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Evaluation Board User Guide
UG-604

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Advantiv EVAL-ADV8003-SMZ-P Video Evaluation Board

FEATURES

Inputs: 1 HDMI (non-HDCP), 1 Component, 1 Graphics (RGB)
Outputs: 1 HDMI

ADDITIONAL EQUIPMENT/SOFTWARE NEEDED

Computer with RS-232 I/O for:
   Sending commands to the software driver and viewing debug messages from the software driver
   Reading/writing registers using the AVES3 application for Windows (requires Windows 7 or higher)
   Updating the software driver (if desired or necessary)

GENERAL DESCRIPTION

The Advantiv® EVAL-ADV8003-SMZ-P video evaluation board (AVEB) is a low cost solution for evaluating the performance of the ADV8003 video signal processor.

The evaluation board provides a Blackfin® ADSP-BF524 processor for system control and includes a software driver (firmware) that provides a serial command interface to control the board's functionality.

This evaluation board does not include support for High-bandwidth Digital Content Protection (HDCP).

HDCP licensees should consider using EVAL-ADV8003-SMZ instead of EVAL-ADV8003-SMZ-P.
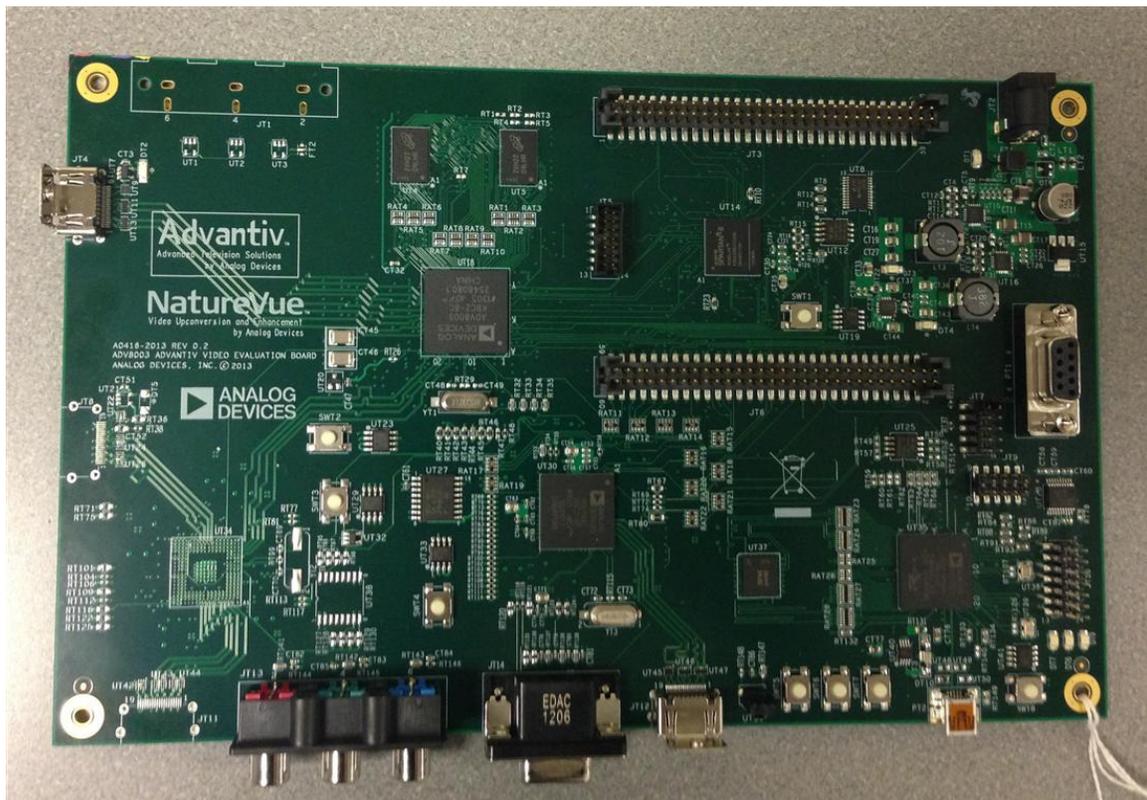
PHOTOGRAPH OF EVALUATION BOARD

Figure 1. Advantiv EVAL-ADV8003-SMZ-P Video Evaluation Board

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REVISION HISTORY

TERMINOLOGY

Throughout this user guide, the following terms are used.

