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User Guide for Advantiv ADV7842/ADV7511 Video Evaluation Board

FEATURES

2 HDMI inputs, 1 HDMI output
Component input
Composite input
VGA input
S-Video input
Mini-USB connector for USB control port
RS-232 control port
Jumperable signal paths for audio and video

GENERAL DESCRIPTION

The Advantiv™ ADV7842/ADV7511 video evaluation board is a low cost solution for evaluating the performance of the ADV7842 HDMI receiver and video decoder ADC. This board can also be used to evaluate the ADV7511.

The evaluation board provides a Blackfin® BF524 processor for system control. The Blackfin offers the potential to process audio (no audio software is included). A serial command interface can be accessed via the USB or the serial port to interact with the ADV7842 and the ADV7511.

This evaluation board is available for purchase with or without HDCP support. Boards with HDCP support are only available to licensees of HDCP.

EVALUATION BOARD

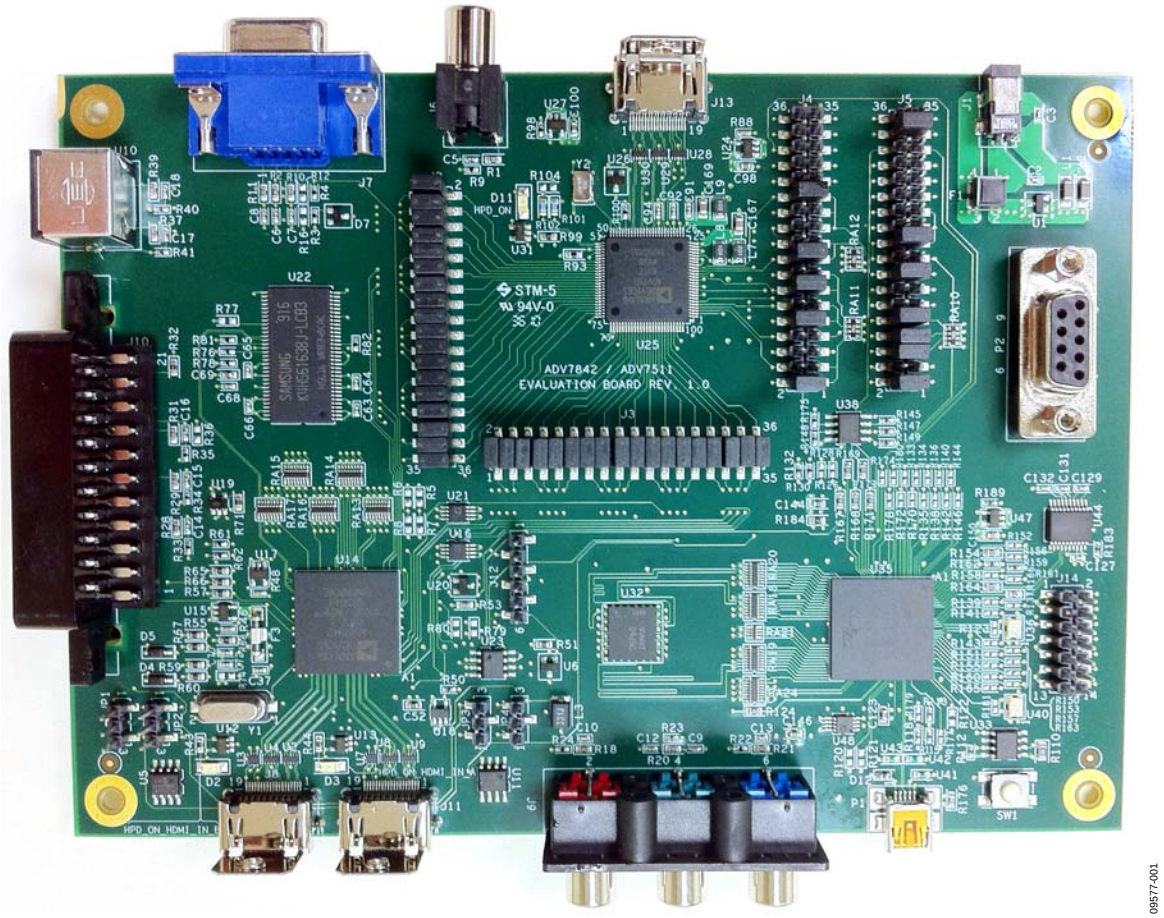

Figure 1. Advantiv ADV7842/ADV7511 Video Evaluation Board with Factory Jumper Settings

