EVB2190

SSI2190 EVALUATION BOARD USER GUIDE

Support Products

EVB2190R1

The SSI2190's tight-pitch 24-lead SSOP package is great for compact PCB layouts, but prototyping can be a challenge. To expedite the development process, we offer the EVB2190R1 that allows evaluation of the SSI2190's awesome capabilities. If you've dreamed up a really unique application that the EVB2190R1 doesn't support, then consider the DAB2190 Dip Adapter for quick protoboard development.

Two versions are available: The EVB2190R1-B blank board with only a SSI2190 attached, and the EVB2190R1-P that is fully assembled and ready for the bench. With the exception of the SSI2190, all components are through-hole for easy construction and experimentation.

Headers provide individual access to each channel's differential inputs, options for CV control via onboard pots or external source are available, and a variable control reference.
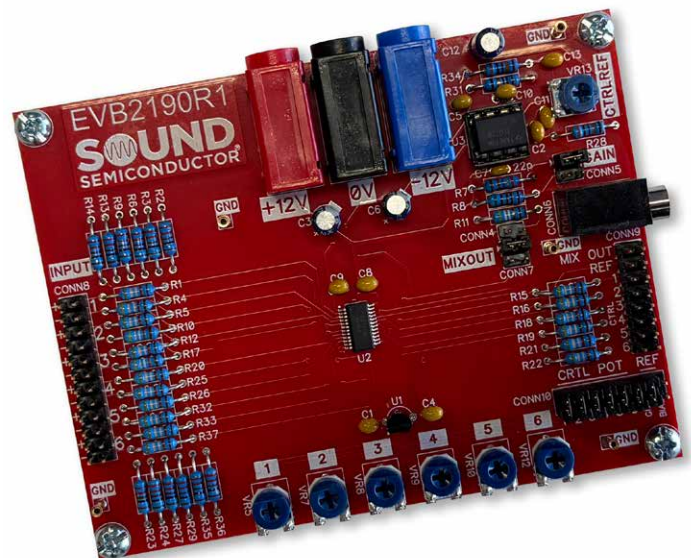
The schematic, bill of materials, and a user guide follow; refer to the SSI2190 data sheet for detailed information on use of the IC.
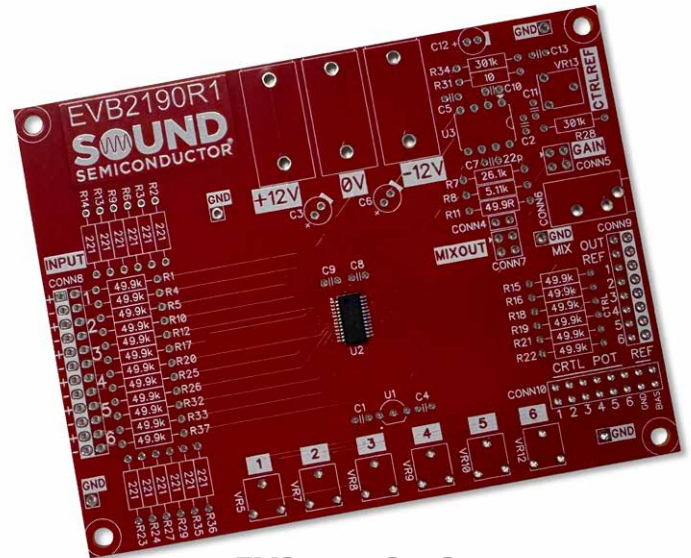
EVB2190R1-B

SPECIFICATIONS

- **PCB size:** 108 x 82mm
- **External Power:** ±12V
- **Inputs:** Differential of Each Channel
  Optional External CV
- **Outputs:** Audio Out - Jack
  Audio Out - Terminal
- **Controls:** Individual Channel CV
  Control Reference

EVB2190R1-P
(Future availability)

SOUND
SEMICONDUCTOR

BILL OF MATERIALS

Type	Reference	Value	Digikey P/N	Note
Resistors	R1	49.9k	49.9KXBK-ND	
	R2	221	221XBK-ND	
	R3	221	221XBK-ND	
	R4	49.9k	49.9KXBK-ND	
	R5	49.9k	49.9KXBK-ND	
	R6	221	221XBK-ND	
	R7	28.7k	28.7KXBK-ND	
	R8	5.11k	5.11KXBK-ND	
	R9	221	221XBK-ND	
	R10	49.9k	49.9KXBK-ND	
	R11	49.9	49.9XBK-ND	
	R12	49.9k	49.9KXBK-ND	
	R13	221	221XBK-ND	
	R14	221	221XBK-ND	
	R15	49.9k	49.9KXBK-ND	
	R16	49.9k	49.9KXBK-ND	
	R17	49.9k	49.9KXBK-ND	
	R18	49.9k	49.9KXBK-ND	
	R19	49.9k	49.9KXBK-ND	
	R20	49.9k	49.9KXBK-ND	Bourns Linear Pot - DRIVE
	R21	49.9k	49.9KXBK-ND	Bourns PV36 Trim Pot - EXPO
	R22	49.9k	49.9KXBK-ND	
	R23	221	221XBK-ND	
	R24	221	221XBK-ND	
	R25	49.9k	49.9KXBK-ND	
	R26	49.9k	49.9KXBK-ND	
	R27	221	221XBK-ND	
	R28	301k	301KXBK-ND	
	R29	221	221XBK-ND	
	R31	10.0	10.0XBK-ND	
	R32	49.9k	49.9KXBK-ND	
	R33	49.9k	49.9KXBK-ND	
	R34	301k	301KXBK-ND	
	R35	221	221XBK-ND	
	R36	221	221XBK-ND	
	R37	49.9k	49.9KXBK-ND	

