EZ-KIT Lite Hardware Description

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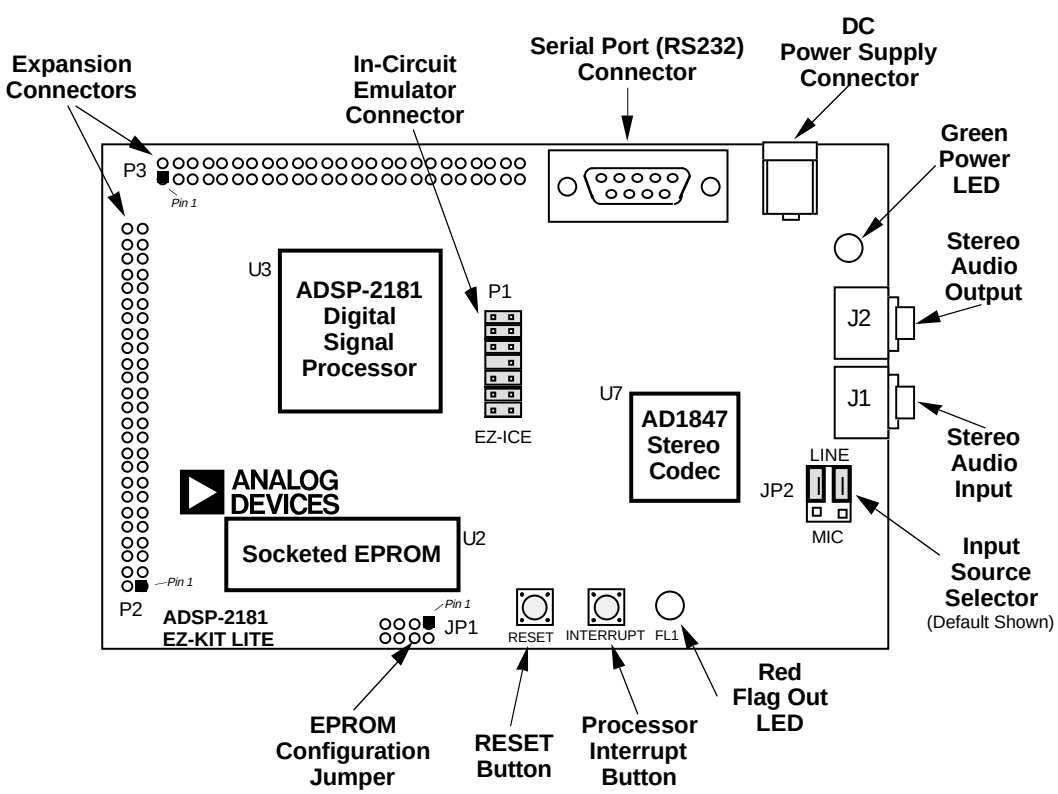
DESIGN OVERVIEW

The hardware consists of a printed circuit board measuring 3.5 inches by 5.5 inches. Assembled onto the printed circuit board are an ADSP-2181 digital signal processor, an EPROM, an AD1847 codec and various support circuits and connectors. The board is a complete signal processing system designed to demonstrate the capabilities of the ADSP-2181 digital signal processor. It can also be used as a platform to develop new applications for the ADSP-2181.



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The EZ-KIT Lite board is an example of a minimum implementation of an ADSP-2181 processor. The EPROM is connected to the processor via the Byte DMA Port. This interface uses only eight of the 24 data lines to carry data (D8 through D15). Eight of the spare data lines (D16 through D23) are used to provide additional address bits. This allows the ADSP-2181 to address up to 32 M bits (4 M bytes) of memory. On this board the EPROM socket is designed to accept EPROMs from 256K bits up to 8 M bits (the largest presently available). JP1 provides a way to adjust the function of pins 3 and 30 of the socket as required by the different size EPROMs. The DSP is configured to boot from the EPROM when reset is deasserted.

The AD1847 codec is connected to the DSP via SPORT0. This high speed synchronous serial port carries all of the data, control, and status information between the DSP and the codec. It is possible to disable the codec if the serial port is to be used for another purpose. The CODECDIS signal available on connector P3 can be used to disable the codec. When this signal is brought low, the codec is disabled and its signals are put in a high impedance state.

The SPORT1 pins are used to communicate with the host PC via the RS-232 interface (U5). The Flag In and Flag Out pins carry the receive and transmit data. The receive data also goes to IRQ1 so the DSP can detect activity without polling the Flag In pin. Software running on the DSP emulates a UART to provide the proper protocol for asynchronous serial communications at a data rate of 9600 bits per second.