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REVISION HISTORY

1/11—Revision 0: Initial Version

EVALUATION BOARD HARDWARE AND SCHEMATIC

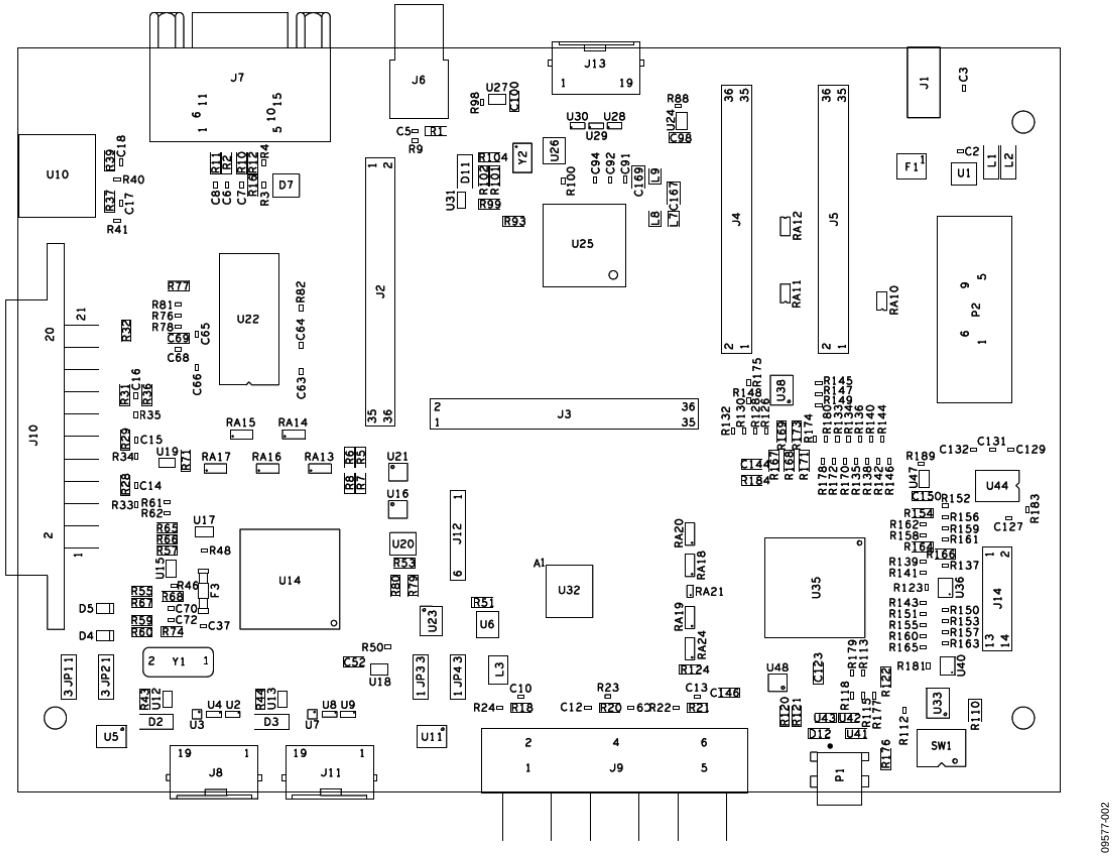

Figure 2. ADV7842/ADV7511 Evaluation Board Schematic

Table 1. Evaluation Board Hardware Components

Component	Function	Description
J9	Component video	Component video input to the ADV7842/ADV7511
J8, J11	HDMI Inputs	J8 is HDMI Port A, J11 is HDMI Port B
P1	Mini-USB	Mini-USB control port to communicate with the Blackfin
SW1	Reset	This switch resets the Blackfin
J1	Power	J1 is where the 5 V, 2.5 A power supply is connected
J14	BF524 JTAG	The ICE-100B or the HPUSB-ICE is connected here to reprogram the system flash or for source code debugging
P2	Serial port	The UART debug port can be used in place of the USB
JP3, JP4	Port B EDID	These jumpers (bottom middle) connect the I^2C bus from the Blackfin to the EDID EEPROM
JP1, JP2	Port A EDID	These jumpers (lower left) connect the I^2C bus from the Blackfin to the EDID EEPROM
J12	VGA EDID	This connector can be used to program the SPI EDID flash for the VGA port
J13	HDMI output	This is the only video output connector
J6	Composite input	This is a standard CVBS/composite connector for NTSC or PAL to the ADV7842/ADV7511
J7	VGA input	VGA/graphics input to the ADV7842/ADV7511
U10	SVIDEO input	Y/C analog input for NTSC or PAL to the ADV7842/ADV7511
J4, J5	Audio, debug Header	The audio bus can be jumpered between three configurations on these connectors. They also have several system signals available for probing as well as video syncs and clock.

