

## EVAL-MELODY-9 Evaluation Board

### FEATURES

- ▶ HDMI input and output with HDCP 2.1 technology support
- ▶ Audio decoding and processing using the [ADSP-21593](#) on the [EV-21593-SOM](#)
- ▶ Differential line level analog audio output

### SYSTEM ON MODULE (SOM) NEEDED

- ▶ EV-21593-SOM with the ADSP-21593
- ▶ Other SOM boards such as the [EV-SC594-SOM](#) can be used as required

### EQUIPMENT NEEDED

- ▶ Analog Devices [ICE-2000](#) USB to JTAG adapter (required for updating the ADSP-21593 firmware)
- ▶ One to three DB25 to RCA cables, such as the CS-2436-06 from Infinite Cables (required for listening to the analog audio)
- ▶ Straight through serial cable: DB9 (required for updating the [ADSP-BF524](#) firmware)
- ▶ FT2232H mini module or Lattice USB programming cable HW-USBN-2B (required to program the LCMXO3LF-2100E FPGA)

### ONLINE RESOURCES

- ▶ [Bill of materials and schematics](#)
- ▶ [Software Needed](#)

### EVAL-MELODY-9 EVALUATION BOARD PHOTOGRAPH

- ▶ PC with a licensed copy of [CrossCore® Embedded Studio](#) Rev. 2.10.0 for Windows® (required for updating the ADSP-21593 firmware)
- ▶ Lattice Diamond 13.2 (required to program the LCMXO3LF-2100E)

### GENERAL DESCRIPTION

The EVAL-MELODY-9 board is a platform that allows users to evaluate Analog Devices, Inc., products intended for decoding high quality, digital audio signals.

The EVAL-MELODY-9 board includes a Blackfin® ADSP-BF524 processor for system control and connectors to attach the EV-21593-SOM with the ADSP-21593, which is a SHARC+® single core, high performance, digital signal processor (DSP) for audio decoding. The evaluation board also includes the [ADV7672](#) High-Definition Multimedia Interface (HDMI®) transceiver with High-bandwidth Digital Content Protection (HDCP) 1.4/2.2/2.3 technology. To order the EVAL-MELODY-9 board, the user must be licensed for the HDCP 2.3 technology.

Full specifications for the ADSP-21593 are listed in the ADSP-21593 data sheet. Full specifications for the ADSP-BF524 are listed in the ADSP-BF524 data sheet. Consult the data sheets in conjunction with this user guide when using the EVAL-MELODY-9 board.

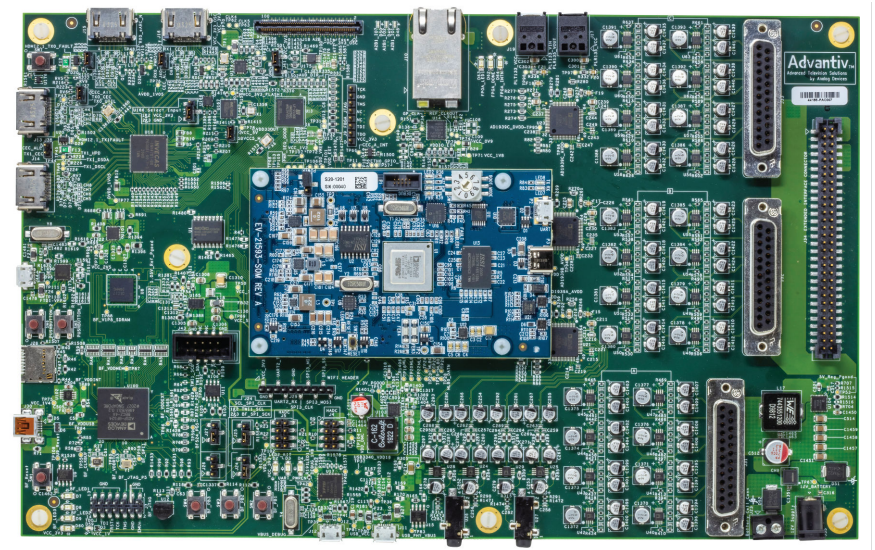


Figure 1. EVAL-MELODY-9 Top Side

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REVISION HISTORY

10/2023—Revision 0: Initial Version

EVALUATION BOARD HARDWARE

Figure 2 shows a block diagram of the EVAL-MELODY-9 board platform. The on-board [ADV7672](#) device provides the digital audio input and the on-board [AD1939](#) device converts the digital audio input to analog audio output. [Table 1](#) describes the EVAL-MELODY-9 board hardware components.

