.

VERIFYING THE J-LINK DRIVER

Installing the J-Link driver is a three-step process.

1. Follow the sequence of instructions provided by Segger to download and install the J-Link driver.
2. When the software installation is complete, plug the debugger/programmer into the USB port of your PC using the USB cable supplied.
3. Verify that the emulator board appears in the Windows® **Device Manager** window (see Figure 2).

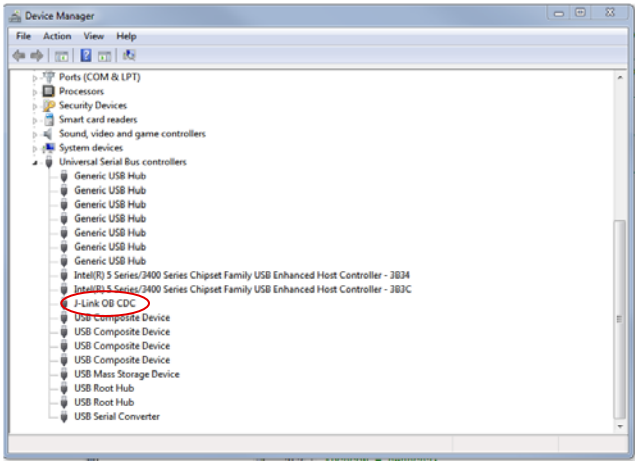

Figure 2. Device Manager

CONNECT THE DEVELOPMENT SYSTEM

To connect the development system, take the following steps:

1. Ensuring correct orientation, insert an ADuCM330/ADuCM331 device. Note that Pin 1 of the device is indicated by a dot in the corner. The dot on the device must be orientated with the dot on the socket, as shown in Figure 3.

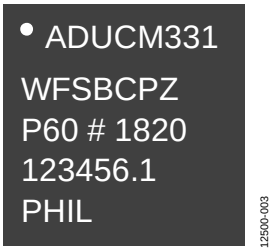

Figure 3. ADuCM331 Device Orientation

2. Connect the debugger/programmer, noting the correct orientation as shown in Figure 4.
3. Connect a 12 V supply between VBAT and GND.
4. Ensure that the board jumpers are in position, as shown in Figure 1.
5. Ensure that the GPIO5 jumper is in place. The GPIO5 jumper is used by the on-board kernel to determine program flow after a reset. See the Kernel section in the ADuCM331WFS Hardware Reference Manual (UG-1423) for full details.
6. Press **RESET**.

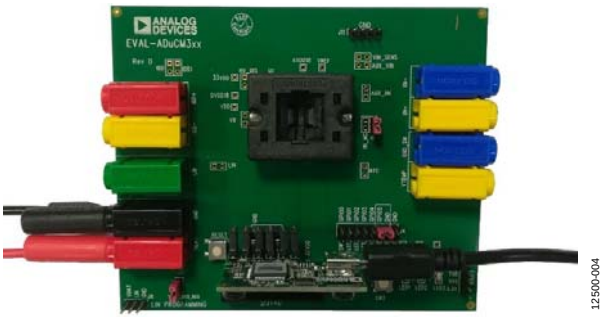

Figure 4. Mini-Link Debugger/Programmer Connection

JUMPER FUNCTIONALITY

Table 1.

Jumper	Functionality
J4, GPIO0	These jumpers connect the SW1 push button to the GPIO0 pin of the device.
J4, GPIO1, GPIO2, GPIO3	These jumpers connect the LEDs to the GPIO1, GPIO2, and GPIO3 pins of the device.
J4, GPIO4	These jumpers connect the SW2 push button to the GPIO4 pin of the device.
J4, GPIO5	This jumper ties the GPIO5 pin of the device to GND. This jumper must be connected when programming the device or when accessing via serial wire debug (SWD).
VBAT_3V3_REG	This jumper enables the 3.3 V regulator on the underside of the printed circuit board (PCB). This jumper powers the LEDs or an additional 3.3 V source.
LIN	This jumper is not inserted and connected via the 0 Ω link. This jumper can disconnect the LIN terminal (green banana socket) from the device when the 0 Ω link is removed.
IDD, IDD1	These jumpers are not inserted and connected via the 0 Ω link. This jumper allows the insertion of an ammeter in series with the VBAT supply through the I_{DD}+/I_{DD} sockets for current measurement when the 0 Ω link is removed.
VB	This jumper is not inserted and is connected via the 0 Ω link. This jumper disconnects the VBAT supply from the device VBAT input when the 0 Ω link is removed.
AUX_VIN	This jumper is not inserted. The VINx_AUX device pins are connected to GND via the 0 Ω link.
VIN_SENS	This jumper is not inserted. This jumper connects a sensor to the VINx_AUX input of the device when the 0 Ω link connecting the VINx_AUX to GND is removed.
IIN	This jumper shorts the inputs of the current channel ADC.
IIN_MC	This jumper is not inserted. This jumper connects to the signal at the IIN+ and IIN− pins of the device.
AUX_IIN	This jumper is not inserted. The IINx_AUX device pins are connected to GND via the 0 Ω link.
NTC	This jumper is not inserted. This jumper allows an external temperature device to be connected between VTEMP and GND_SW of the device.
J1	J1 is the JTAG programming interface. This interface allows the use of a JTAG with SWD capability.
J2	J2 is the SWD programming interface. See the orientation shown in Figure 4.
J3	J3 allows GPIO1 and GPIO4 to be used as UART connections, operating the device LIN logic in UART mode.
J4	J4 is a GPIO header.
J8	J8 is a header for programming the flash via LIN using the USB-I2C/LIN-CONVZ dongle.
J11	Ground header.