Type	Reference	Value	Digikey P/N	Note
Capacitors	C1	0.1µF	BC3324-ND	
	C2	0.1µF	BC3324-ND	
	C3	10µF	399-6598-ND	Polarized
	C4	0.1µF	BC3324-ND	
	C5	0.1µF	BC3324-ND	
	C6	10µF	399-6598-ND	Polarized
	C7	22pF	BC1005CT-ND	
	C8	0.1µF	BC3324-ND	Polarized
	C9	0.1µF	BC3324-ND	Polarized
	C10	0.1µF	BC3324-ND	
	C11	0.1µF	BC3324-ND	
	C12	10µF	399-6598-ND	Polarized
	C13	0.1µF	BC3324-ND	
Pots	VR1	5k	3306F-502-ND	Bourns 3306
	VR2	5k	3306F-502-ND	Bourns 3306
	VR3	5k	3306F-502-ND	Bourns 3306
	VR4	5k	3306F-502-ND	Bourns 3306
	VR5	5k	3306F-502-ND	Bourns 3306
	VR6	5k	3306F-502-ND	Bourns 3306
	VR7	5k	3306F-502-ND	Bourns 3306
Connectors	CONN1	+12V		Newark – Multicomp 80P3614 (red)
	CONN2	0V		Newark – Multicomp 80P3613 (black)
	CONN3	-12V		Newark – Multicomp 80P3616 (blue)
	CONN4		609-67996-202HLF-ND	Bergstik 2 x 1 Pin Header
	CONN5		609-3209-ND	Bergstik 2 x 2 Pin Header
	CONN6		CP1-3533N-ND	1/8" Audio Jack
	CONN7		609-3209-ND	Bergstik 2 x 2 Pin Header
	CONN8		609-3215-ND	Bergstik 2 x 12 Pin Header
	CONN9		609-3389-ND	Bergstik 2 x 8 Pin Header
	CONN10		609-3389-ND	Bergstik 2 x 8 Pin Header
	CONN11 - 15		ED90074-ND	Mill-Max Pin Terminal
	n/a		S9337-ND	Shunt for Bergstik Headers
IC's	U1		497-15783-1-ND	L78L05ABZ-AP Reference
	U2		SSI2190	
	U3		296-14997-5-ND	TL072IP
Misc.	PCB2190R1			PCB for EVB2190
	n/a		3M5461-ND	Socket for TL072
	n/a			1" Nylon Standoff, Threaded
	n/a			6/32" - 40 Screws (4)

SOUND SEMICONDUCTOR

GROUND POINTS

CONN11, CONN13, CONN12, CONN14, CONN15

SIGNAL INPUTS

CONN8

R1 49.9k, R5 49.9k, R12 49.9k, R20 49.9k, R26 49.9k, R33 49.9k
R4 49.9k, R10 49.9k, R17 49.9k, R25 49.9k, R32 49.9k, R37 49.9k

R36 221, R35 221, R29 221, R27 221, R24 221, R23 221
R2 221, R3 221, R6 221, R9 221, R13 221, R14 221

SSI2190 U2

POWER INLET

CONN3 -12V, CONN2 0V, CONN1 +12V
C6 10u/25, C3 10u/25, C4 100n, U1 IN OUT GND, C1 100n
+5V

INTERNAL VOLTAGE RAILS

-12V C5 100n, C2 100n +12V, U3 V- V+

CONTROL POTS AND REFERENCE HEADER

MIX 1, MIX 2, MIX 3, MIX 4, MIX 5, MIX 6
VR5 5k, VR7 5k, VR8 5k, VR9 5k, VR10 5k, VR12 5k
+5V

CONN10

CTRL REF
C12 10u/25, R31 10, C10 100n, U3.7 A

CTRL BIAS
-12V R34 301k, VR13 5k, R28 301k +12V
C13 100n, C11 100n

CONTROL INPUTS MIX OUT

CONN9

R15 49.9k, R18 49.9k, R21 49.9k
R16 49.9k, R19 49.9k, R22 49.9k

CONN7

U3.2 B
C7 22p, R6 5.11k, R7 26.1k
R11 49.9k

OUTPUT GAIN
CONN4, CONN5

MIXOUT JACK
CONN6 Sleeve Tip Ring

| Title	SSI2190 Evaluation Board		
Size	Number		Rev
	EVB2190R1		1
Date 9/2/2024	Drawn by SK		
Filename	Sheet	1	

