

# **EV-21562-AUTO Manual**

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# Regulatory Compliance

The *EV-21562-AUTO* evaluation board is designed to be used solely in a laboratory environment. The board is not intended for use as a consumer-end product or as a portion of a consumer-end product. The board is an open system design, which does not include a shielded enclosure and, therefore, may cause interference to other electrical devices in close proximity. This board should not be used in or near any medical equipment or RF devices.

The *EV-21562-AUTO* evaluation board is in the process of being certified to comply with the essential requirements of the European EMC directive 2004/108/EC and, therefore, carries the “*CE*” mark.



The *EV-21562-AUTO* evaluation board contains ESD (electrostatic discharge) sensitive devices. Electrostatic charges readily accumulate on the human body and equipment and can discharge without detection. Permanent damage may occur on devices subjected to high-energy discharges. Proper ESD precautions are recommended to avoid performance degradation or loss of functionality. Store unused boards in the protective shipping package.



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# 1 Preface

Thank you for purchasing the Analog Devices, Inc. *EV-21562-AUTO* evaluation board.

The *EV-21562-AUTO* is a low cost Audio evaluation board that features the entry level ADSP-21562 DSP along with Audio DACs and ADCs. This evaluation board has 12-channel out audio output and 4-channel input.

## Purpose of This Manual

This manual provides instructions for installing the product hardware (board). This manual describes the operation and configuration of board components and provides guidelines for running code on the board.

## Manual Contents

The manual consists of:

- *Using the board*

Provides basic board information.

- *Hardware Reference*

Provides information about the hardware aspects of the board.

- *Bill of Materials*

A companion file in PDF format that lists all of the components used on the board is available on the website at <http://www.analog.com/EV-21562-AUTO> .

- *Schematic*

A companion file in PDF format documenting all of the circuits used on the board is available on the website at <http://www.analog.com/EV-21562-AUTO> .

## Technical Support

## Supported Integrated Circuit

This evaluation system supports the Analog Devices ADSP-21562 IC.

## Supported Tools

### Product Information

#### Analog Devices Website

The Analog Devices website, <http://www.analog.com>, provides information about a broad range of products - analog integrated circuits, amplifiers, converters, transceivers, and digital signal processors.

Also note, [MyAnalog.com](http://MyAnalog.com) is a free feature of the Analog Devices website that allows customization of a web page to display only the latest information about products you are interested in. You can choose to receive weekly e-mail notifications containing updates to the web pages that meet your interests, including documentation errata against all manuals. [MyAnalog.com](http://MyAnalog.com) provides access to books, application notes, data sheets, code examples, and more.

Visit [MyAnalog.com](http://MyAnalog.com) to sign up. If you are a registered user, just log on. Your user name is your e-mail address.

#### EngineerZone

EngineerZone is a technical support forum from Analog Devices, Inc. It allows you direct access to ADI technical support engineers. You can search FAQs and technical information to get quick answers to your embedded processing and DSP design questions.

Use EngineerZone to connect with other DSP developers who face similar design challenges. You can also use this open forum to share knowledge and collaborate with the ADI support team and your peers. Visit <http://ez.analog.com> to sign up.

## 2 Using the Board

This chapter provides information on the major components and peripherals on the board, along with instructions for installing and setting up the emulation software.

### Product Overview

Below is the block diagram of the *EV-21562-AUTO* board.