Source

A source outputs digital audio/video over a DVI/HDMI interface. This can be a DVD/Blu-ray player, set-top box, game console, or any other device with a DVI/HDMI output.

Sink

A sink accepts video through a DVI/HDMI interface. This is nearly always a display with DVI/HDMI input in the context of this user guide.

Software driver

"Software driver" refers to the software that runs on the ADSP-BF524 and implements the link between a source and sink with respect to this evaluation board.

EVALUATION BOARD HARDWARE

A block diagram of the EVAL-ADV8003-SMZ-P is shown in Figure 2 and components are described in Table 1:
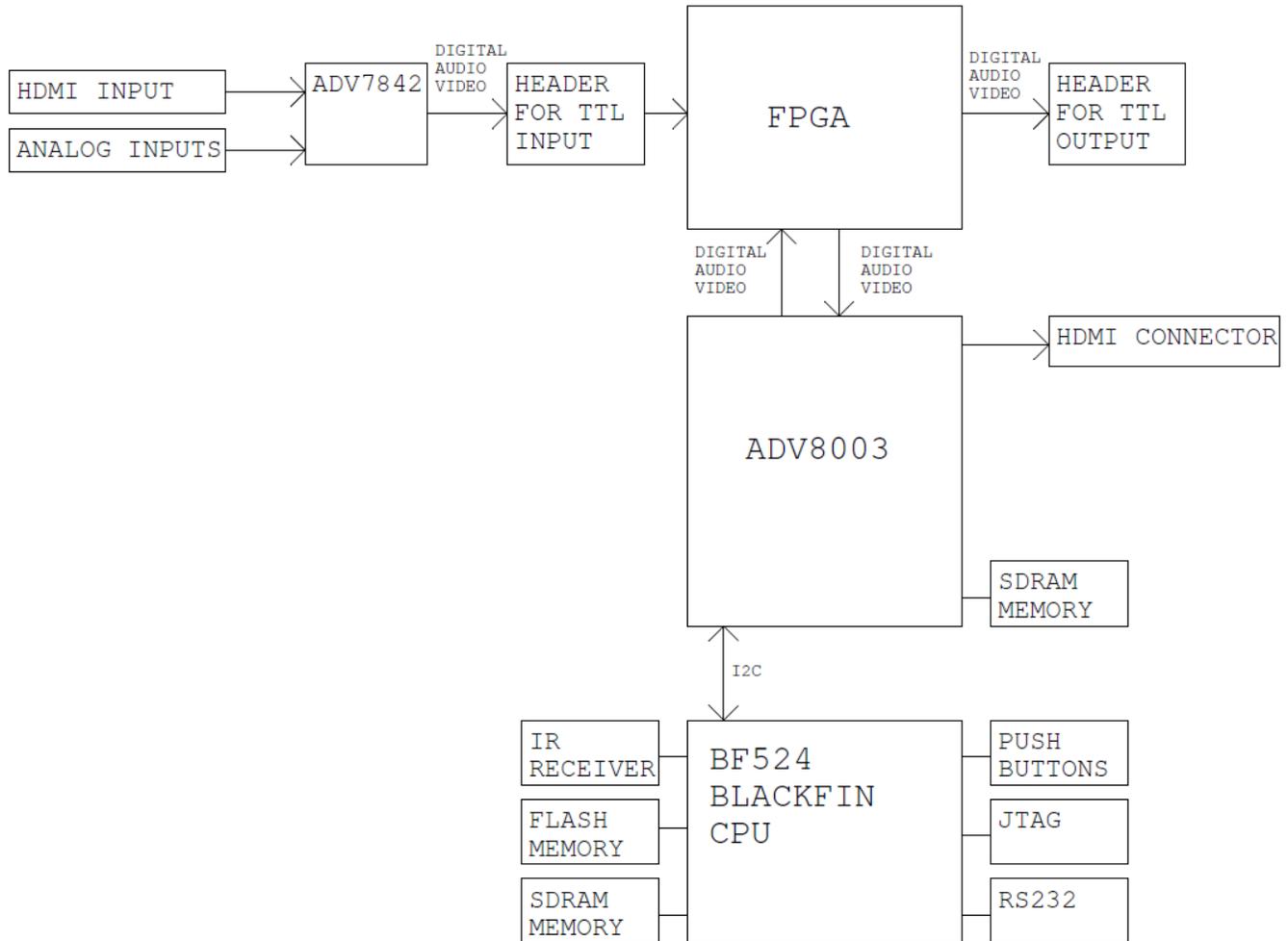