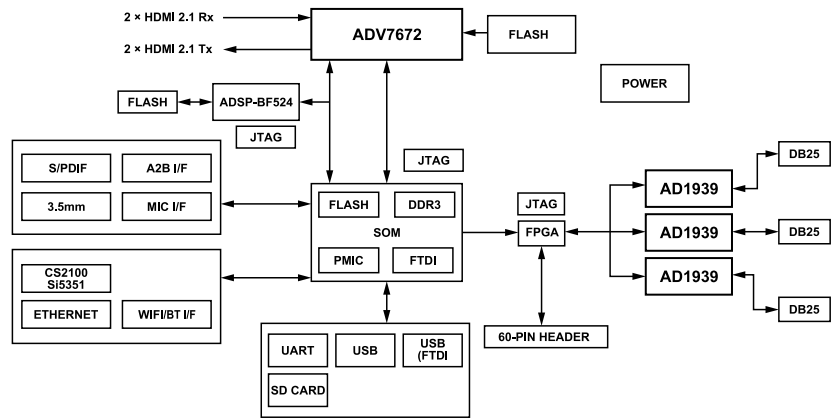


Figure 2. EVAL-MELODY-9 Hardware Block Diagram

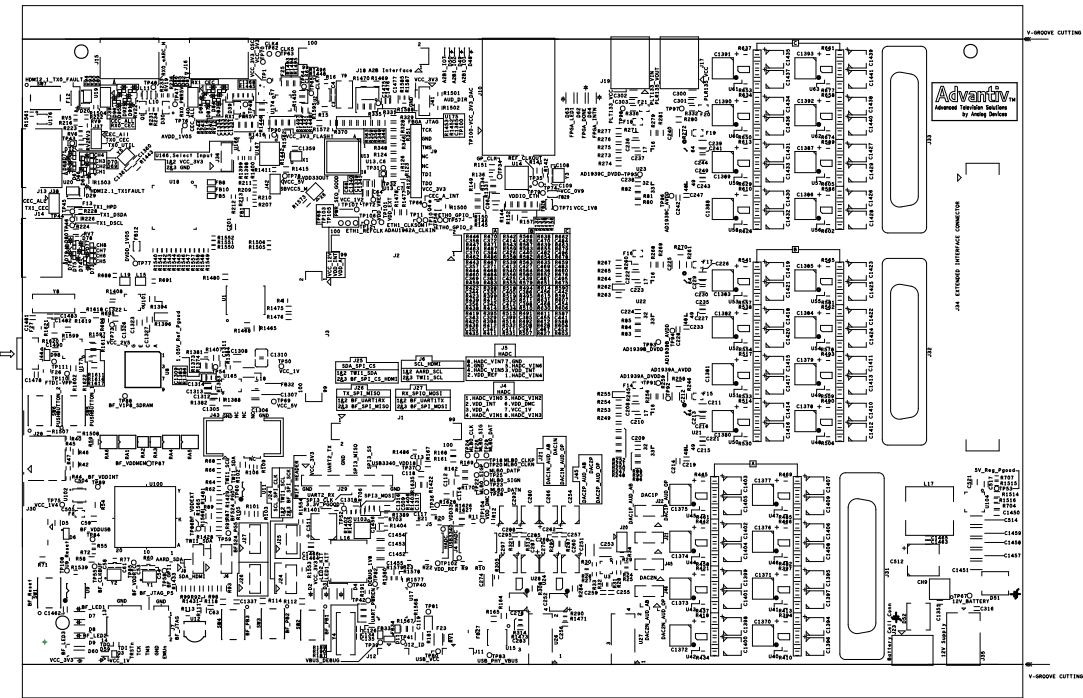


Figure 3. EVAL-MELODY-9 Printed Circuit Board (PCB) Assembly Drawing (Top Side)

