

Advantiv EVAL-ADV7619-7511 Video Evaluation Board

FEATURES

Two HDMI inputs, one HDMI output
 PC communication via RS-232 or USB interface
 Audio and video signals paths connected to jumpers for easy monitoring

EQUIPMENT NEEDED

Computer with RS-232 (or USB) I/O to accomplish the following:
 Send scripts to the board's command line interface
 Send commands to the board's repeater software and view software output
 Control the board via Advantiv video evaluation software (AVES) application
 Update the board's firmware (if desired or necessary)

SOFTWARE NEEDED

Windows OS for controlling the board via AVES application
 RS-232 software for updating the board firmware (if desired or necessary)

GENERAL DESCRIPTION

The Advantiv® EVAL-ADV7619-7511 video evaluation board (AVEB) is a low cost solution for evaluating the performance of the [ADV7619](#) HDMI receiver and/or the ADV7511 HDMI transmitter.

The evaluation board provides a Blackfin® [ADSP-BF524](#) processor for system control. The [ADSP-BF524](#) offers the potential to process audio (no audio software is included). The evaluation board includes software (firmware) that provides a serial command interface to control the board's functionality.

This evaluation board is available in two options.

- With HDCP support (EVAL-ADV7619-7511), available only to licensees of HDCP
- Without HDCP support (EVAL-ADV7619-7511P)

PHOTOGRAPH OF EVALUATION BOARD

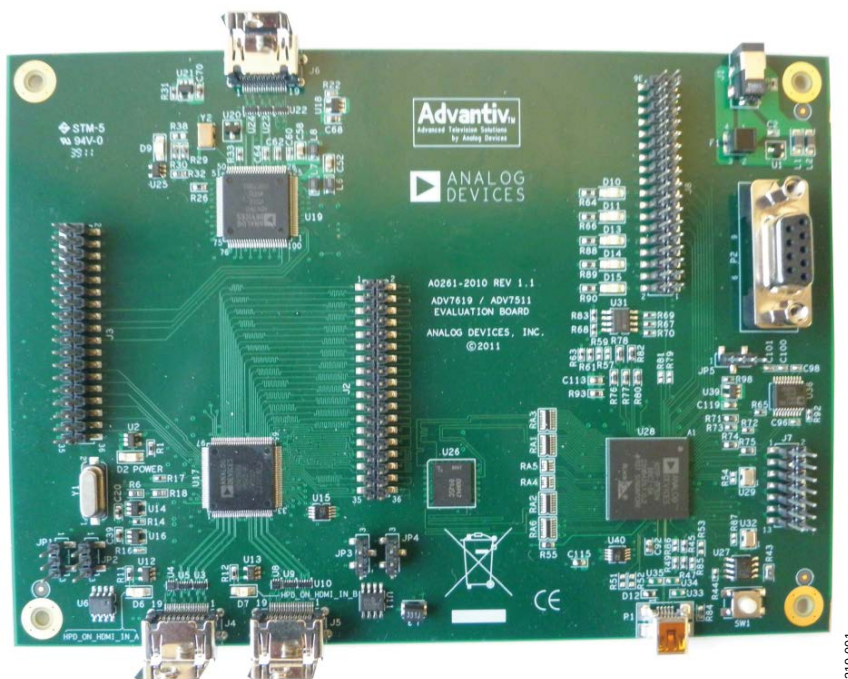


Figure 1. Advantiv EVAL-ADV7619-7511 Video Evaluation Board with Factory Jumper Settings