Figure 2. Block Diagram of the EVAL-ADV8003-SMZ-P

Table 1. Evaluation Board Hardware Components

Reference Designator	Function	Description
JT2	Power Connector	J12 is where the 7.5 V, 4 A power supply is connected.
SWT8	BF524 Reset	This switch resets the BF524 processor.
PT1	BF524 RS-232 port	RS-232 interface between the BF524 and the computer (for user control and debug output).
PT2	BF524 USB port	USB interface between the BF524 and the computer (will be used in future to update OSD)
JT10	BF524 JTAG	The ICE-100B or the HPUSB-ICE is connected here to program the BF524 flash or to execute source code debugging.
JT12	HDMI Input	HDMI Input (RXA) for the ADV7842
JT13	Component Input	Component input for the ADV7842
JT14	Graphics Input	Graphics (RGB) input for the ADV7842
JT4	HDMI Output	HDMI Output (TX1) from the ADV8003
JT6	Dig A/V Input	Header for Digital Audio/Video Input (TTL)
JT3	Dig A/V Output	Header for Digital Audio/Video Output (TTL)

CONFIGURING THE EVALUATION BOARD

Whereas in the past, we provided scripts to configure our evaluation boards, due to the flexibility of the ADV8003, we strongly recommend using the software driver to configure the board and evaluate the components.

Whether the software driver starts automatically depends on if a jumper is installed across Pin 1 and Pin 2 of JT7, as follows:

* If a jumper **is not** installed on JT7 pins 1-2, the application will automatically start the SW driver after power-up or reset. At that point the board can be configured using the supplied IR remote or console commands.

* If jumper **is** installed on JT7 pins 1-2, the application will pause at the command prompt and not start the SW driver in order to allow the user to configure the board. This is typically accomplished with the AVES application.

The RS-232 command-line interface operates at 115,200 baud, eight data bits, no parity, one stop bit, and no flow control. Typing **help** via RS-232 lists the commands that can be used to control the board as well as indicate the version of firmware and build date.

The SW driver is a collection of routines that configures the various devices via I2C. The RS232 output is used to provide useful information back to the user. Registers can still be read/written from the command line, but anything that is written to a register can be overwritten by the SW driver.

Since the commands for the software driver change frequently, we describe these in a separate document available in the EVAL-ADV8003-SMZ-P support page on EngineerZone (https://ez.analog.com/docs/DOC-4497).

AVES3

AVES3 is a Windows®-based application that runs on a PC and allows the user to read and write registers on the ADV7842 and ADV8003. It also displays the individual bit fields for each register and allows the user to read/write these individual bit fields. The software supports RS-232, USB, and I²C (using the Total Phase Aardvark I²C/SPI host adapter).

Starting with AVES3, each evaluation board will have its own AVES3 folder which will contain files specific to that evaluation board.

The AVES3 folder for this board can be downloaded from the EVAL-ADV8003-SMZ-P support page on EngineerZone (https://ez.analog.com/docs/DOC-4497).

EVALUATION BOARD SOFTWARE

The SW driver on evaluation board can be updated using the u-boot bootloader that comes with board. However, we suggest that customers purchase VisualDSP++ 5.0 and a low-cost JTAG debugger for Blackfin processors (HPUSB-ICE or ICE-100B) to use in case the u-boot software is accidentally erased or corrupted.

UPGRADING THE APPLICATION BINARY USING U-BOOT

Every EVAL-ADV8003-SMZ-P evaluation board ships with the U-Boot boot loader firmware. Assuming this software hasn't been erased/corrupted, you have the option of upgrading the firmware using only an RS-232 cable and software.

The output from u-boot should look something like this:

```
------------------
U-Boot 2012.07-rc2 (ADI-2012R2) (Jul 16 2013 - 11:21:16)

CPU:   ADSP bf524-0.2 (Detected Rev: 0.2) (spi flash boot)
Board: ADI Advantiv™ Video Evaluation Board
       Support: http://ez.analog.com
Clock: VCO: 300 MHz, Core: 300 MHz, System: 100 MHz
RAM:   8 MiB
SF: Detected M25P32 with page size 64 KiB, total 4 MiB
In:    serial
Out:   serial
Err:   serial
KGDB:  [on serial] ready
Hit any key to stop autoboot:
------------------
```

If you see this RS232 output, you can use the following steps to upgrade the application binary on your board (if you determine this is necessary). Note that these instructions assume you are using the version 4.78 of Tera Term for Windows (which is free to download and use). We have experienced YMODEM issues with previous versions of TeraTerm, so we strongly suggest using version 4.78 or higher.

