Audio EI3 Extender Board Support Package (BSP) v1.1.0 Release Notes

These release notes subsume the release notes for previous updates. Release notes for previous updates can be found at the end of this document.

Release Dependencies

- Requires Cross Core Embedded Studio (CCES) Release version 1.1.0. The download link can be found in the "Product Downloads" section at www.analog.com/cces.

This release was tested with the following hardware:

- Audio EI3 Extender Board Rev 1.0 BOM 1.0. More information on this hardware can be found at www.analog.com/EI3-Audio
- ADSP-BF707 EZ-Board Rev 1.0 BOM 1.4. More information on this hardware can be found at www.analog.com/BF707EZBoard
- ADSP-BF609 EZ-Board Rev 1.0 BOM 1.3. More information on this hardware can be found at www.analog.com/BF609EZBoard

New features and examples in this release

- ADSP-BF707 EZ-Board support added.
- As of release 1.1.0 the header files and source code for Audio EI3 Extender BSP drivers are MISRA-C compliant.
- Opening an audio example from the example browser or the system overview page now copies the project to your workspace.
- Two additional parameters added to the ADI_ADAU1761_SPORT_INFO struct:

```
ADI_ADAU1761_SPORT_DATA_LEN eDataLen;     /*!< The SPORT data transfer
length. */
bool bEnableStreaming;                    /*!< The flag to enable SPORT
streaming mode. */
```

Software issues addressed in this release

- Record/Playback examples stop playing back if you hit the playback button before the recording is finished (EZXAUD3-3)
- No readme for dspproj file
- Examples do not browse properly when using system.svc and clicking on the driver
- Examples do not have instructions for running the example in the readme
- Code analysis warning (unused declaration)
- Line In goes directly to Headphone out when dxe starts running
- The ADAU1761 driver should support all valid data lengths

Documentation

Documentation updated to version 1.1.0.

Known issues

None.

Audio EI3 Extender Board Support Package (BSP) v1.0.0 Release Notes

Thank you for installing the Audio EI3 Extender Board Support Package (BSP). The BSP provides software and documentation in support of the Audio EI3 Extender Board.

The Audio EI3 Extender Board connects to an Analog Devices EZ-Board by means of the Expansion Interface 3 (EI3) interface. The EZ-Board is designed for use with CrossCore® Embedded Studio (CCES) for Analog Devices Processors software development tools. The CCES development environment aids advanced application code development and debug, such as:

- Create, compile, assemble, and link application programs written in C++, C, and assembly
- Load, run, step, halt, and set breakpoints in application programs
- Read and write data and program memory
- Read and write core and peripheral registers

- Plot memory

For more details on CCES, please visit www.analog.com/cces. For more on the ADSP-BF609 EZ-Board, please visit www.analog.com/BF609EZBoard.

The Audio EI3 Extender BSP provides comprehensive software support for the Audio EI3 Extender Board. Specifically, drivers, examples and code sketches are included for the following components:

- ADAU1761 low power stereo audio codec

The CCES Help environment provides complete hardware and software documentation.

Installation Logging

The installer does not create a log file by default. If you encounter installation issues, you can generate an installation log file by running the installer from the command prompt.

Change to the directory containing downloaded installer executable and run the following from the command prompt:

```
ADI_Audio_EI3_Extender_Board-Rel1.0.0.exe /v"/l*v c:\temp\installer.log"
```

Support and Assistance

There are several options for contacting support:

- Submit your questions online at:

  http://www.analog.com/support

- E-mail your Processor and DSP software and development tools questions from within CrossCore Embedded Studio:

  Go to “Help->E-mail Support…”. This will create a new e-mail addressed to processor.tools.support@analog.com, and will automatically attach your CrossCore Embedded Studio version information (ProductInfo.html).