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REVISION HISTORY

4/12—Revision 0: Initial Version

EVALUATION BOARD ARTWORK AND COMPONENTS

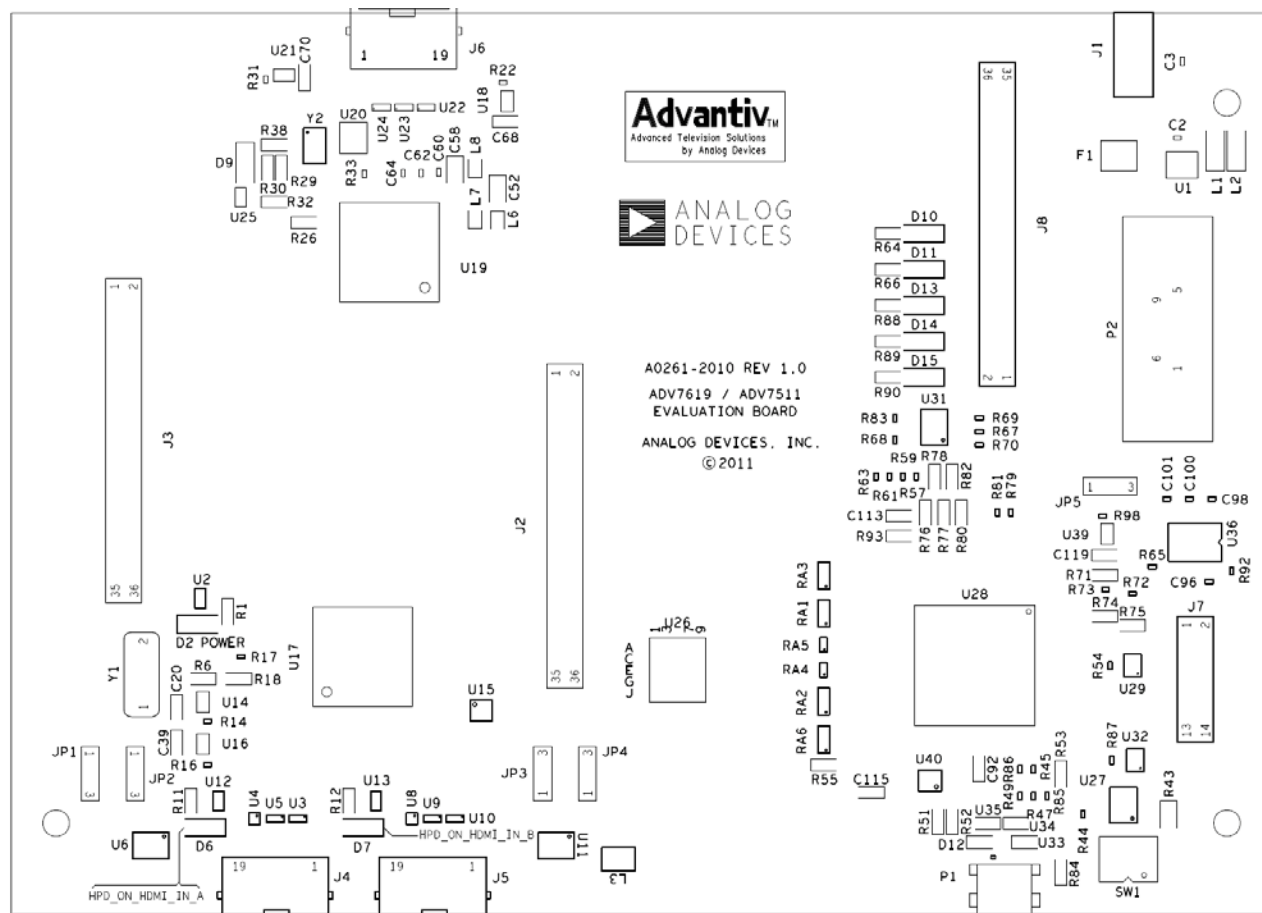


Figure 2. Assembly Drawing (Top Side) of the EVAL-ADV7619-7511

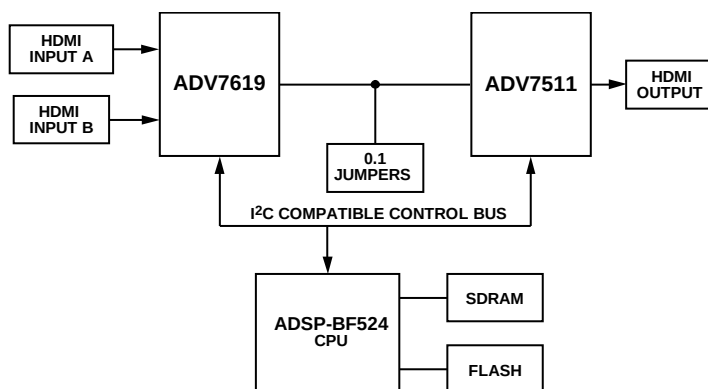


Figure 3. Block Diagram of the EVAL-ADV7619-7511

Table 1. Evaluation Board Hardware Components

Reference Designator	Function	Description
J4, J5	HDMI inputs	J4 is HDMI Port A; J5 is HDMI Port B.
J6	HDMI output	This is the only video output connector.
P2	RS-232 port	RS-232 interface to the computer (for user control and debug output).
P1	USB port	This USB port can be used instead of RS-232 if the user's computer does not have the RS-232 interface.
SW1	Reset	This switch resets the BF524 processor.
J1	Power	J1 is where the 5 V, 2.5 A power supply is connected.
J7	BF524 JTAG	The ICE-100B or the HPUSB-ICE is connected here to reprogram the system flash or to execute source code debugging.
JP1, JP2	Port A EDID	These jumpers (see Figure 2, lower left) connect the I ² C bus from the Blackfin processor to the EDID EEPROM.
JP3, JP4	Port B EDID	These jumpers (see Figure 2, bottom middle) connect the I ² C bus from the Blackfin processor to the EDID EEPROM.
J8	Audio/control jumpers	The audio bus can be jumpered among three configurations on these connectors. They also have several control signals available for probing, as well as video syncs and clock.
J2, J2	Video jumpers	The digital video pixel bus signals are jumpered here for easy access and flexibility in evaluation.