USING THE EVALUATION BOARD

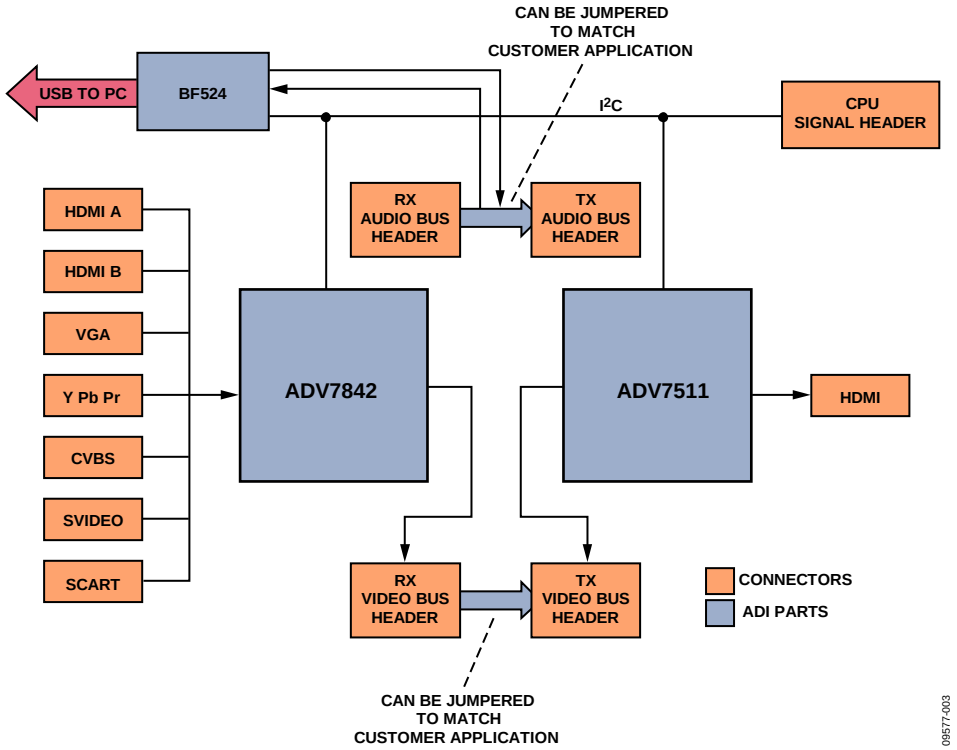

Figure 3. Block Diagram

TERMINOLOGY

The terms listed and described in this section are used in this user guide.

Source
Plays video out of a standard video port. This includes DVDs, cameras, set top boxes, Blu-ray players, game consoles, or any other device with a video output of any of the types supported by the board.

Sink
Accepts video in through a standard video port. This is nearly always an HDMI display (monitor or TV) in the context of this evaluation board.

Repeater
Refers to the software that implements the link between source and sink with respect to this board, and which runs on the BF524.

Serial interface
Refers to the command line interface from the board regardless of whether it is from the UART or USB port.

EVALUATION BOARD USAGE

The evaluation board can be connected as shown in Figure 3. By default, the video buses of the ADV7842 and ADV7511 are directly connected, and the I²S/SPDIF outputs of the ADV7842 are directly connected to the I²S/SPDIF inputs of the ADV7511.

All video inputs are available on both versions of the board. Note that a board, which is not HDCP enabled will not work with most consumer HDMI sources, thus, a devoted test source is needed. An HDCP license is required to purchase an HDCP-enabled board. A license is not required to purchase the non-HDCP-enabled board.

