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EVAL-ADUCM300QSPZ Development System Getting Started Tutorial

DEVELOPMENT SYSTEM KIT CONTENTS

Evaluation board (EVAL-ADUCM300QSPZ) 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 ADuCM300 is a fully integrated, 8 kSPS, data acquisition system that incorporates dual, high performance, multichannel, Σ-Δ analog-to-digital converters (ADCs), a 32-bit Arm® Cortex®-M3 processor, and flash memory. The ADuCM300 has a 128 kB program flash, 4 kB data flash, and 6 kB static random access memory (SRAM).

The ADuCM300 is fully qualified for general automotive sensing applications and can interface to multiple external precision sensors in a system solution that also integrates a programmable Cortex-M3 microcontroller to postprocess the sensor signals on-chip, before transmitting the results off chip via industry-standard wired interfaces.

The ADuCM300 integrates all of the required features to precisely and intelligently interface, monitor, process, and diagnose a precision sensing system over a wide range of operating conditions.

The EVAL-ADUCM300QSPZ development system supports the ADuCM300 and allows a flexible platform for evaluation of the ADuCM300 silicon. The evaluation board allows quick removal and insertion of a device via a 32-lead lead frame chip scale package (LFCSP) socket and provides the connections necessary to allow rapid measurement setups. Switches and LEDs are provided on the evaluation board to assist in debugging and simple code development. Sample code projects are also provided to illustrate key features of each peripheral and examples of how these peripherals can be configured.

This user guide provides step-by-step details of how to set up and configure the example software, available from the **Tools & Simulation** section of the ADuCM300 product 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.

For full details, see the ADuCM300 data sheet, which must be consulted in conjunction with this user guide when working with the evaluation board.

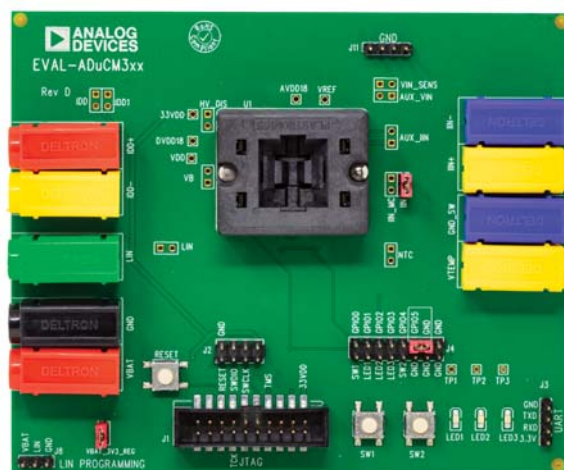## EVAL-ADUCM300QSPZ SOCKETED EVALUATION BOARD SETUP

Figure 1.

TABLE OF CONTENTS

REVISION HISTORY

6/2019—Revision 0: Initial Version

EVALUATION BOARD QUICK START PROCEDURES

SOFTWARE INSTALLATION PROCEDURE

The following items are required to begin the software installation procedure:

- Keil μVision software Version 5 (μVision5) or higher
- CMSIS pack for ADuCM300
- 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 the μVision5 software are available on the **Tools & Simulations** section of the ADuCM300 product page. CMSIS packs are required for μVision5 and newer and are available on the ADuCM300 product page.

To install the μVision5software, take the following steps:

1. Close all open applications.
2. Download and install μVision5 (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 ADuCM300 product page, download the CMSIS pack for the ADuCM300.