USING THE EVB2190R1

CONN8, CONN9 Connector Type Options

There are two options for these connections. Signals are on the inner pins, while corresponding grounds are on the outer pins. If you just want access to individual signals using clip lead, populate the pins with a single-row header situated closest to the SSI2190 (furthest from the edge of the board). For mass connection to external circuits populate with dual-row headers and use standard IDC headers and cables.
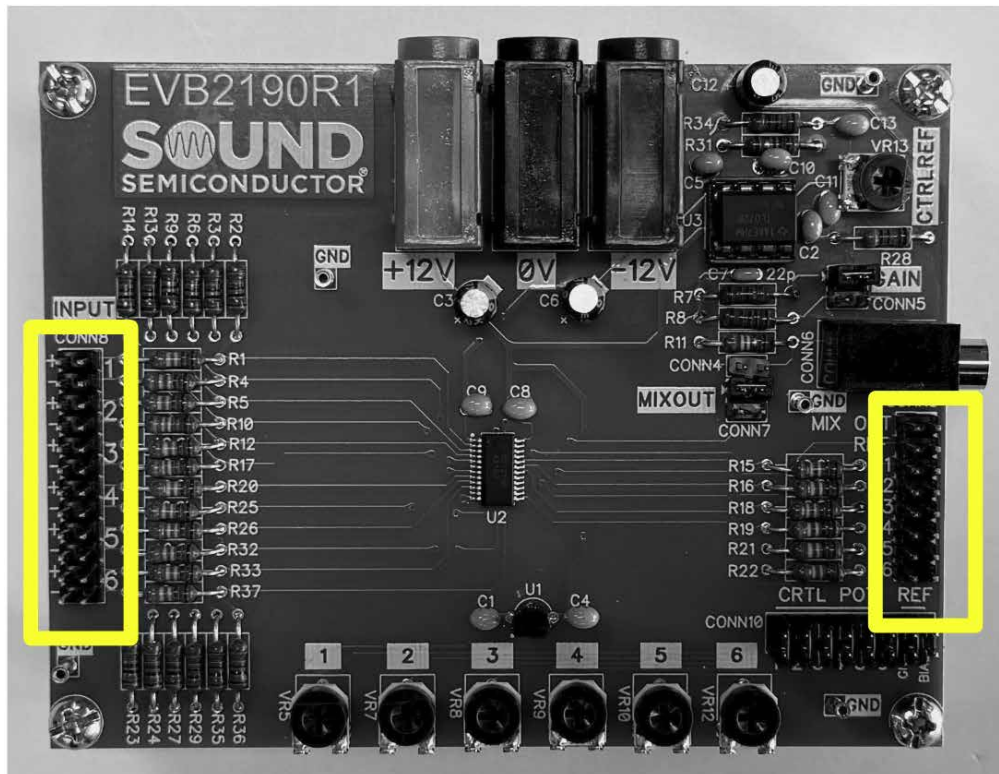
CONN1, CONN2, CONN3 - Power