U1 is a logic device containing six inverters. Two of these inverters are used to provide a power-on reset and to de-bounce the reset push button. Another two inverters are used to de-bounce the interrupt push button. A fifth inverter is used to drive the red LED (D1) because the FL1 pin cannot sink enough current to drive it directly. The sixth inverter is not used.

The IDMA port on the DSP is not used on the EZ-KIT Lite board. All of the IDMA signals are available on connector P3.

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SPECIFICATIONS

Processor:	ADSP-2181KS-133 operating at an instruction rate of 33 MHz (16.667 external clock)
Analog interface:	AD1847 stereo codec
Analog inputs:	One stereo pair of 2V RMS AC coupled line level inputs One stereo pair of 20mV RMS AC coupled microphone inputs
Analog outputs:	One stereo pair of 1V RMS AC coupled line level outputs
Power:	8 to 10V DC at 300 mA
Environment:	0 to 70° centigrade 10 to 90 percent relative humidity (non condensing)

CONNECTORS

J1 is a 1/8 inch (3.5 mm) stereo jack. This jack is used to bring either line level or microphone audio signals into the board.

J2 is also a 1/8 inch (3.5 mm) stereo jack. This jack is used to bring out line level audio signals from the board.

J3 is a female 9 pin D-Sub connector. It is used to communicate with a host computer using RS-232 signal levels and asynchronous serial protocols.

J4 is a jack for a 5.5 mm cylindrical plug. It is used to supply power to the board. The center pin of the jack is 2 mm diameter and should connect to the negative side of the power source. The outer sleeve of the mating plug must be positive.

JP1 is a site for an eight pin header. It can be used to configure the board for EPROM sizes other than the 1 Mbit (128K byte) EPROM (27C010) shipped with the board. Most users will not need this feature.

JP2 is a six pin header. It is used to configure input jack J1 for either line level or microphone input. The center pin in each group of three is connected to one of the AD1847 codecs Line 1 Input pins. Jumpers (also known as shunts or shorting links) can be used to connect these pins to either the output of the microphone amplifier or to the output of the line level input filter.

P1 is a 14 pin header connector used to connect to an ADSP-2181 EZ-ICE® in-circuit emulator. Pin 7 should be removed for keying purposes.

P2 and P3 are sites for 50 pin header connectors. These connectors can be used to access the ADSP-2181 signals for expansion or test purposes.

U2 is a socket for an EPROM in a DIP package. As built the board will accept a 27C512 (64K byte) or 27C010 (128K byte) EPROM. Changing connections at JP1 allows the board to accept a 27C256 (32K byte), 27C020 (256K byte), 27C040 (512K byte), or 27C080 (1M byte) EPROM. This socket is connected to the ADSP-2181's byte-wide memory interface.

R28 is a site for a zero ohm resistor. If this resistor is installed the ADSP-2181 processor can reset the board under software control. The software would assert reset by configuring PF0 as an output and then setting it low.

R29 is another site for a zero ohm resistor. If this resistor is installed and X3 and C37 are removed the codec can operate off of the ADSP-2181's CLKOUT signal instead of its own 24.576 MHz clock. It will also be necessary to change X1 to a lower frequency value to stay within the codecs ratings.

SWITCHES

S1 is the reset push button switch. Pushing this button causes the ADSP-2181 processor and the AD1847 codec to go into the hardware reset state and remain there until it is released. The switches output is de-bounced electronically to prevent multiple transitions due to mechanical contact bounce.

S2 is the interrupt push button switch. Pushing this button causes the ADSP-2181 processor to receive an IRQE interrupt input. This may cause the processor to execute the current IRQE interrupt handler software if the interrupt is enabled and the IRQE interrupt vector is in place. The switches output is de-bounced electronically to prevent multiple interrupts due to mechanical contact bounce.

INDICATORS

D1 is a red light emitting diode which is controlled by the FL1 output of the ADSP-2181 processor. Software can control the state of this indicator by writing to an internal register. See the ADSP-2181 documentation for more details.

D2 is a green light emitting diode which is on whenever the board has power.

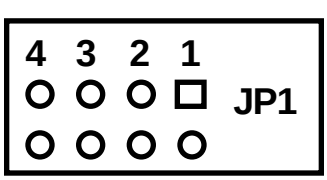
HARDWARE OPERATION

When power is applied to the board a reset circuit holds the processor in reset for approximately 30 ms. Reset is then deasserted and the processor begins the boot process. The BMODE and MMAP pins on the ADSP-2181 are grounded so the processor boots from the byte-wide memory interface which is connected to the EPROM socket. If the EPROM supplied with the board is installed in the socket the operation of the board will proceed as documented in the software section of this manual.