VERIFYING THE J-LINK DRIVER

To install the J-Link driver, take the following steps:

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 the PC with the supplied USB cable.
3. Verify that the emulator board appears in the Windows® **Device Manager** window (see Figure 2).
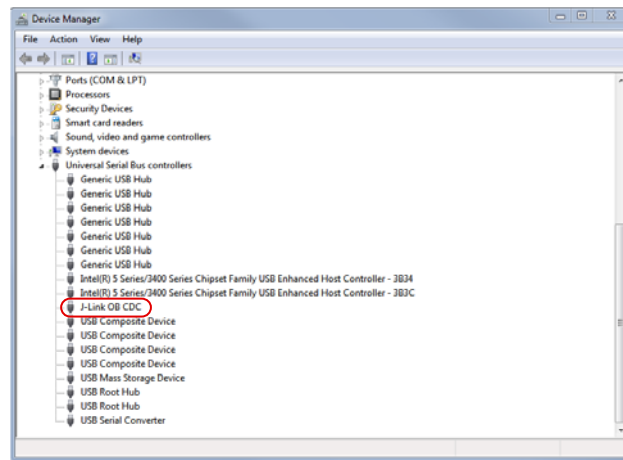

*Figure 2. **Device Manager** Window*

CONNECT THE DEVELOPMENT SYSTEM

To connect the development system, take the following steps:

1. Ensure proper orientation and insert an ADuCM300 device. Note that Pin 1 of the device is indicated by a dot in the corner. The dot on the device must be oriented with the dot on the socket, as shown in Figure 1.
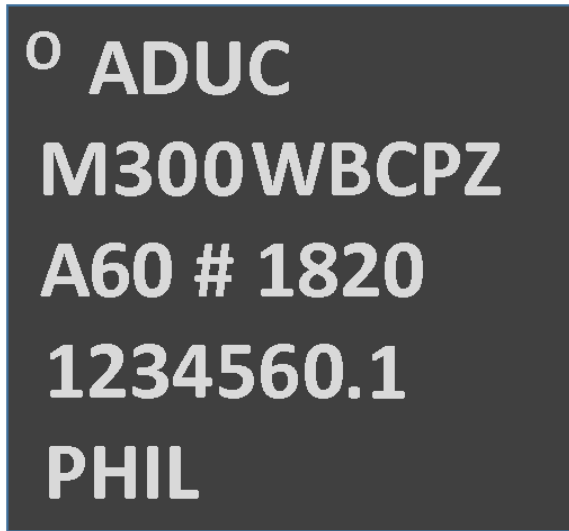

Figure 3. ADuCM300 Device Orientation

2. Connect the debugger/programmer, noting the proper orientation, as shown in Figure 4.
3. Connect the board supply voltage (12 V dc) between the VBAT and GND banana sockets.
4. Ensure that the board jumpers are in position, as shown in Figure 1.
5. Ensure that the GPIO5 jumper is in place (beside the LIN jumper). The GPIO5 jumper is used by the on-board kernel to determine program flow after a reset. See the ADuCM300 Hardware Reference Manual for full details.
6. Press the RESET button.
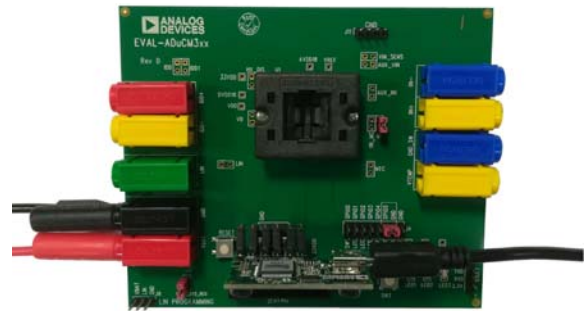
Figure 4. Mini Link Debugger/Programmer Connection