KEIL µVISION5 INTEGRATED DEVELOPMENT ENVIRONMENT

INTRODUCTION

The Keil µVision5 integrated development environment (IDE) integrates all the tools necessary to edit, assemble, and debug code. The ADuCM330/ADuCM331 development system supports nonintrusive emulation limited to 32 kB code. This section describes the project setup steps to download and debug code on an ADuCM330/ADuCM331 development system. It is recommended to use the J-Link debugger driver.

QUICK START STEPS

Starting µVision5

First, ensure that the CMSIS pack for the ADuCM330/ADuCM331 has been installed (see the Getting Started section).

After installing Keil µVision5, a shortcut appears on the PC desktop. Double-click the shortcut to open Keil µVision5.

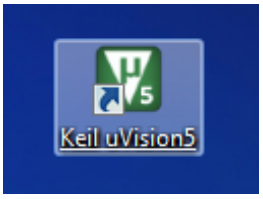

Figure 5. Keil µVision5 Desktop Shortcut

1. When Keil opens, click the **Pack Installer** button on the toolbar.

*Figure 6. **Pack Installer** Button*

2. The **Pack Installer** window opens.

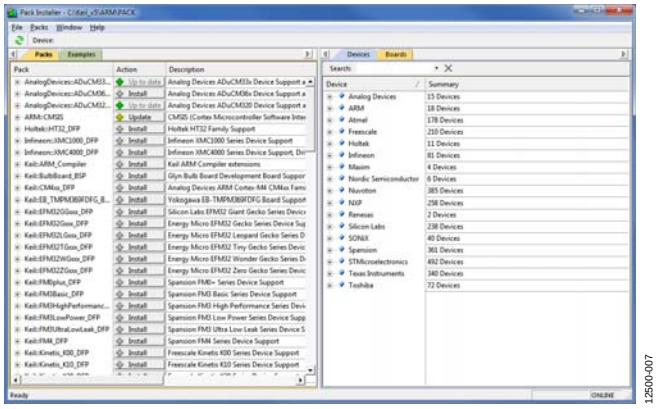

*Figure 7. **Pack Installer** Window*

3. Install the CMSIS pack. In the **Pack Installer** window, click **File** > **Import** and locate the downloaded CMSIS pack. Follow the on-screen prompts to install.
4. In the right-hand side of the window, under the **Devices** tab, click **Analog Devices** > **ADuCM33x Series** > **ADuCM330**.

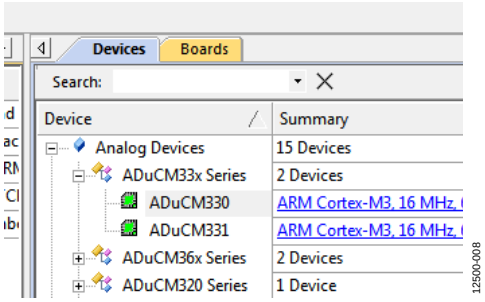

*Figure 8. **Devices** Tab*

5. In the left-hand side of the window, click the **Examples** tab.

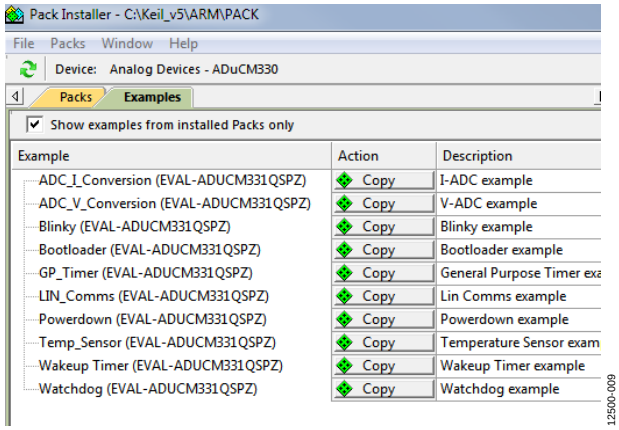

*Figure 9. **Examples** Tab*

6. Select the **Blinky** example and click **Copy**.
7. Choose a destination folder and click **ok**. This installs the **Blinky** example and necessary startup files to your PC.

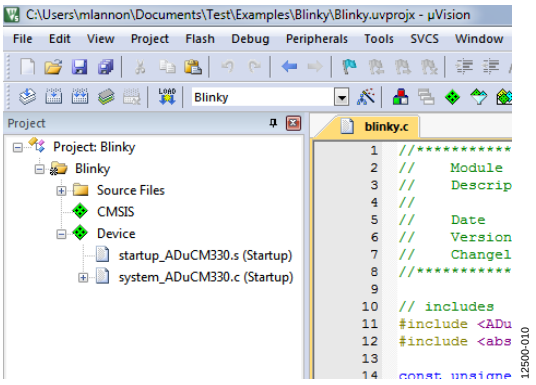

Figure 10. Blinky Example

8. The example must to be compiled by clicking the **Rebuild** button on the toolbar.

*Figure 11. **Rebuild** Button*

9. When the build is complete, the message shown in Figure 12 appears.

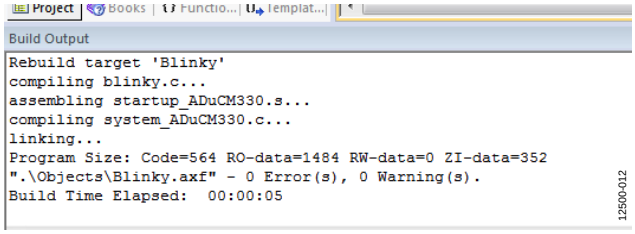

Figure 12. Build Output

10. To download the code to the EVAL-ADUCM331QSPZ board, click **Load**.

*Figure 13. **Load** Button*

11. When the code is downloaded to the applications board, the two LEDs blink repeatedly.