Connect power to the three 4mm banana jacks: +12V to red, Ground to black, -12V to blue. It is recommended to use a good quality dual-rail bench power supply. The SSI2190 can operate over wide bipolar and unipolar supply ranges, typically ±4V to ±15V, and 8V to 30V. However the EVB2190R1 is designed for bipolar supplies.
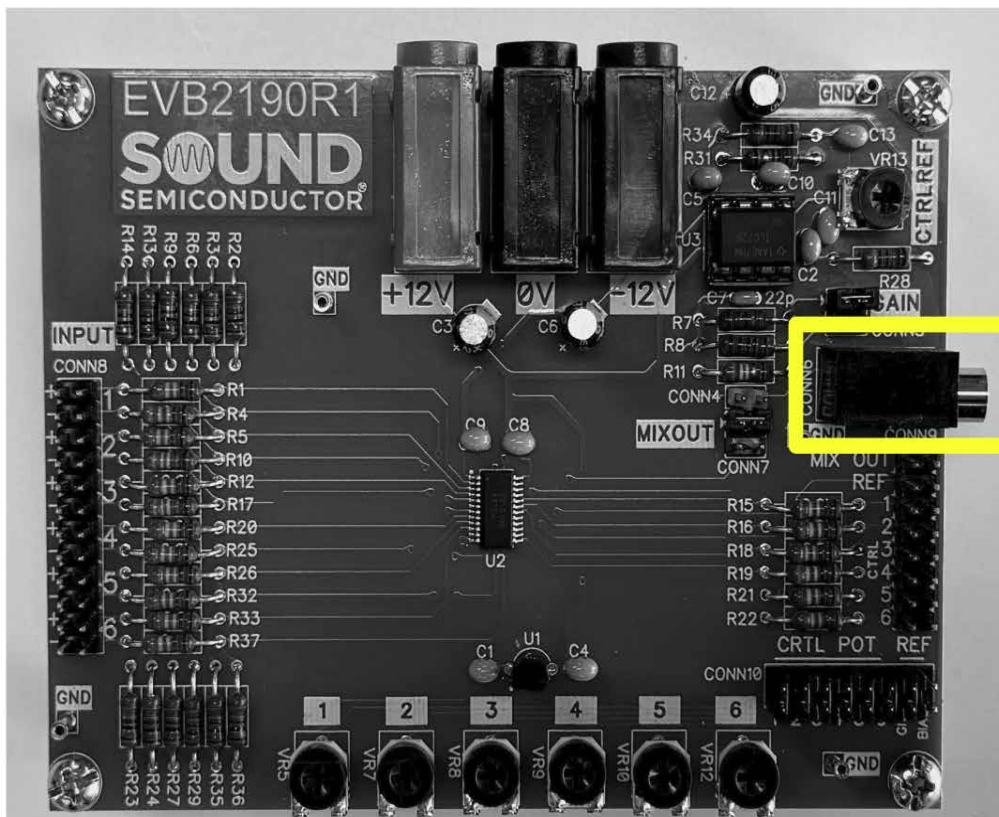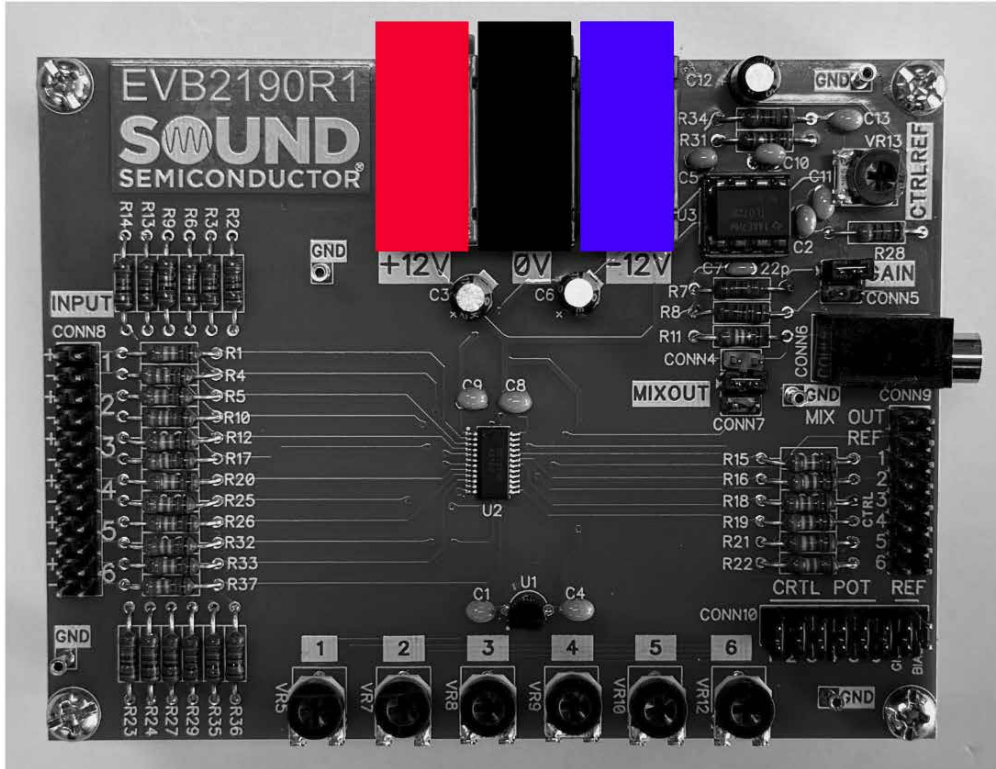
CONN6 - Mix Out

The MIX OUT connection is a 3.5mm jack socket. The mix output signal is also available on CONN9.

CONN8 - Signal Inputs

The signal inputs comprise six pairs of differential (+ and -) inputs.