Table 1. Jumper Functionality

Jumper	Functionality
J4 (GPIO0)	This jumper connects Push-Button 1 to GPIO0 of the device.
J4 (GPIO1, GPIO2, GPIO3)	These jumpers connect the LEDs to GPIO1, GPIO2 and GPIO3 of the device.
J4 (GPIO4)	This jumper connects Push-Button 2 to GPIO4 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) and powers the LEDs or an additional 3.3 V source.
LIN	Not inserted, connected via and 0R link. This jumper can disconnect the LIN terminal (green banana socket) from the device when the 0R link is removed.
IDD, IDD1	Not inserted, connected via an 0R link. This jumper allows the insertion of an ammeter in series with the supply voltage through the $I_{DD}+/I_{DD}$ sockets for current measurement when the 0R link is removed.
VB	Not inserted, connected via an 0R link. This jumper allows the supply voltage to disconnect from the VBAT input when the 0R link is removed.
AUX_VIN	Not inserted, the AIN6 and AIN7 pins are connected to GND via the 0R link.
VIN_SENS	Not inserted, this jumper allows to connect a sensor to the AIN6 and AIN7 inputs of the device when the 0R link connecting the AIN6 and AIN7 inputs to GND are removed.
IIN	This jumper shorts the inputs of the AIN0 and AIN1 pins.
IIN_MC	Not inserted, allows to connect to signal at the AIN0 and AIN1 pins.
AUX_IIN	Not inserted, the AIN2 and AIN3 pins are connected to GND via the 0R link.
NTC	Not inserted, this jumper allows an external temperature device to be connected between the AIN5 and GND_SW pins of the device.
J1	J1 is the JTAG programming interface. Allowing to use a JTAG with SWD capability.
J2	J2 is the SWD programming interface. Check orientation with Figure 4.
J3	J3 allows for GPIO1 and GPIO4 to be used as universal asynchronous receiver/transmitter (UART) connection operating the device local interconnect network (LIN) logic in UART mode.
J4	J4 is a general-purpose input/output (GPIO) header.
J8	J8 is a header for programming via LIN using the USB-I2C/LIN-CONVZ dongle.
J11	Ground header.

KEIL µVISION5 INTEGRATED DEVELOPMENT ENVIRONMENT

The Keil µVision5 integrated development environment (IDE) integrates all the tools necessary to edit, assemble, and debug code. The ADuCM300 development system supports nonintrusive emulation limited to 32 kB code. This section describes the project setup steps to download and debug code on an ADuCM300 development system. It is recommended to use the J-Link debugger driver.

STARTING KEIL µVISION5

Ensure that the CMSIS pack for the ADuCM300 has been installed (see the Evaluation Board Quick Start Procedures section).

After installing the µVision5 software, a shortcut appears on the PC desktop. Double-click the shortcut to open the µVision5 software (see Figure 5).
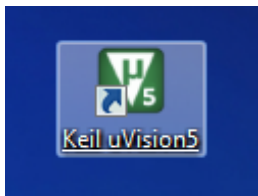
*Figure 5. **Keil µVision5** Desktop Shortcut*

1. When the Keil software opens, click the **Pack Installer** icon on the toolbar (see Figure 6).

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

2. The **Pack Installer** window opens (see Figure 7).
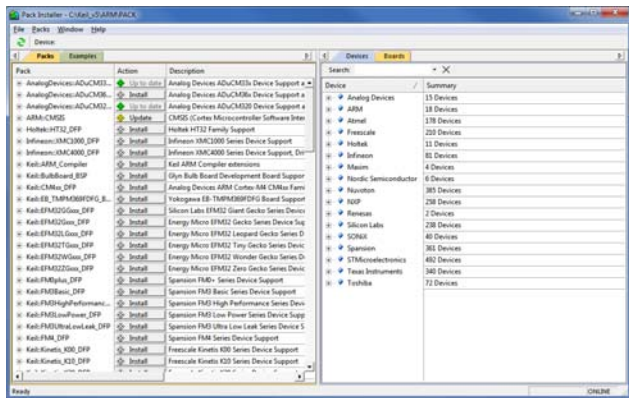
*Figure 7. **Pack Installer** Window*

3. Install the CMSIS pack. In the **Pack Installer** window, click **File** > **Import** and locate the downloaded CMSIS pack. Follow the prompts to install the pack.