HARDWARE EXPANSION

CONFIGURING THE BOARD FOR DIFFERENT EPROMS

JP1 allows the ADSP-2181 EZ-KIT Lite board to be configured for any one of six different EPROM sizes. As the board is shipped it can accommodate either a 27C512 or 27C010. If some other size EPROM is installed in the socket at U2 it will be necessary to change the connections at JP1. JP1 looks like this.



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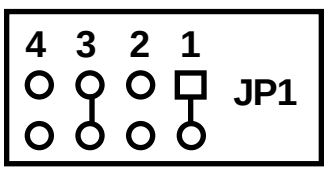
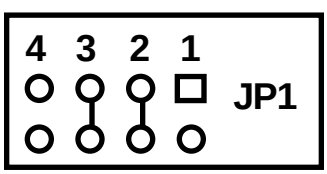
Connections are made vertically between pads. The pair of pads below each number constitutes the jumper position associated with that number. Connections can be made in several ways. If an eight pin header is installed and the etch connections on the back are cut then EPROM size changes can be accommodated easily by installing and removing shunts. If frequent size changes are not contemplated it may be sufficient to solder wires between the pads and so make the connections permanent.

For a 27C256 EPROM the connections should be as follows.



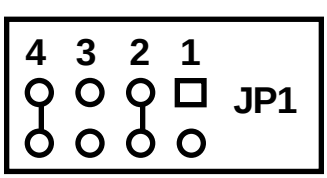
Note that this involves cutting the etch on the back of the board at jumper position 2 and adding a connection at jumper position 1.

For a 27C512 or 27C010 EPROM the connections should be as follows.



Note that this is how the connections are arranged when the board is manufactured.

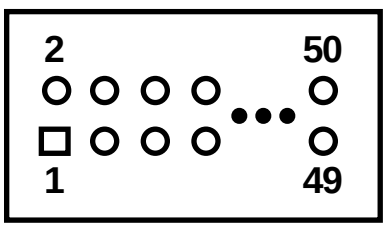
For a 27C020, 27C040 or 27C080 EPROM the connections should be as follows.



Note that this involves cutting the etch on the back of the board at jumper position 3 and adding a connection at jumper position 4.

EXPANSION CONNECTORS

P2 and P3 are sites for 50 pin header connectors which provide access to the ADSP-2181 signals for expansion or test purposes. The pin numbers on these connectors are arranged as follows.



The signals available on these pins are the following.

P2 Pin Number	Signal Name	P2 Pin Number	Signal Name
1	A0	2	A1
3	A2	4	A3
5	A4	6	A5
7	A6	8	A7
9	A8	10	A9
11	A10	12	A11
13	A12	14	A13
15	D0	16	D1
17	D2	18	D3
19	D4	20	D5
21	D6	22	D7
23	D8	24	D9
25	D10	26	D11
27	D12	28	D13
29	D14	30	D15
31	D16	32	D17
33	D18	34	D19
35	D20	36	D21
37	D22	38	D23
39	WR	40	RD
41	IOMS	42	BMS
43	DMS	44	CMS
45	PMS	46	BR
47	BGH	48	BG
49	VCC	50	GND

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P3 Pin Number	Signal Name	P3 Pin Number	Signal Name
1	GND	2	IAD0
3	IAD1	4	IAD2
5	IAD3	6	IAD4
7	IAD5	8	IAD6
9	IAD7	10	IAD8
11	IAD9	12	IAD10
13	IAD11	14	IAD12
15	IAD13	16	IAD14
17	IAD15	18	GND
19	IACK	20	IAL
21	IS	22	IWR
23	IRD	24	GND
25	PF0	26	PF1
27	PF2	28	PF3
29	PF4	30	PF5
31	PF6	32	PF7
33	FL0	34	FL1
35	FL2	36	CLKOUT
37	RESET	38	IRQL0
39	IRQL1	40	IRQ2
41	PWD	42	PWDACK
43	CODECDIS	44	TXD0
45	TFS0	46	RFS0
47	RXD0	48	SCK0
49	VCC	50	GND

The functions of these signals are listed in the ADSP-2181 documentation with the exception of the signal CODECDIS. This pin may be grounded to disable the on-board AD1847 codec so the serial port can be used for some other purpose.

HARDWARE DEBUGGING

If the green LED fails to light, check your power connections. Verify that your power supply has the proper size connector and that the polarity is correct. The power supply voltage measured at the connector to the board should be in the range of 8 to 10 volts DC. Also, make sure that there are no objects beneath or on top of the board that may be causing a short circuit.

If the power connection is good and the green LED is lit yet the red LED does not flash and no audio signal was produced, make sure that the EPROM is properly seated in the socket.

Hit the reset button if the board appears to be operating improperly.