Depending on which build option you select (see above) you either connect to individual pins, or via a 24-pin header and ribbon cable over to your test circuit. The pins closest to the board edge are grounds, with the signal pins closest to the SSI2190.
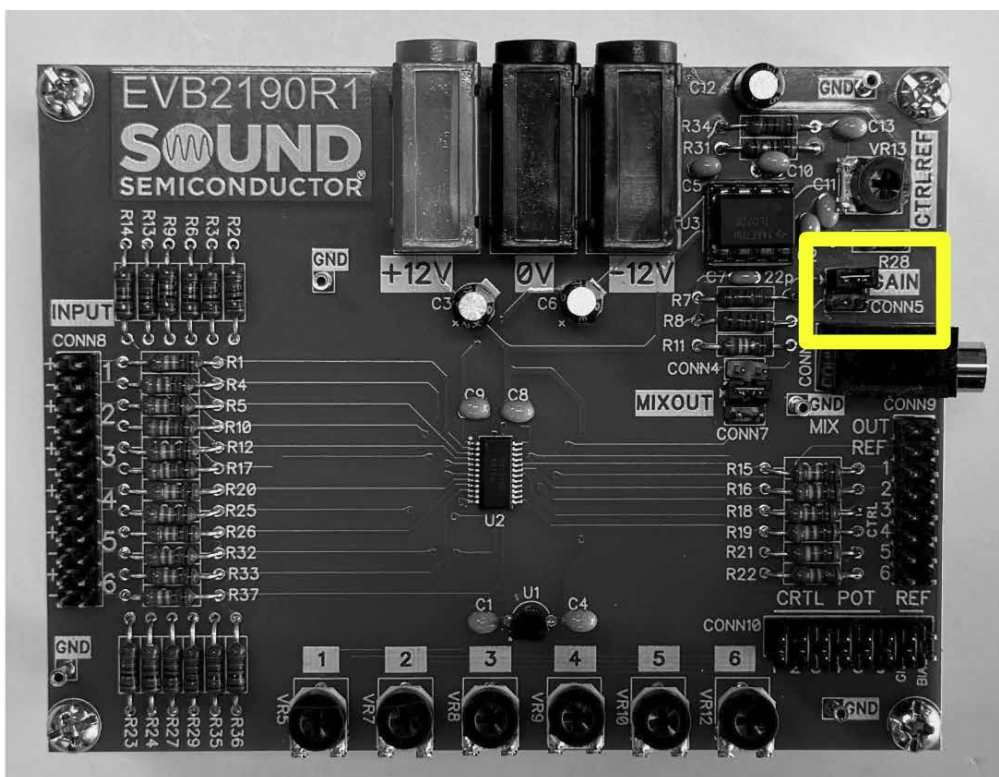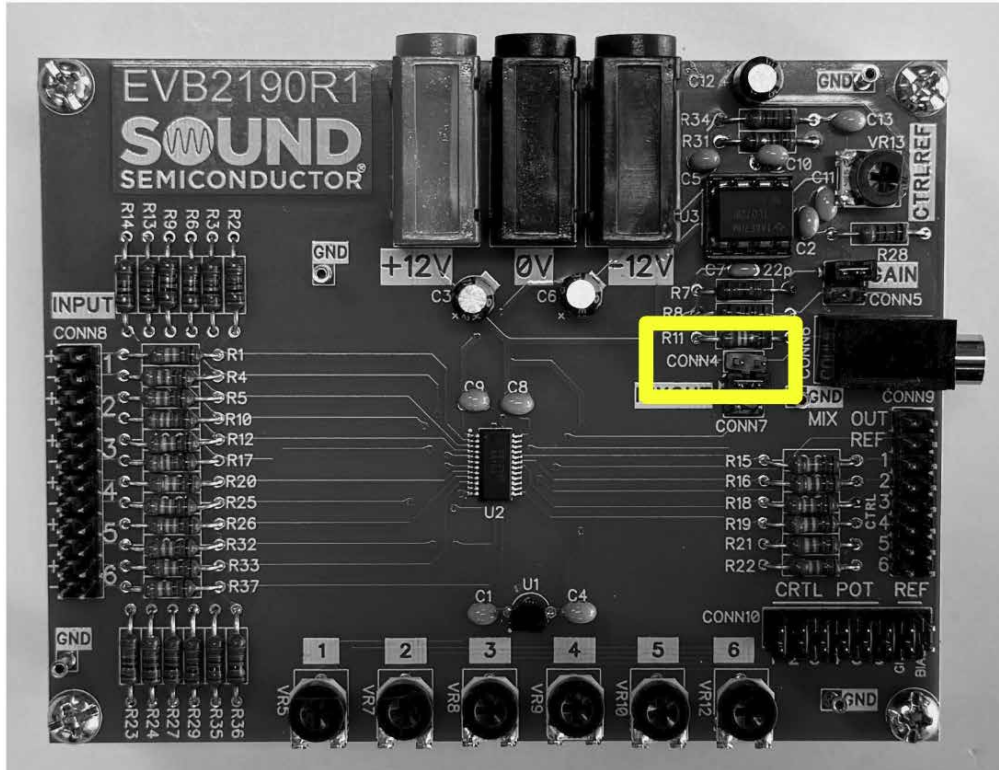
Unused inputs can be left floating.
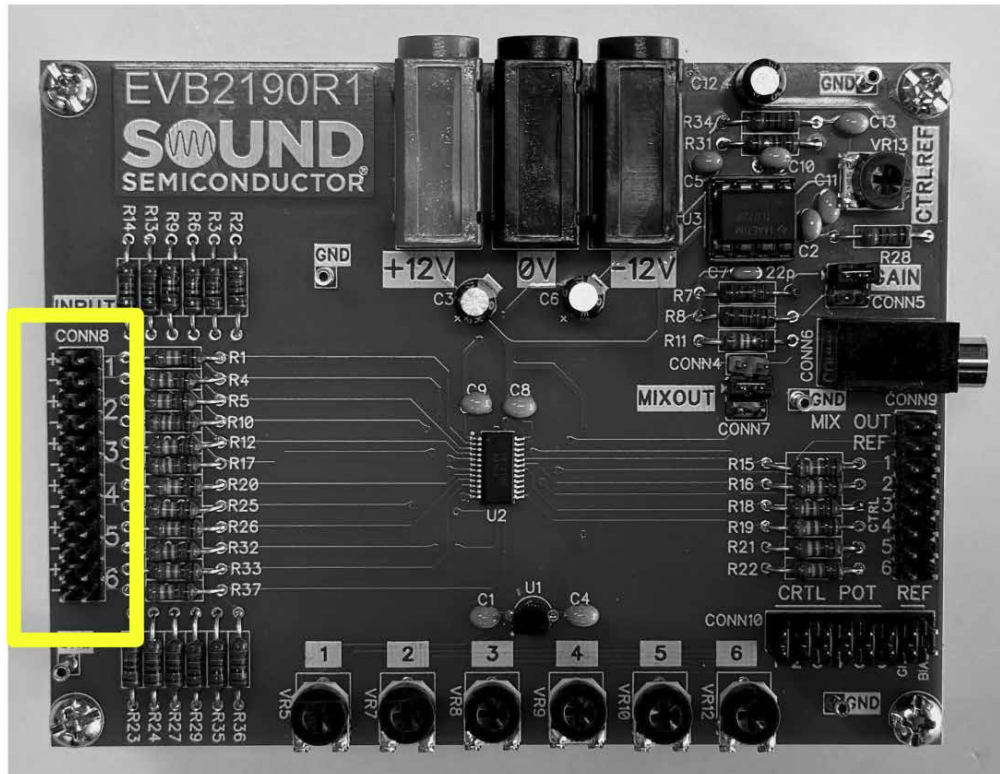
CONN4 - Output Opamp Gain Resistor