4. In the **Devices** tab, click **Analog Devices** > **ADuCM300 Series** > **ADuCM300** (see Figure 8).
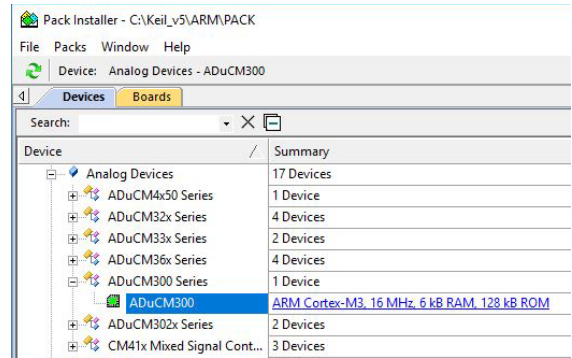
*Figure 8. **Devices** Tab*

5. Click the **Examples** tab (see Figure 9).
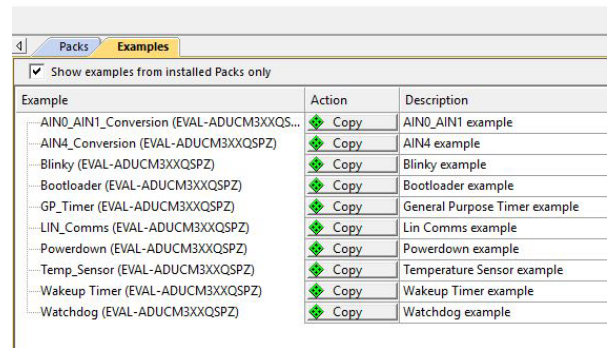
*Figure 9. **Examples** Tab*

6. Select the **Blinky (EVAL-ADUCM3XXQSPZ)** example and click **Copy**.

7. Choose a destination folder and click **Ok** to install the **Blinky (EVAL-ADUCM3XXQSPZ)** example and necessary startup files on the PC.
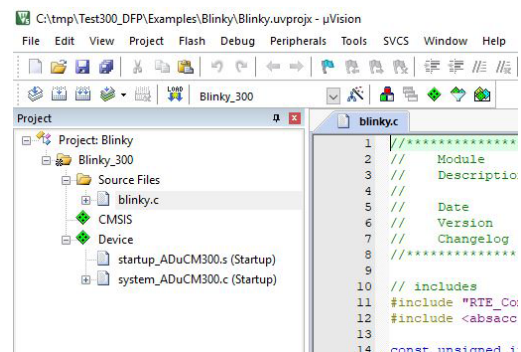
*Figure 10. **Blinky (EVAL-ADUCM3XXQSPZ)** Example*

8. The example must be compiled by clicking the **Rebuild** button on the toolbar (see Figure 11).

Figure 11. Rebuild Button

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

Figure 12. Build Output Window

10. To download the code to the EVAL-ADUCM300QSPZ board, click **Load** (see Figure 13).
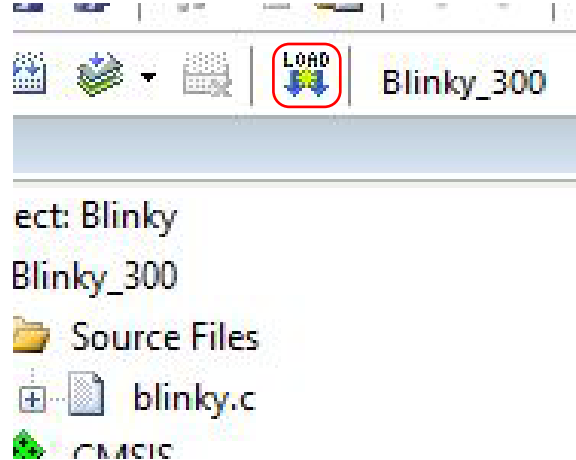
Figure 13. Load Button

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

ESD Caution

ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

ANALOG DEVICES

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