- E-mail your Processors and DSP applications and processor questions to:
  - processor.support@analog.com OR
  - processor.china@analog.com (Greater China support)

- Post your questions in the Processors and DSP online technical support community in Engineer Zone at:

  http://ez.analog.com/community/dsp

Supported Processors

Although the Audio EI3 extender is designed to work with any EZ-Board that supports the Expansion Interface 3, this release of the BSP supports only the ADSP-BF60x family of Blackfin processors.

Software Requirements

To build the projects included in the Audio EI3 BSP, CrossCore Embedded Studio version 1.0.0 or later is required..

Getting Started

Adding a Driver to a Project

When adding an Audio EI3 Driver to your project, the IDE will add the sources for the driver to the CCES Project folders, starting at "system/Audio_EI3". There will be a folder specific to the driver(s) you have added under this folder.

Creating a project which includes an Audio EI3 driver

In order to create a project you should follow the instructions provided in the CrossCore Embedded Studio help. As part of the project creation, the page "Add-in selection" contains a list of all the available

add-ins for the project that you are creating based on the installed products and the project's chosen processor and type. You can see the drivers in support of the Audio EI3 under the "Device Drivers and System Services" category. Within this category you will see "Audio EI3 Extender Board Drivers".

The Audio EI3 add-in generates a call to adi_initComponents(). For more information on adi_initComponents(), please refer to the CCES help section:

> CrossCore® Embedded Studio 1.0.0 > Graphical Development Environment > System Configuration

Adding an Audio EI3 driver to an existing project

Every CrossCore Embedded Studio project contains a System Configuration file called `system.svc` which is located in the root of the project. The file is the IDE's interface for managing the various pre-written software components used in the "system" implemented by a project. Double-clicking any `system.svc` file in a navigation view opens that file in the System Configuration Utility which allows you to see the add-ins that you currently have in your project. Click on "Add..." and select the Codec (ADAU1761) driver from the Audio EI3 Extender Board Drivers add-in which is under the "Device Drivers and System Services".

Notes:

- If the IDE detects that `adi_initComponents()` is not yet present in `main()`, it prompts you to add it and offers to insert it for you.

Configuration

There are no Audio EI3 driver configuration options available in the IDE.

Interrupts

CrossCore Embedded Studio provides a coherent interrupt management mechanism which allows for the same interface to be used in RTOS and non-RTOS applications. This means that interrupt service routines in all applications must be written in C and use the adi_int interface. Any thread-safety requirements or interactions with tasks are handled by the adi_int interface. For more information on the adi_int API, in CrossCore Embedded Studio go to Help > Search and enter adi_int.

Examples of the usage of this interrupt management mechanism are the System Services and Device Drivers provided with Crosscore Embedded Studio. By using the adi_int interface, the same services and drivers can be used in all applications regardless of whether an operating system is used.

Sketches and Examples

Sketches

CrossCore Embedded Studio provides a mechanism by which small code fragments, called sketches, can be generated with parameterized input provided by the user. The resulting code can then be copied and pasted to a project. Audio EI3 BSP related sketches are provided. To locate the sketches specific to the Audio EI3 Extender BSP, open up the example browser (Help -> Browse Examples) and then select Audio EI3 Extender Board product in the "Product:" pulldown.

Examples

In addition to the code sketches, the Audio EI3 Extender BSP provides examples which show how to use each of the drivers included in the BSP.

The following examples are available in this release: (For more information on the examples see the README file.)

1. Playback Audio from Memory Example
2. Playback Audio from Memory (callback method) Example
3. Record and Playback Audio Example
4. Record and Playback Audio (callback method) Example

Note:

- Double-clicking on an example from the example browser or the system overview page opens the project in the installation folder without copying it to your workspace. If you want to modify the example in any way, it is recommended that you copy it to your workspace.

The Audio EI3 Extender Board Support Package examples require an audio input source (line in or microphone) and output (speakers or headphones). The input and output selections are made using #defines in the example code. The microphones are mounted on the board. The connectors are labeled as follows:

- Headphones (J2)
- Line Out (J3)
- Line In (J4)
- Aux In (J5) (Not used in examples.)