If you want to experiment with different feedback circuits for the output opamp, CONN4 is where you can connect your own feedback circuit, for example, a capacitor or a diode distortion circuit.

Remove the jumper from CONN5 if using this feature.

CONN5 - Output Opamp Gain

The output opamp has two selectable gains, set by CONN5. In the upper position shown the opamp has greater gain giving close to unity gain for one channel.

If multiple channels are mixed at the same time this can lead to overloading, so move the link to the lower position for lower gain when summing multiple channels.

CONN7 - Output Shunt

For normal operation short pins 1-2 as shown in the diagram. This connects the MIX OUT of the SSI2190 to the input of an inverting opamp.

If you wish to experiment with your own circuit then remove the 1-2 jumper from CONN9 and connect your circuit to the other two pins (3 = signal, 4 = ground).
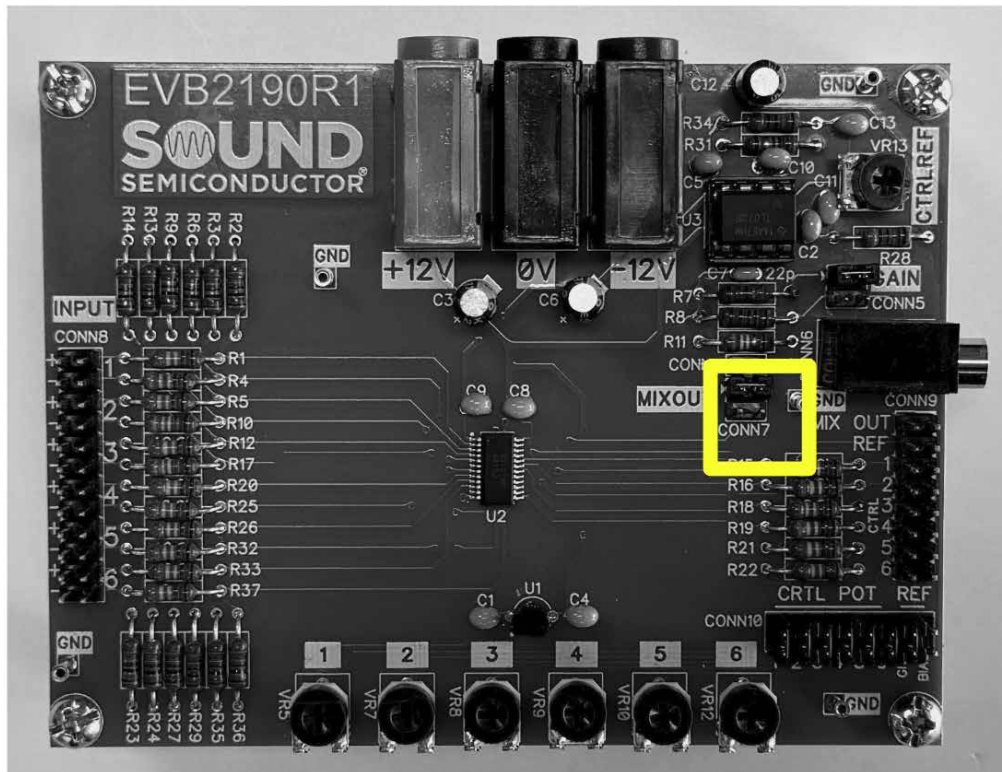
CONN9 - Control