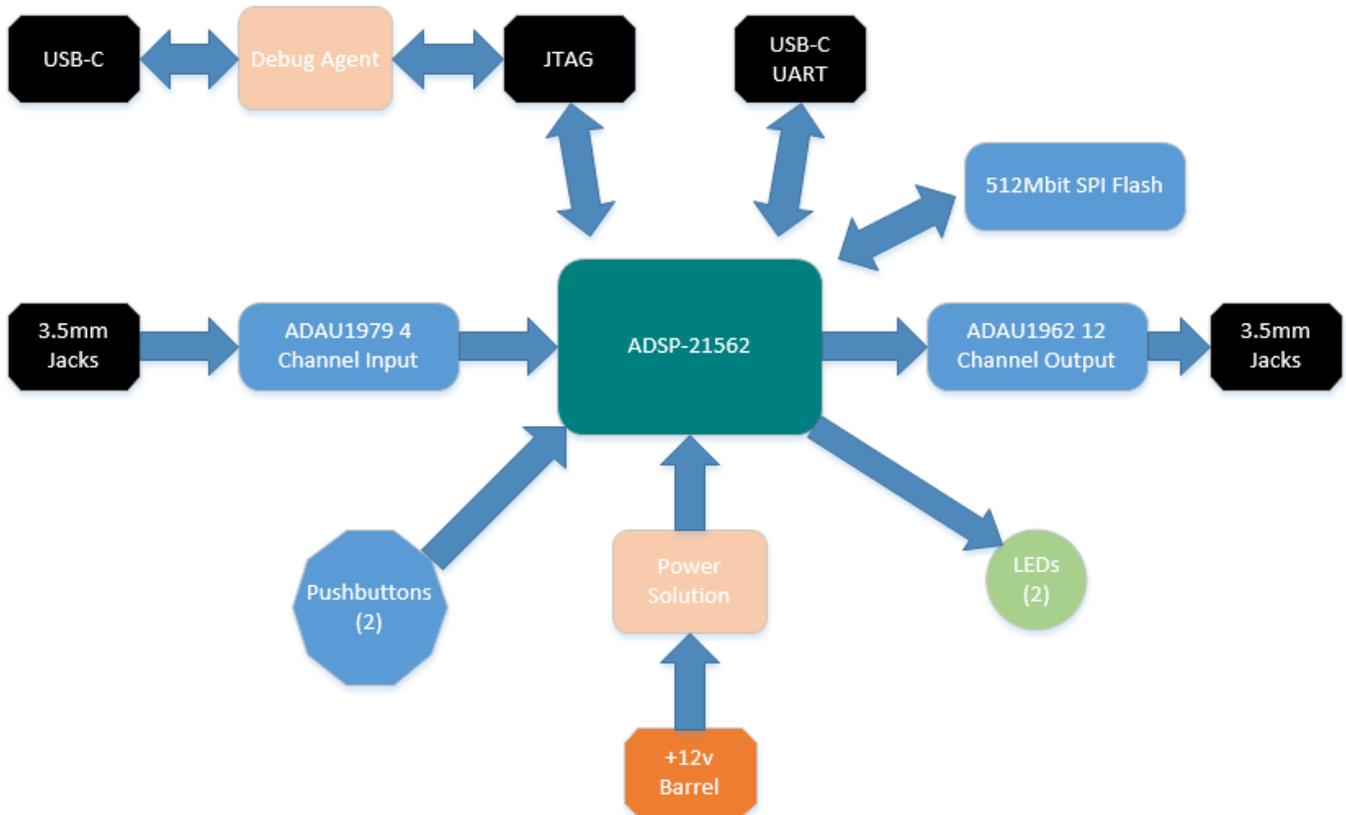


Figure 2-1: Block Diagram

The board features:

- Analog Devices ADSP-21562 processor
  - 120 Lead LQFP
  - 25 MHz oscillator
- SPI Flash Quad (SPI2) Memory
  - 512Mbit
  - ISSI IS25LP512M - 512M-bit Serial Flash Memory with Dual and Quad SPI
  - Single/Dual/Quad SPI
- Audio

- Analog Devices [ADAU1962A](#) - 12 Channel, High Performance, 192kHz, 24-Bit DAC
- Analog Devices [ADAU1979](#) - Quad Analog-to-Digital Converter
- 8 3.5mm connectors. 12 output channels and 4 input channels
- Universal Asynchronous Receiver/Transmitter (UART0)
  - FTDI [FT232R](#) - USB to UART
  - USB-C
- Debug Interface (JTAG)
  - Debug Agent
  - JTAG 10-pin 0.05" header
- LEDs
  - 11 LEDs: one power (green), one board reset (red), 3 general-purpose (amber), 3 A2B LEDs, one fault (red) and 2 UART leds (amber)
- Pushbuttons
  - Three pushbuttons: one reset and two IRQ/Flag
- P6 connector
  - DAI
  - SPI
  - TWI
  - GPIO
  - GND
- External power supply
  - CE compliant
  - 12V @1.6 Amps

## Package Contents

Your *EV-21562-AUTO* package contains the following items.