The board can be controlled either by a standard serial cable on P2 or a mini-USB cable on P1. In either case, the interface shows up on the controlling PC as a COM port. To use the USB, a driver must be downloaded from the location indicated on the card enclosed with the board (This is typically on the EngineerZone support community at http://ez.analog.com).

The serial interface operates at 115200 baud, 8 data bits, no parity, 1 stop bit, and no flow control. Either UART or USB can be used, but using USB disables the UART. Thus, UART and USB cannot be used simultaneously.

Type **help** at the serial interface to list the commands available to control the board as well as to indicate the version of firmware and build date.

If the board is HDCP enabled, then the Analog Devices, Inc., repeater software starts on boot, allowing an HDMI sink to receive content from an HDMI/HDCP source soon after connection.

Individual registers can be read and written from/to the ADV7842 and ADV7511. There are three main ways to control

the board: command line without repeater, command line with repeater, and DVP evaluation software/XRC.

COMMAND LINE WITHOUT REPEATER

This mode uses the serial interface. The BF524 boots to a known reset state and registers can be read from and written to directly. In this case, it is safe to assume that all registers will be at their reset value. For a board without HDCP enabled, this is the normal state on boot for the board. A board with HDCP enabled starts the repeater on boot.

It is possible to start the repeater in this mode with the **startrep** command. This only works with HDCP protected sources on an HDCP-enabled board. A non-HDCP-enabled board still operates, but will not authenticate HDCP.

COMMAND LINE WITH REPEATER

The command line with repeater mode also uses the serial interface and is the typical evaluation control/interface recommended for an HDCP-enabled board. Messages from the repeater are seen on the console as the repeater goes about the normal business of maintaining an encrypted HDMI link as sources, sinks, or formats change. Registers can still be read and written from the command line, but anything that is written to a register could get overwritten by the repeater software.

In this mode, there are additional commands from the repeater itself. All repeater commands are of the format "rep XXX" where XXX is the repeater command. A list of repeater commands is displayed using the **rep help** command. These commands provide information about the state of the repeater, source, and sink.

DVP EVALUATION SOFTWARE/XRC

The DVP evaluation software/XRC runs on a PC and uses the USB connection. Evaluation software may be downloaded from the location indicated on the card enclosed with the board (typically on the EngineerZone support community at http://ez.analog.com). This software allows scripts to be run from a PC to control the ADV7842 and ADV7511.

For a non-HDCP-enabled board, this software is the easiest way to evaluate different modes of the ADV7842 and ADV7511.

Note that the terms DVP evaluation software and XRC are used interchangeably.