1. After you see the **hit any key to stop autoboot** prompt, press a key during the countdown. You should then see a prompt, **bfin >**.
2. At the prompt, type the following command:
```
sf probe 0:1
```
You should see the following:
```
SF: Detected M25P32 with page size 64 KiB, total 4 MiB
bfin>
```
3. At the prompt, type the following command:
```
loady
```
You should see the following output:
```
## Ready for binary (ymodem) download to 0x00800000 at 115200 bps...
```

4. In Tera Term, under **File**, click **Transfer**, then **YMODEM**, and select **Send…**
5. Select the application binary file (for example, **BF_7842_8003_VSP_1.80RC3_20140312.bin**) and click **Open**.
You should see the YMODEM send dialog box progress quickly from 0% to 100%. If the software stalls at Packet 1 or Packet 2 for a few seconds, you may need to cancel and retry. It is possible that you may need to repeat Step 3 through Step 5 a few times to accomplish the transfer. After the transfer is complete, you should see something like the following output:
```
CCxyzModem - CRC mode, 0(SOH)/721(STX)/0(CAN) packets, 4 retries
## Total Size      = 0x000b3f70 = 737136 Bytes
bfin>
```
6. At the prompt, type the following command to erase the application area of the SPI flash memory:
```
sf erase 0x60000 0xc0000
(Note: that this is slightly larger than the value 0xa0000 used on previous evaluation boards)
```
You should then see the following output:
```
bfin>
```

7. At the prompt, type the following command to program the application area of the SPI flash memory:
```
sf write $(loadaddr) 0x60000 $(filesize)
```
You should then see the following output:
```
bfin>
```

8. At this point, if you reset your board and allow the countdown to complete, U-Boot should launch the application binary that you just programmed.

UPGRADING THE OSD BINARY USING U-BOOT

u-boot can also be used to program the OSD binary (located in UT27). You can use the following steps to upgrade the OSD binary on your board (if you determine this is necessary). Note that these instructions assume you are using version 4.78 of Tera Term for Windows (which is free to download and use). Note: we have experienced YMODEM issues with previous versions of TeraTerm, so we strongly suggest using version 4.78 or higher.

1. At the bfin> prompt, type the following command:

       run spiloopon

2. You should see the following output:

gpio: pin pg9 (gpio 25) value is 1
gpio: pin pf5 (gpio 5) value is 0
gpio: pin pf7 (gpio 7) value is 1

3. Type the following command:

sf probe 0:3

4. You should see the following output:

SF: Detected M25P128 with page size 256 KiB, total 16 MiB
bfin>
(Note: you may need to enter this command 2-3 times in order to detect the M25P128 correctly.)

   At the prompt, type the following command:

       loady

   You should see the following output:

       ## Ready for binary (ymodem) download to 0x00800000 at 115200 bps...

1. In Tera Term, under **File**, click **Transfer**, then **YMODEM**, and select **Send…**
2. Select the OSD binary file (for example, **OSD_1.80RC3_20140312.bin**) and click **Open**.
3. You should see the YMODEM send dialog box progress slowly from 0% to 100%. If the software stalls at Packet 1 or Packet 2 for a few seconds, you may need upgrade Teraterm to version 4.78. (Note: we have noticed that if the software stalls, it typically results in a wrong file size. We believe this was an issue with YMODEM transfer in Teraterm and the version 4.78 appears to have fixed it.)
4. After the transfer is complete, you should see something similar to the following output:

       CCxyzModem – CRC mode, 0(SOH)/7739(STX)/0(CAN) packets, 3 retries
       ## Total Size   = 0x0078e6e5 = 7923429 Bytes

5. bfin>At the prompt, type the following command to erase the contents of UT27 (serial flash memory for ADV8003 OSD)

       sf erase 0x0 0x800000

   You should then see the following output:

       bfin>

6. At the prompt, type the following command to program UT27 with the OSD binary

       sf write $(loadaddr) 0x0 $(filesize)