- *EV-21562-AUTO* board
- Universal 12V DC power supply
- USB 3.0 Type C to A Cable

- Getting Started Notes

Contact the vendor where you purchased your *EV-21562-AUTO* evaluation board or contact Analog Devices, Inc. if any item is missing.

## Default Configuration

The *EV-21562-AUTO* board is designed to run as a standalone unit.

The *Default Hardware Setup* figure shows the default settings for jumpers and switches and the location of the jumpers, switches, connectors, and LEDs. Confirm that your board is in the default configuration before using the board.

### Default Config

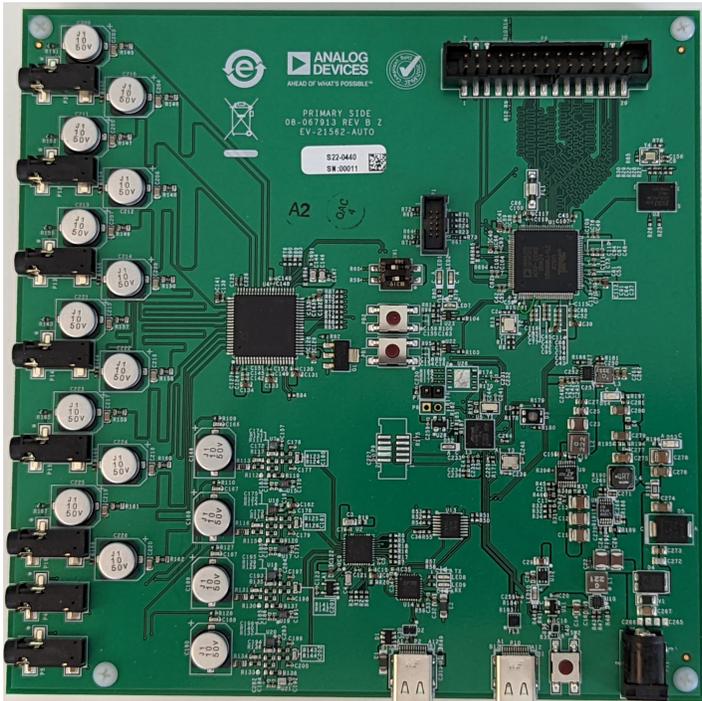


Figure 2-2: Default Hardware Setup

## Debug Interface

The *EV-21562-AUTO* provides a JTAG connection via P1 . This is for attaching an emulator, such as the ICE-1000 or ICE-2000 to for debugging.

## Debug Agent

The *EV-21562-AUTO* provides a JTAG connection via an onboard Debug Agent. The Debug Agent uses a USB connection to the PC and allows debugging of Analog Devices DSPs without the need of an external ICE.

## Reference Design Information

A reference design info package is available for download on the Analog Devices Web site. The package provides information on the schematic design, layout, fabrication, and assembly of the board.

The information can be found at:

<http://www.analog.com/EV-21562-AUTO>

## ADAU1962A - 12 Channel, High Performance, 192kHz, 24-Bit DAC

The ADAU1962A is a high performance, single-chip digital-to-analog converter (DAC) that provides 12 DACs with differential or single-ended output using the patented Analog Devices, Inc., sigma-delta ( $\Sigma$ - $\Delta$ ) architecture. A SPI/I<sup>2</sup>C port is included, allowing a micro-controller to adjust volume and many other parameters. The ADAU1962A operates from 2.5 V digital and 3.3 V analog supplies. A linear regulator is included to generate the digital supply voltage from the analog supply voltage.

The ADAU1962A is designed for low EMI. This consideration is apparent in both the system and circuit design architectures. By using the on-board PLL to derive the internal master clock from an external LRCLK, the ADAU1962A can eliminate the need for a separate high frequency master clock and can be used with or without a bit clock. The DACs are designed using the latest Analog Devices continuous time architectures to further minimize EMI.