JUMPER CONFIGURATION

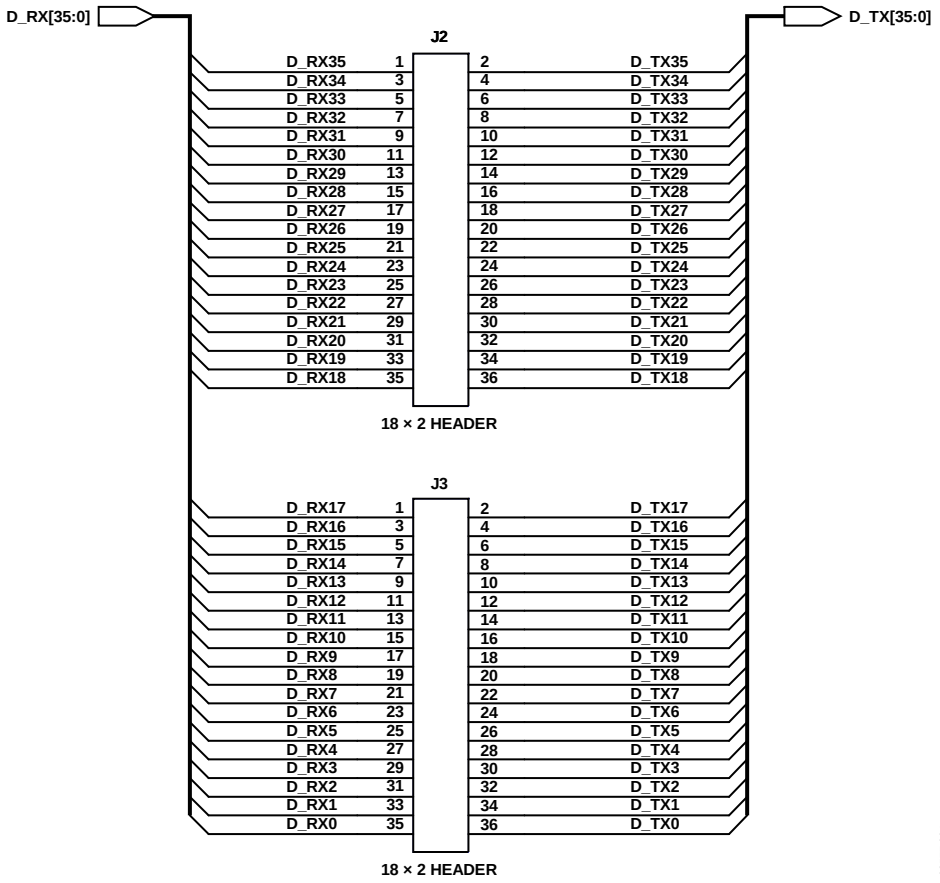

Figure 4. Video Bus Headers

Figure 4 shows how the evaluation board video bus headers between the ADV7842 and ADV7511 are pinned out. By default, these two busses are directly connected. When referring to jumpers, the phrase "by default" indicates how they are configured at the factory. This user guide assumes that the jumpers are factory set as shown in Figure 1.

If a different connection is required (as when trying to connect a device to a customer-specific system), the video bus jumpers can be reassigned. Keep in mind that signal integrity suffers with long leads. If the jumper configurations are changed, the repeater software no longer operates and serial control customized to the interface configuration will be the only way to test out the configuration.

Information about the pixel port interfaces can be found in the appropriate data sheets.

AUDIO JUMPER CONFIGURATIONS

There are three primary jumper configurations for audio.

- I^2S/SPDIF directly from ADV7842 to ADV7511 (as shown in Table 2)
- DSD/DST directly from ADV7842 to ADV7511 (as shown in Table 3)
- I^2S0 through BF524 from ADV7842 to ADV7511 (as shown in Table 4). This configuration is for a customer experienced with Blackfin audio processing. No software support for this mode is built into the software on the board.

By default, the board comes with the first configuration listed above active.