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.

Repeater

A repeater 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

EVALUATION BOARD USAGE

The evaluation board can be connected in the ways shown in Figure 3. By default, the video buses of the [ADV7619](#) and [ADV7511](#) are directly connected, and the I²S and S/PDIF outputs of the [ADV7619](#) are directly connected to the I²S and S/PDIF inputs of the [ADV7511](#).

Note that the version of the board without HDCP support (EVAL-ADV7619-7511P) does not work with most consumer HDMI sources (for example, Blu-ray players) because they automatically implement HDCP encryption. Therefore, a non-HDCP video source is needed with the non-HDCP version of the board.

An HDCP license is required to purchase an HDCP-enabled board. No license is required to purchase the non-HDCP-enabled board.

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.

If the board is HDCP-enabled, the Analog Devices, Inc., repeater software starts on power-up, allowing an HDMI sink to receive content from an HDMI/HDCP source soon after it is connected.

There are three main ways to control the board.

- Commands via RS-232
- Repeater software via RS-232
- Advantiv video evaluation software (AVES)

Commands via RS-232

This mode uses the RS-232 command-line interface. The [ADSP-BF524](#) powers up to a known reset state and then outputs a prompt. At this point, commands can be entered. Typing **help** prints a list of commands. Using the appropriate commands, the user can read/write registers in the [ADV7619](#) and [ADV7511](#). All registers are at their reset values.

Boards without HDCP enabled (EVAL-ADV7612-7511P) typically use this mode.

It is possible to start the repeater software in this mode with the startrep command via RS-232. This only works with HDCP-protected sources on an HDCP-enabled board. A non-HDCP-enabled board can still operate but does not support HDCP.

Repeater Software via RS-232

This mode also offers the RS-232 command-line interface but primarily to control the repeater software. Boards with HDCP support (EVAL-ADV7619-7511) typically start the repeater software on power-up. The repeater software outputs messages via RS-232 as it establishes an encrypted HDMI link and sources, sinks, or formats change. Registers can still be read/written from the command line, but anything that is written to a register can be overwritten by the repeater software.

In this mode, there are additional commands from the repeater itself. All repeater commands are in the rep XXX format, 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.

AVES

AVES is a Windows®-based application that runs on a PC and allows the user to read/write registers on the [ADV7619](#) and [ADV7511](#). It also displays the individual bit fields for each register and allows the user to modify these individual bit fields. The software supports RS-232, USB, and I²C (using the Total Phase Aardvark I²C/SPI host adapter). Information about the video evaluation board can be found on the EVAL-ADV7619-7511 page on EngineerZone at <http://ez.analog.com/docs/DOC-1944>.

For a non-HDCP-enabled board, this software may be the easiest way to evaluate the different modes of the [ADV7619](#) and [ADV7511](#).

Additional information about the software can be found on EngineerZone at <http://ez.analog.com/docs/DOC-1944>, where the latest version of the software can also be downloaded.

JUMPERS

This evaluation board has all of the digital audio/video signals (as well as some control signals) connected to 0.1 inch jumpers. This provides users with easy access and maximum flexibility when evaluating the devices.

The arrangement of the pins/signals in the schematic does not necessarily match the physical arrangement on the board.

Figure 4 to Figure 6 match the physical arrangement on the board and may be useful when probing these signals.