## ADAU1979 - Quad Analog-to-Digital Converter

The ADAU1979 incorporates four high performance, analog-to-digital converters (ADCs) with 4.5 V rms capable ac-coupled inputs. The ADCs use a multibit sigma-delta ( $\Sigma$ - $\Delta$ ) architecture with continuous time front end for low EMI. An I<sup>2</sup>C/SPI control port is included that allows a microcontroller to adjust volume and many other parameters. The ADAU1979 uses only a single 3.3 V supply. The device internally generates the required digital DVDD supply. The low power architecture reduces the power consumption. The on-chip PLL can derive the master clock from an external clock input or frame clock (sample rate clock). When fed with the frame clock, it eliminates the need for a separate high frequency master clock in the system.

## FT232R - USB to UART

The FT232R is a USB-to-serial-UART interface with the following advanced features:

- Single chip USB to asynchronous serial data transfer interface

- Entire USB protocol handled on the chip. No USB specific firmware programming required
- Fully-integrated 1024 bit EEPROM storing device descriptors and CBUS I/O configuration
- Fully-integrated USB termination resistors
- Fully-integrated clock generation with no external crystal required, plus optional clock output selection enabling a glueless interface to an external MCU or FPGA
- Data transfer rates from 300 baud to 3 Mbaud (RS422, RS485, RS232) at TTL levels
- 128 byte receive buffer and 256 byte transmit buffer utilizing buffer smoothing technology to allow for high-data throughput
- FTDI's royalty-free Virtual Com Port (VCP) and Direct (D2XX) drivers eliminate the requirement for USB driver development in most cases.
- Transmit and receive LED drive signals
- UART interface support for 7 or 8 data bits, 1 or 2 stop bits, and odd/even/mark/space/no parity
- FIFO receives and transmits buffers for high-data throughput
- Device supplied pre-programmed with unique USB serial number
- Supports bus-powered, self-powered and high-power bus-powered USB configurations
- Integrated +3.3V level converter for USB I/O
- Integrated level converter on UART and CBUS for interfacing to between +1.8V and +5V logic
- True 5V/3.3V/2.8V/1.8V CMOS drive output and TTL input
- Configurable I/O pin output drive strength
- Integrated power-on-reset circuit
- Fully-integrated AVCC supply filtering - no external filtering required.
- UART signal inversion option
- +3.3V (using external oscillator) to +5.25V (internal oscillator) single supply operation
- Low-operating and USB suspend current
- Low USB bandwidth consumption
- UHCI/OHCI/EHCI host controller compatible
- USB 2.0 full speed compatible

## IS25LP512M - 512M-bit Serial Flash Memory with Dual and Quad SPI

The IS25LP512M Serial Flash memory offers a versatile storage solution with high flexibility and performance in a simplified pin count package. ISSI's "Industry Standard Serial Interface" Flash is for systems that require limited space, a low pin count, and low power consumption. The device is accessed through a 4-wire SPI Interface consisting of a Serial Data Input (SI), Serial Data Output (SO), Serial Clock (SCK), and Chip Enable (CE#) pins, which can also be configured to serve as multi-I/O (see pin descriptions).

The device supports Dual and Quad I/O, as well as standard, Dual Output, and Quad Output SPI. Clock frequencies of up to 133MHz allow for equivalent clock rates of up to 532MHz (133MHz x 4) which equates to 66.5Mbytes of data throughput. The IS25xE series of Flash adds support for DTR (Double Transfer Rate) commands that transfer addresses and read data on both edges of the clock. These transfer rates can outperform 16-bit Parallel Flash memories, allowing for efficient memory access to support XIP (eXecute In Place) operation.

The memory array is organized into programmable pages of 256/512 bytes. This family supports page program mode where 1 to 256/512 bytes of data are programmed in a single command.

QPI (Quad Peripheral Interface) supports 2-cycle instructions, further reducing instruction times. Pages can be erased in groups of 4Kbyte sectors, 32Kbyte blocks, 64K/256Kbyte blocks, and/or the entire chip. The uniform sector and block architecture allows for a high degree of flexibility so that the device can be utilized for a broad variety of applications requiring solid data retention.

## 3 Hardware Reference

This chapter describes the hardware design of the *EV-21562-AUTO* .

### System Architecture

The board's configuration is shown in the *Block Diagram* figure.