CONN9 has three functions:

- The MIX OUT is available on the top-most pin
- The CONTROL REF is available to monitor or inject external signals through the second top-most pin
- The six CONTROL CVs can be monitored on the corresponding six pins. If the CONN10 jumpers are not fitted then external CVs can be applied. Unused CONTROL CVs can be left unconnected.
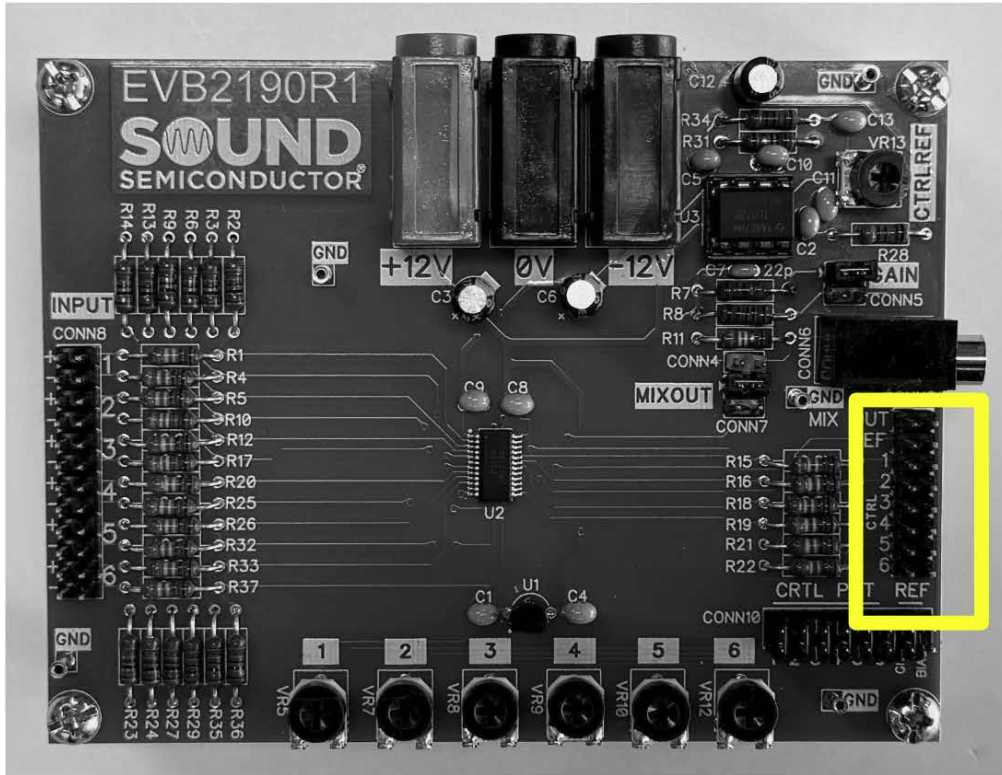
CONN10 - Control Routing and CTRL REF

To use the on-board trimmers to set the channel gains add jumpers to the leftmost 6 pairs of pins. This is the default setting. To use external CVs remove the jumpers and connect the CVs to the corresponding pins on CONN9.

The rightmost two sets of pins control the voltage that sets CTRL REF. With the default setting shown above CTRL REF is connected to ground. This is the recommended configuration. However it is also possible to experiment with the voltage on the CTRL REF pin by moving the jumper to the other position closest to the board edge and then adjusting the CTRLREF trimmer at the top of the board.