   You should then see the following output:
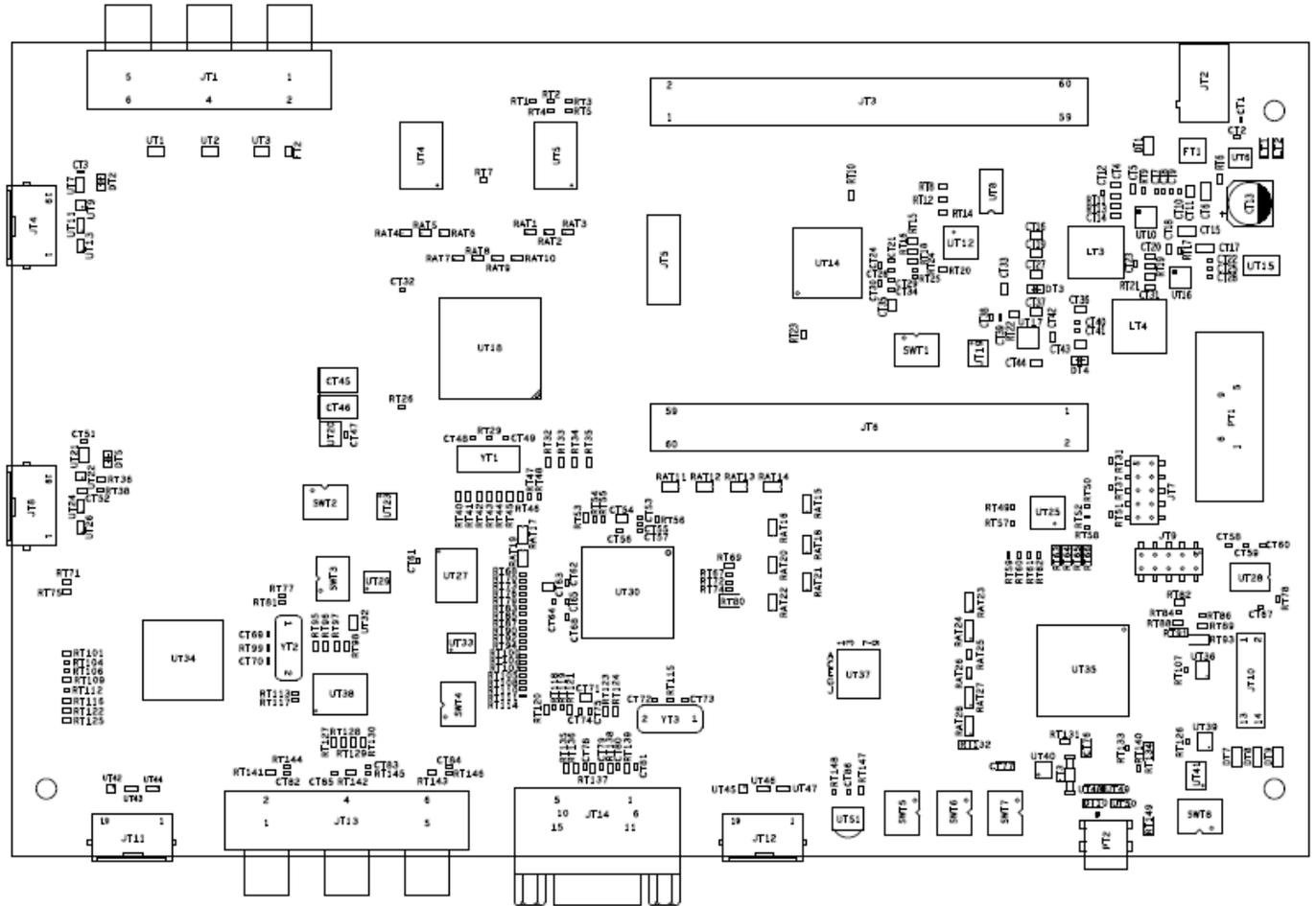
       bfin>

EVALUATION BOARD ARTWORK

Figure 3. Assembly Drawing (Top Side) of the EVAL-ADV8003-SMZ-P

RELATED LINKS

Resource	Description
TBD	TBD

I²C refers to a communications protocol originally developed by Philips Semiconductors (now NXP Semiconductors).