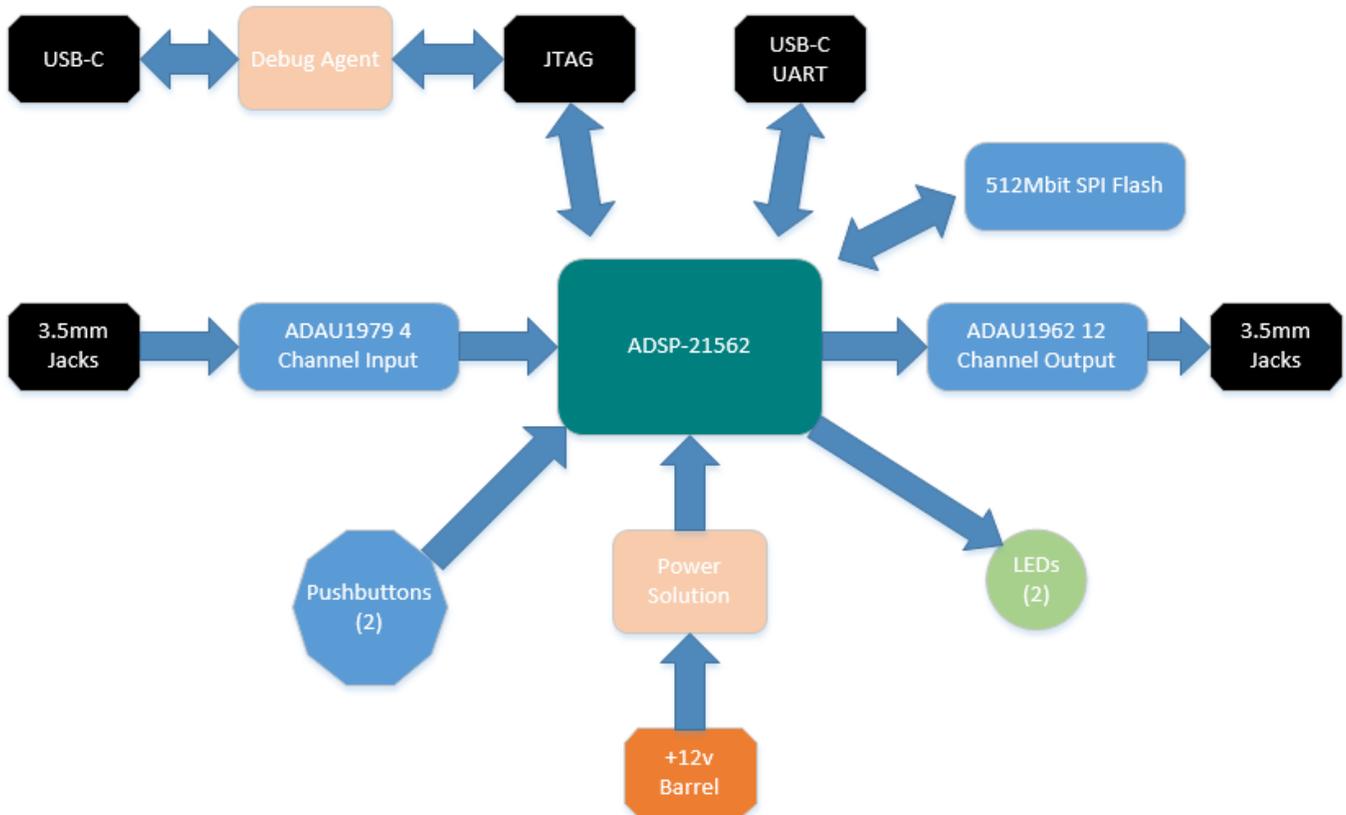


Figure 3-1: Block Diagram

This evaluation board is designed to demonstrate the ADSP-21562 processor's capabilities. The board has a 25 MHz input clock and runs at a max core clock frequency of 400MHz.

User I/O to the processor is provided in the form of two pushbuttons and two LEDs.

## Switches

This section describes operation of the switches. The switch locations are shown in the *Switch Locations* figure.