To inject an external CTRL REF signal remove the jumper from CONN10 and connect the bias voltage to the appropriate pin on CONN9.
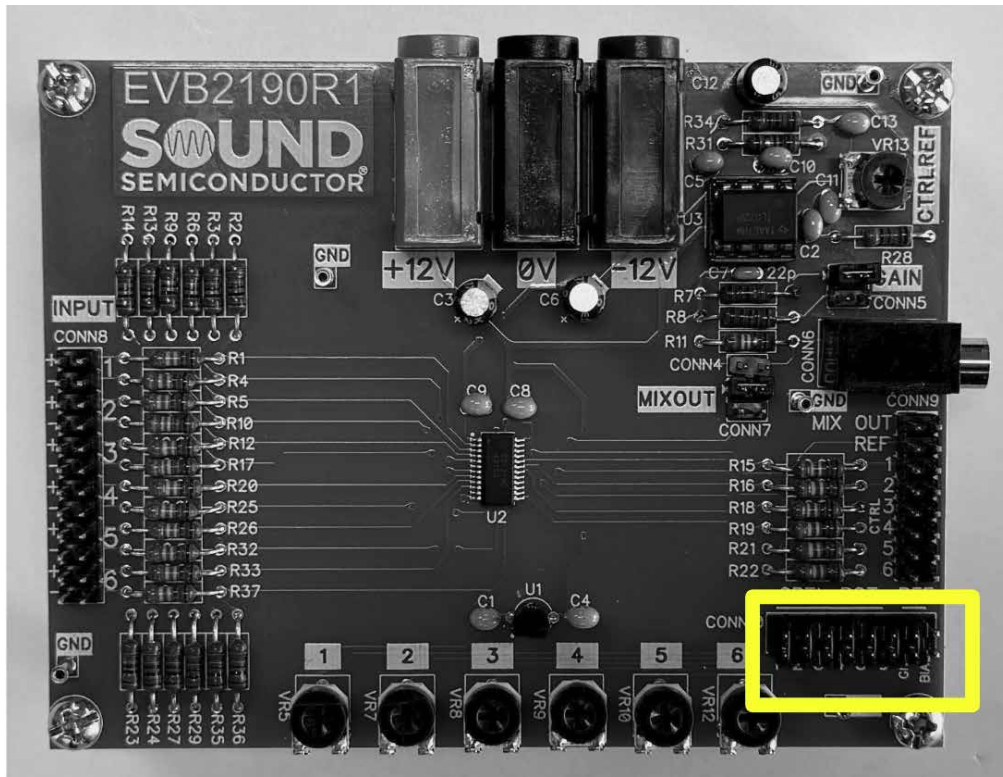
CONFIGURATION

1. Configure the board according to your requirements.
2. Apply power to the board.
3. Apply input signals.
4. Vary the control voltages (either from the on-board trimmers or externally) to vary the mix amount of each input.

Setting the CTRL REF Bias

If the CTRL REF bias option is chosen use the CTRLREF trimmer to adjust the voltage. You can monitor the bias voltage on the second-from-top pin on CONN9, as shown.
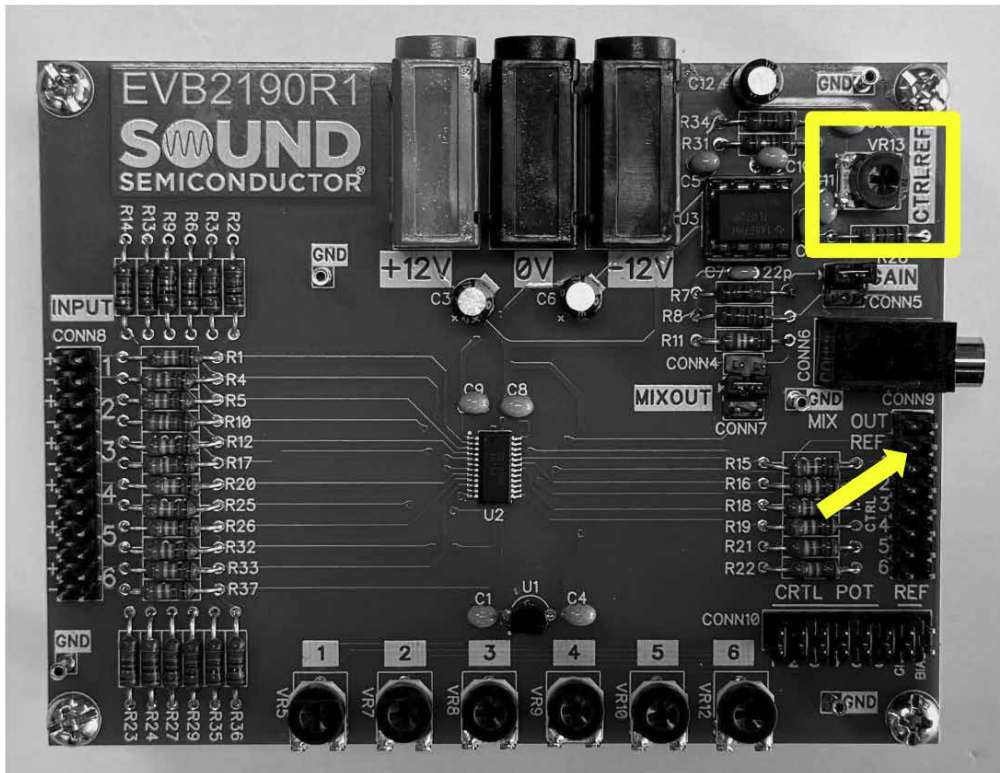
Setting the Channel Mix Amounts

The EVB2190R1 board has six on-board trimmers for setting each channel's CV from 0V to +5V. The voltages can be measured at CONN9. If you want to use external CVs then remove the jumpers on CONN10 and inject your CVs into CONN9.