D_RX0	1	2	D_RX1
D_RX2	3	4	D_RX3
D_RX4	5	6	D_RX5
D_RX6	7	8	D_RX7
D_RX8	9	10	D_RX9
D_RX10	11	12	D_RX11
D_RX12	13	14	D_RX13
D_RX14	15	16	D_RX15
D_RX16	17	18	D_RX17
D_RX18	19	20	D_RX19
D_RX20	21	22	D_RX21
D_RX22	23	24	D_RX23
D_RX24	25	26	D_RX25
D_RX26	27	28	D_RX27
D_RX28	29	30	D_RX29
D_RX30	31	32	D_RX31
D_RX32	33	34	D_RX33
D_RX34	35	36	D_RX35

Figure 4. J2 Configuration

D_RX36	1	2	D_RX37
D_RX38	3	4	D_RX39
D_RX40	5	6	D_RX41
D_RX42	7	8	D_RX43
D_RX44	9	10	D_RX45
D_RX46	11	12	D_RX47
VCLK	13	14	VS
HS	15	16	DE
DSD4/DST_ST	17	18	DSD0
DSD5/DSD_FL	19	20	DSD1
CEC_TX	21	22	DSD2
A_RX0	23	24	MCLK
A_RX1	25	26	SCLK
A_RX2	27	28	DSD_CLK/DST_CLK
A_RX3	29	30	DSD3
A_RX4	31	32	GPIOO28
A_RX5	33	34	SPDIF_TX_IN
GND	35	36	GPIO30

Figure 5. J3 Configuration

ADV7619_RESET	1	2	ADV8002_POWERDOWN
ADV7619_CS _n	3	4	ADV8002_INT1
ADV7619_INT1	5	6	ADV8002_INT2
ADV7619_INT2	7	8	ADV8002_INT3
GPIO14	9	10	ADV8003_RESET _n
GPIO15	11	12	GPIO1
GPIO16	13	14	GPIO2
GPIO17	15	16	GPIO3
GPIO18	17	18	GPIO4
GPIO19	19	20	GPIO5
GPIO20	21	22	GPIO6
GPIO21	23	24	GPIO7
GPIO22	25	26	GPIO8
GPIO23	27	28	GPIO8
GPIO24	29	30	GPIO9
GPIO25	31	32	GPIO10
GPIO26	33	34	GPIO11
GPIO27	35	36	GPIO12

Figure 6. J8 Configuration

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EVALUATION BOARD SOFTWARE

UPGRADING THE FIRMWARE

The software (firmware) on the evaluation board can be upgraded using the standard Blackfin development tools.

- VisualDSP++ 5.0 Update 8
- JTAG debugger for Blackfin processors (HPUSB-ICE or ICE-100B) connected to the JTAG connector (J7)

Using these tools, you can connect to the [ADSP-BF524](#) processor, run a script, and program the SPI flash memory device (U10).

With that said, all but a very few evaluation boards are shipped with the U-Boot boot loader firmware. If this is the case, you have the option of upgrading the firmware using only an RS-232 cable and software.

If you see the following output after resetting the board or applying power, your evaluation board has U-Boot:

```
-----
U-Boot 2010.06 (ADI-2010R1-RC2) (Jan 12 2011 -
15:53:34)

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 M25P80 with page size 256, total 1
MiB
In: serial
Out: serial
Err: serial
KGDB: [on serial] ready
Hit any key to stop autoboot:
-----
```

If your evaluation board has U-Boot, you can use the following steps to upgrade the application firmware of your board (if you determine this is necessary). Note that these instructions assume you are using the latest version of Tera Term for Windows (which is free to download and use), but any RS-232 software with Ymodem upload capability should also work.

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 M25P80 with page size 256, total
1 MiB
1024 KiB M25P80 at 0:1 is now current device
bfin>
```

3. At the prompt, type the following command:

```
loady
```

You should see the following output:

```
## Ready for binary (ymodem) download to
0x00100000 at 115200 bps...
C
```

4. In Tera Term, under **File**, click **Transfer**, then **YMODEM**, and select **Send**.
5. Select the application firmware (for example, **EVAL-ADV7619-7511_v1p1_app.bin**) and click **Open**.
6. 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 the following:

```
CCxyzModem - CRC mode,
0(SOH)/215(STX)/0(CAN) packets, 5 retries
## Total Size = 0x000357fc = 219132
Bytes
bfin>
```

7. At the prompt, type the following command to erase the application area of the SPI flash memory:

```
sf erase 0x60000 0xa0000
```

You should then see the following output:

```
bfin>
```

8. 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>
```

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

RELATED LINKS

Resource	Description
ADV7619	Product Page, ADV7619 Dual Port Xpressview™ 225 MHz HDMI® Receiver
ADV7511	Product Page, ADV7511 225 MHz, High Performance HDMI® Transmitter with ARC
ADSP-BF524	Product Page, ADSP-BF524 Low Power Blackfin Processor with Advanced Peripherals and Low Standby Power
DOC-1881	ADV7619 Design Support Files
DOC-1740	ADV7511 Design Support Files
DOC-1944	Advantiv™ EVAL-ADV7619-7511 Video Evaluation Board
DOC-1789	Advantiv™ Video Evaluation Software

NOTES

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

**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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