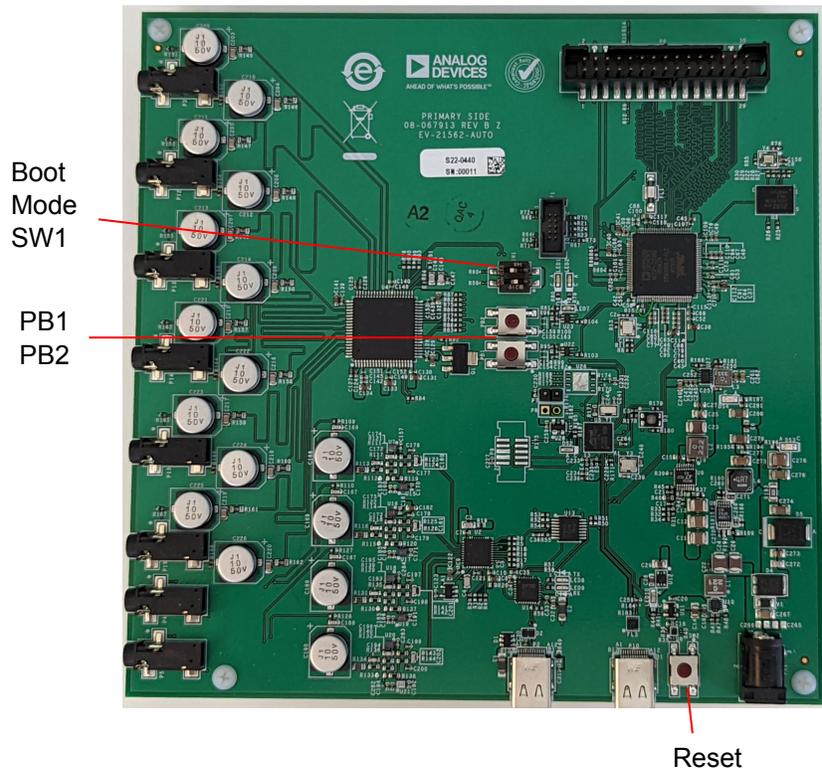


Figure 3-2: Switch Locations

## Boot Mode Select ( sw1 )

The Boot Mode selection switch selects between the different boot modes of the processor. The *Boot Mode Switch* table shows the available boot mode settings. By default, the processor boots from SPI2 master boot which uses the on-board SPI flash memory.

Table 3-1: Boot Mode Switch

<i>Position</i>	<i>Processor Boot Mode</i>
00	No Boot
10	<i>SPI Flash Boot</i>
01	External SPI Host Boot
11	UART Boot

## Reset Pushbutton ( sw2 )

The reset pushbutton resets the ADSP-21562 processor. The reset signal also is connected to the expansion connectors via the `SYS_HWRST` signal. [Reset \( LED10 \)](#) is used to indicate when the board is in reset.

## GPIO Pushbuttons ( PB1 and PB2 )

The GPIO pushbuttons are connected to the processor's signals PB\_02 and PB\_03 , respectively.

## Jumpers

This section describes functionality of the configuration jumpers. The *Jumper Locations* figure shows the jumper locations.