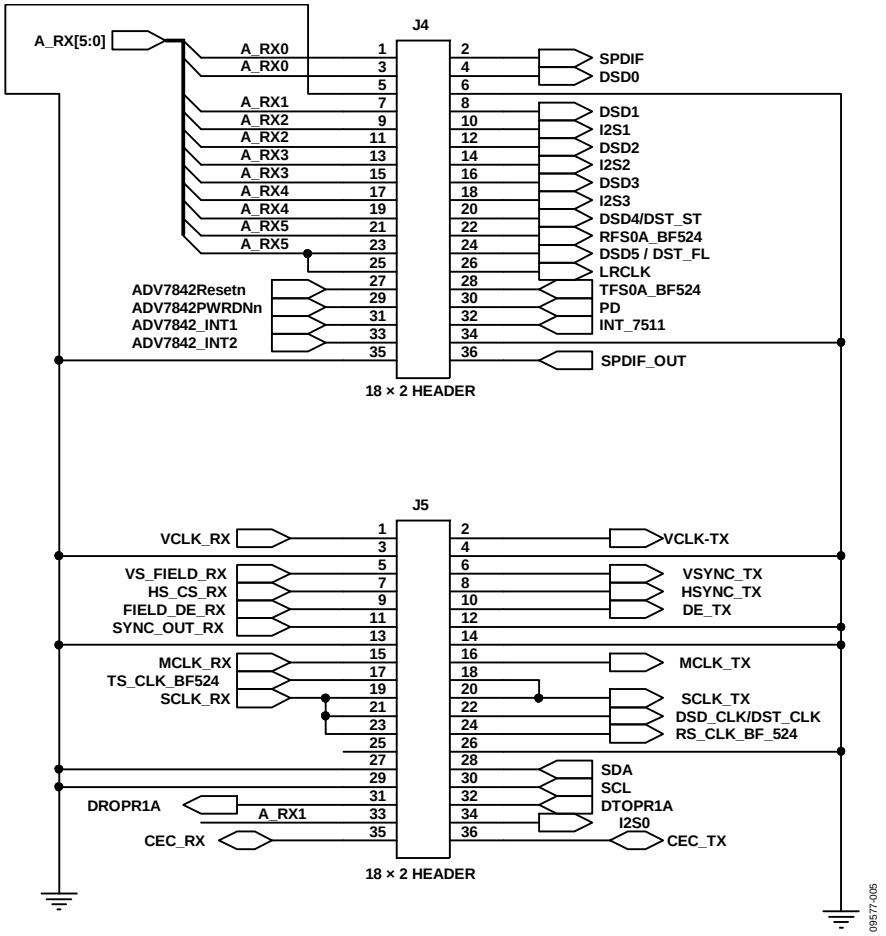

Figure 5. Audio Bus and Debug Headers

Table 2. I²S/SPDIF Directly from ADV7842 to ADV7511

Jumper	Pins	Description
J4	1 to 2	A_RX0 to SPDIF
J5	33 to 34	A_RX1 to I2S0
J4	9 to 10	A_RX2 to I2S1
J4	13 to14	A_RX3 to I2S2
J4	17 to 18	A_RX4 to I2S3
J4	25 to 26	A_RX5 to LRCLK
J5	15 to 16	MCLK_RX to MCLK_TX
J5	19 to 20	SCLK_RX to SCLK_TX

Table 2 shows the default configuration and the most typical. It is required to use the repeater software.

Table 3. DSD/DST Directly from ADV7842 to ADV7511

Jumper	Pins	Description
J4	3 to 4	A_RX0 to DSD0
J4	7 to 8	A_RX1 to DSD1
J4	11 to 12	A_RX2 to DSD2
J4	15 to 16	A_RX3 to DSD3
J4	19 to 20	A_RX4 to DSD4 / DST_ST
J4	23 to 24	A_RX5 to DSD5 / DST_FL
J5	15 to 16	MCLK_RX to MCLK_TX
J5	19 to 20	SCLK_RX to SCLK_TX

The configuration shown in Table 3 is used with sources/sinks that support DSD/DST. It must be used with command line scripts or XRC.

Table 4. I²S0 through BF524 from ADV7842 to ADV7511

Jumper	Pins	Description
J5	31 to 33	A_RX1 to DPROPR1A
J5	32 to 34	DTOPR1A to I2S0
J5	23 to 24	SCLK_RX to RS_CLK_BF_524
J5	17 to 18	TS_CLK_BF524 to SCLK_TX
J4	21 to 22	A_RX5 to RFS0A_BF524
J4	26 to 28	TFS0A_BF524 to LRCLK

EDID JUMPERS

The EDID EEPROMs on the board are, by default, unprogrammed. The repeater software uses the SRAM in the ADV7842 for the EDID. Jumpers are provided to allow programming as well as the use of fixed EDIDs in the EEPROM.

HDMI Port A and Port B

JP1 and JP2 are used to connect EEPROM U5 to the HDMI DDC lines to allow the use of a fixed EDID. By default, these jumpers should be open and U5 is unused. Connecting Pin 1 and Pin 2 on JP1 and JP2, respectively, puts U5 on the DDC lines to HDMI Port A. Connecting Pin 2 and Pin 3 puts U5 on the board's regular I²C bus, where it can be programmed with data from the debug jumper or the Blackfin. For HDMI Port B, the same applies to JP3 and JP3 with EEPROM U11.

SPI EDID

U23 is an SPI-programmable EEPROM that can be programmed from J12. The ADV7842 can then be programmed to load its EDID from the SPI memory. This is only used as part of customized software or a script. It is not used by the repeater software.

PROGRAMMING THE BF524

The Blackfin can be programmed and source-code debugged through the JTAG connector J14. It is possible to program and debug source code using the standard Blackfin development tools VisualDSP++® and the HPUSB-ICE.

A low cost ICE, IDE-100B, is also available. This can be used to simply reprogram the SPI flash with new firmware for the board. The latest firmware release for the board can be found at the location indicated on the card enclosed with the board (typically on the EngineerZone support community at http://ez.analog.com). At a minimum, the ICE-100B and a VisualDSP++ test drive are required to reprogram the board.

A flash driver is needed by the Flash Programmer in VisualDSP++. It is also available for download at the location indicated on the card enclosed with the board (typically on the EngineerZone support community at http://ez.analog.com).

For information regarding audio and the BF524, refer to the Blackfin data sheet.

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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.

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