Note that *Microphone In* is connected to the onboard iMEMS ADMP421 ICs U3 and U4.

SigmaStudio™

The examples provided with the Audio EI3 Extender Board Support Package use SigmaStudio generated program and register values to initialize the ADAU1761 SigmaDSP®. The SigmaStudio graphical development tool is the programming, development, and tuning software for the SigmaDSP audio processors. Each audio example has a SigmaStudio folder. Within this folder is a SigmaStudio project file and an export folder. The SigmaStudio project file was used to configure the program data and registers for the examples. The example loads the SigmaStudio exported files using the adi_adau1761_SigmaStudioLoad() driver API. In order to change the ADAU1761 initialization the SigmaStudio project can be modified and the output exported. These examples were created using SigmaStudio version 3.5. See http://www.analog.com/sigmadsp for more information on SigmaDSP and SigmaStudio.

Location

In order to locate the Audio EI3 Extender BSP examples and sketches, you can use the following:

- Open CrossCore Embedded Studio's Example Browser which can be found in CrossCore Embedded Studio under Help. Select in the Product section "Audio EI3 Extender Board v1.0.0" for a full list of examples and sketches.
- Import projects located in your Audio EI3 Extender BSP installation folder under the example directory in product installation. `(<audio_ei3_installation_root>\Audio_EI3\Blackfin\Examples\ADSP-BF609).`

Documentation

Hardware Manual and API documentation for the drivers included in the Audio EI3 Extender BSP can be found in CCES Help.

General information on the driver model can be found in CCES help under

CrossCore ® Embedded Studio 1.0.0 > System Runtime Documentation > System Services and Device Drivers

Integration with CrossCore Embedded Studio

System View

CrossCore Embedded Studio provides the System View which is used by the Audio EI3 Extender BSP. Use the System Configuration Overview tab to add Audio EI3 Extender BSP driver sources into a CrossCore Embedded Studio project.

To access the System Configuration Overview tab, do one of the following:

- In a navigation view, double-click the `system.svc` file of a project. The System Configuration utility appears with the overview tab selected.
- If the utility is already open, select the Overview tab.

As well as being able to add, remove and upgrade add-ins from this window, you will also be provided a list of examples and sketches associated with the selected add-in.

For more information about the System Configuration utility, see the CrossCore Embedded Studio help.

MISRA-C Support

MISRA C is a software development standard for the C programming language developed by the Motor Industry Software Reliability Association (MISRA). Its aims are to facilitate code safety, portability, and reliability in the context of embedded systems, specifically those systems programmed in ANSI C. The compiler detects violations of the MISRA rules at compile-time, link-time, and run-time.

As of release 1.0.0 neither the header files or source code for Audio EI3 Extender BSP drivers are MISRA-C compliant.

System Services and Device Driver Thread Safety

All system services and device drivers (SSDD) use mutexes and semaphores to ensure thread-safety. If an RTOS is present then the SSDD will use the RTOS mutex and semaphores. If an RTOS is not present then the SSDD will use a non-RTOS implementation of mutexes and semaphores (spin locks).

Known issues with the Audio EI3 Extender Board Support Package (BSP)

Outdated documentation for the Audio EI3 Driver APIs is erroneously included in CCES Help under the following topic help topic:

> CrossCore® Embedded Studio 1.0.0 > System Runtime Documentation > System Services and Device Drivers > Audio EZ-Extender® API Reference

This documentation is stale and should be ignored.

TAR-48697 MemoryPlayback in release configuration has errors when examples terminate

The Memory Playback examples provided with the Audio EI3 Extender Board Support Package display an error message when the program terminates. This error message is only seen when the examples are built in the release configuration. The program is terminated by pressing the PB1 button or after a timeout period. This error doesn’t affect operation of the example. There’s no workaround for avoiding this error.