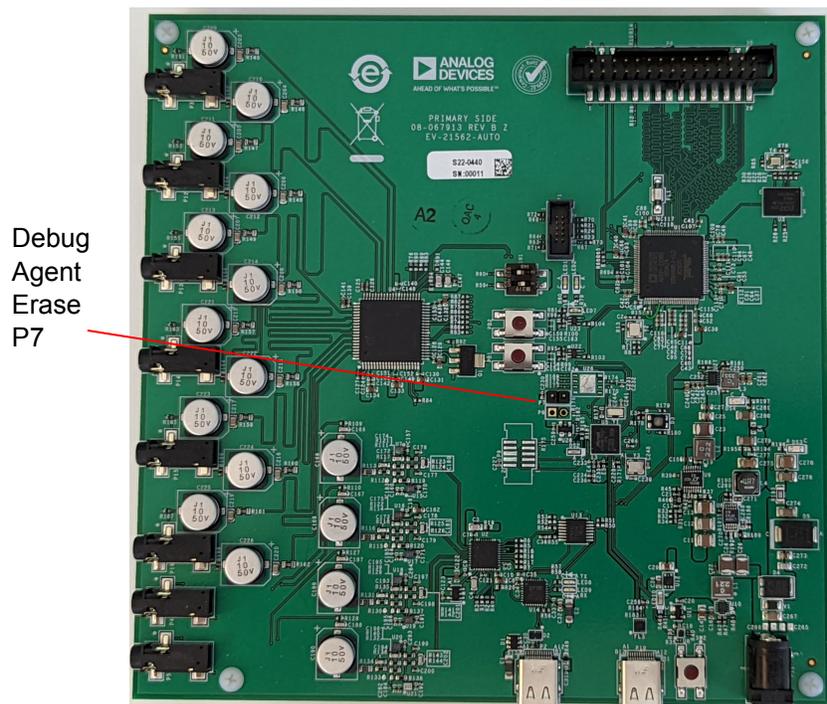


Figure 3-3: Jumper Locations

## Debug Agent Erase ( P7 )

This Debug Agent jumper is used to erase the Debug Agent in case of issues during automatic update.

## LEDs

This section describes the on-board LEDs. The *LED Locations* figure shows the LED locations.

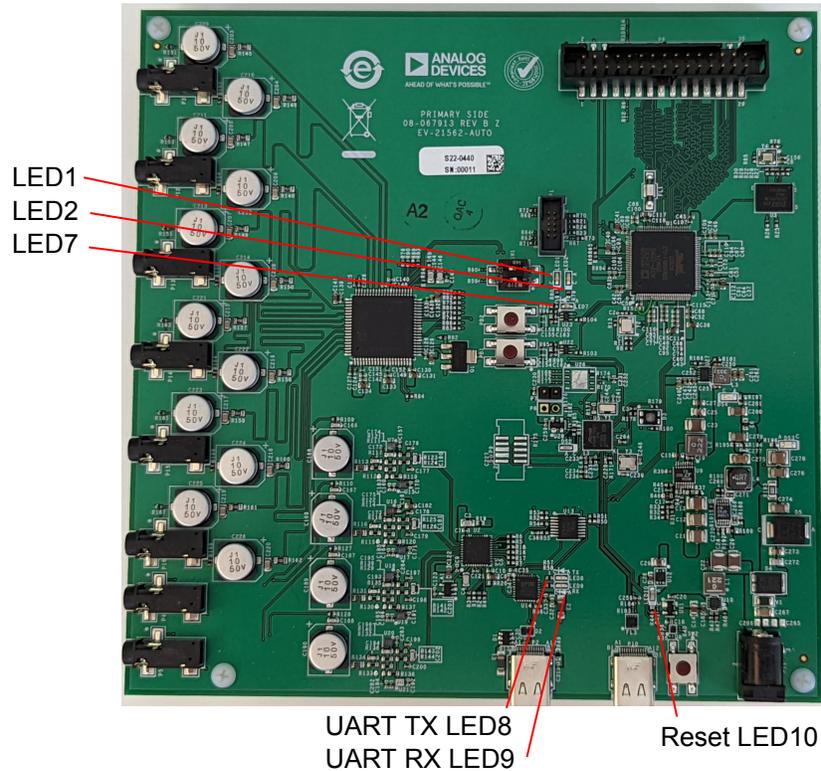


Figure 3-4: LED Locations

## Fault ( DS1 )

When ON, it indicates a system fault. For more information, refer to the ADSP-2156xHardware Reference Manual.

## USB to UART Activity ( LED8-9 )

The USB to UART activity LEDs are used to indicate the transmitting and receiving of data between a PC and the [FT232R - USB to UART](#).

Table 3-2: USB to UART LEDs

LED	Function
LED2	Receive
LED3	Transmit

## Power ( LED7 )

When ON (green), it indicates that power is being supplied to the board properly.

## GPIO ( LED1 , LED2 )

Three LEDs are connected to the general-purpose I/O pins of the processor (see the *GPIO LEDs* table). The LEDs are active high and are turned ON (amber) by writing a 1 to the correct processor signal.

Table 3-3: GPIO LEDs

Reference Designator	Programmable Flag Pin
LED1	PB_00
LED2	PB_01

## Reset ( LED10 )

When ON (red), it indicates that the board is in reset. A master reset is asserted by pressing SW2 , which activates the LED. For more information, see [Reset Pushbutton \( SW2 \)](#).

## Connectors

This section describes connector functionality and provides information about mating connectors. The connector locations are shown in the *Connector Locations* figure.