Table 1. Evaluation Board Key Hardware Components

Reference Designator	Function	Description
J35	Power connector	The 12 V at 7 A power supply is connected at J35.
J1, J2, J3	SOM connectors	The connectors on which the SOM board, such as the <a href="#">EV-21593-SOM</a> or <a href="#">EV-SC594-SOM</a> , is mounted.
SW1	<a href="#">ADSP-BF524</a> reset	This push-button switch resets the ADSP-BF524 processor.
J12	USB-UART port	This port is the USB interface for the ADSP-BF524 or the SOM universal asynchronous receiver transmitter (UART) port (configurable).
J11	SOM USB port	This port is the USB interface for the SOM such as the EV-SC594-SOM.
J28	SOM SD card port	This port is the secure digital (SD) card interface for the SOM such as the EV-SC594-SOM

## EVALUATION BOARD HARDWARE

Table 1. Evaluation Board Key Hardware Components (Continued)

Reference Designator	Function	Description
J10	SOM Ethernet port	This port is the Gigabit Ethernet (GigE) interface for the SOM such as the EV-SC594-SOM
J30	ADSP-BF524 USB port	Unused.
J7	ADSP-BF524 JTAG	Connect an <a href="#">ICE-2000</a> Joint Test Action Group (JTAG) emulator at J7 to program the ADSP-BF524 firmware or to step through the ADSP-BF524 source code.
J15	HDMI input 1 (Rx0)	HDMI connector for receiving audio and video over HDMI (from a Blu-ray Disc® player, for example).
J16	HDMI input 2 (Rx1)	HDMI connector for receiving audio and video over HDMI (from a Blu-ray Disc player, for example).
J13	HDMI output 1 (Tx0)	HDMI connector for transmitting audio and video over HDMI (to a TV, for example).
J14	HDMI output 2 (Tx1)	HDMI connector for transmitting audio and video over HDMI (to a TV, for example).
D9	ADSP-BF524 LED	Indicates the status of the ADSP-BF524 and flashes when the firmware is running.
J31	Differential audio output	The DB25 female connector contains differential, line level, analog audio outputs.
J32	Differential audio output	The DB25 female connector contains differential, line level, analog audio outputs.
J33	Differential audio output	The DB25 female connector contains differential, line level, analog audio outputs.
J17	S/PDIF out port	The S/PDIF out port used for audio optical output.
J19	S/PDIF in port	The S/PDIF out port used for audio optical input.
J34	Extender connector	The connector is used for connecting to other boards or extend functions using daughter boards.

## EVALUATION BOARD SOFTWARE

The software on the EVAL-MELODY-9 board consists of firmware and a configuration code running on the following three devices:

- ▶ [ADSP-BF524](#) application processor (U100)
- ▶ [ADSP-21593](#) audio processor (U1) on [EV-21593-SOM](#)
- ▶ Lattice® LCMXO3LF-2100E FPGA (U13)

For the EVAL-MELODY-9 board to work correctly, configure all three devices for the desired application. Request the software and full documentation package for the EVAL-MELODY-9 board through

the [Software Request Form](#) (SRF) process on the Analog Devices website. For additional options, contact a local Analog Devices sales or distribution representative.

The software passes video from the HDMI Rx0 input to the Tx0 output and processes the extracted audio in the ADSP-21593. The line level analog audio output is available on the J31, J32, and J33 connectors. It is recommended to purchase the CS-2436-06 from Infinite Cables because its RCA cables are labeled with the channel number.

## RELATED LINKS

Table 2.

Resource	Description
<a href="#">ADSP-21593</a>	Dual SHARC+ cores high performance DSP (up to 1 GHz)
<a href="#">ADSP-BF524</a>	Blackfin embedded processor

**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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