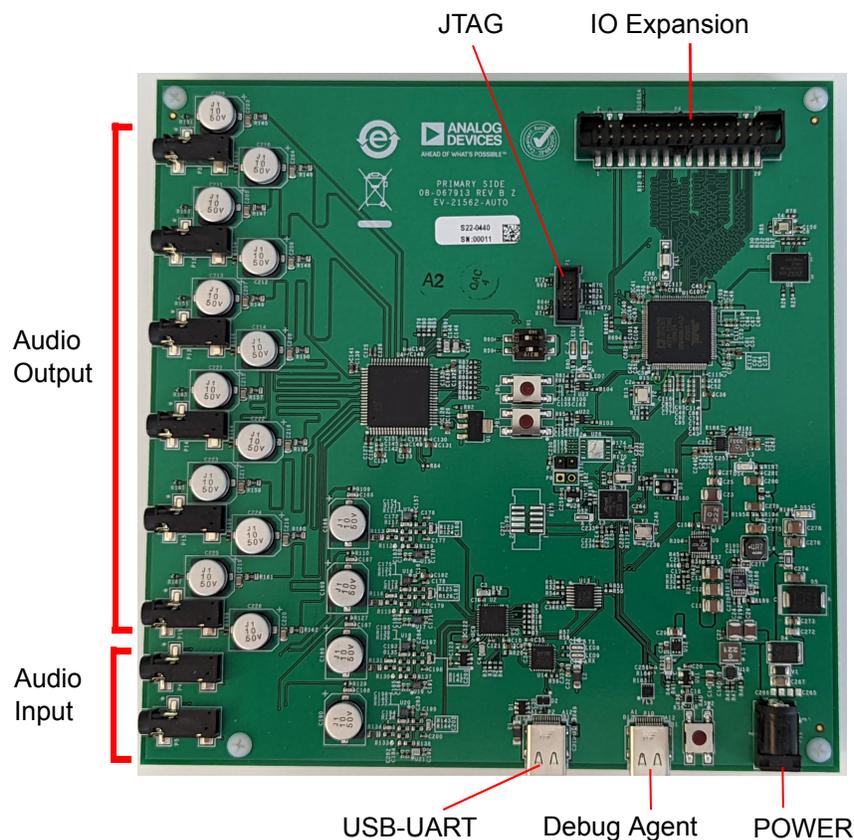


Figure 3-5: Connector Locations

**NOTE:** Connectors on the back of the board are noted with dotted lines.

## Audio Input ( P4 and P5 )

<i>Part Description</i>	<i>Manufacturer</i>	<i>Part Number</i>
3.5mm Stereo female	Switchcraft	35RASMT2BHNTRX
<i>Mating Cable</i>		
Standard audio cable with 3.5mm connectors		

## Audio Output ( P3 , P12 , P13 , P14 , P15 , P16 )

<i>Part Description</i>	<i>Manufacturer</i>	<i>Part Number</i>
3.5mm female	Switchcraft	35RASMT2BHNTRX
<i>Mating Cable</i>		
Standard audio cable with 3.5mm connectors		

## JTAG ( P1 )

The JTAG header provides debug connectivity for the processor. This is a 0.05" shrouded through-hole connector from SAMTEC (SHF-105-01-L-D-SM-K). This connector mates with ICE- 1000, ICE-2000, and any newer Analog Devices emulators. For more information, see [Debug Interface](#)

## USB to UART ( P2 )

<i>Part Description</i>	<i>Manufacturer</i>	<i>Part Number</i>
USB Micro-AB	Hirose	ZX62D-AB-5P8
<i>Mating Cable</i>		
USB Micro-B to Standard-A cable		

## IO Expansion Header ( P6 )

<i>Part Description</i>	<i>Manufacturer</i>	<i>Part Number</i>
30-pin, 2.54mm	3M	D2530-6V0C-AR-WF
<i>Mating Connector</i>		
30-pin, 2.54mm	3M	D89130-0031HK

**Power Plug ( P11 )**

<i>Part Description</i>	<i>Manufacturer</i>	<i>Part Number</i>
2.1 mm power jack	CUI	PJ-102AH
<i>Mating Cable</i>		
12.0VDC@1.5A power supply	CUI	EMSA120150-P5RP-SZ

