

# SSI2190

## PROCIRCUIT™ 6-INTO-1 VOLTAGE CONTROLLED MIXER\*

The SSI2190 is a six-into-one voltage controlled mixer in a compact 24-lead SSOP package, based on a new-generation Operational Transconductance Amplifier (OTA) developed by Sound Semiconductor. The high-compliance current output allows easy paralleling of multiple SSI2190s.

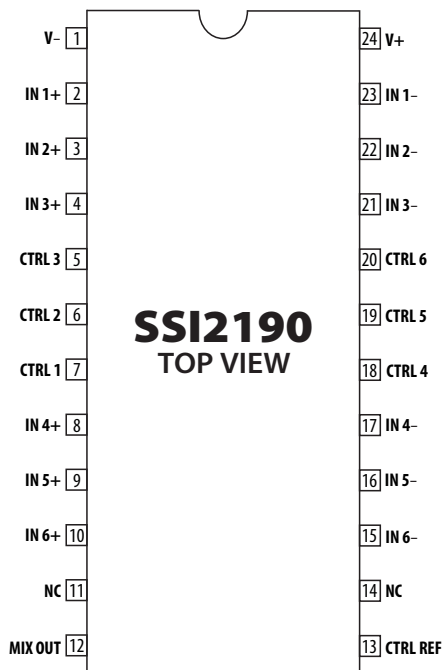
Each input channel has differential voltage inputs and a current-mode linear control input. Low distortion, low control feedthrough, full mute attenuation, and wide dynamic range round out the SSI2190s features.

The SSI2190 makes mixing of audio signals – as well as control voltages – a simple endeavor. Voltage controlled equalizers are easily designed. Differential inputs can be used for phase correction, and differential signal paths. As a generic audio building block, applications are only limited by one’s imagination.

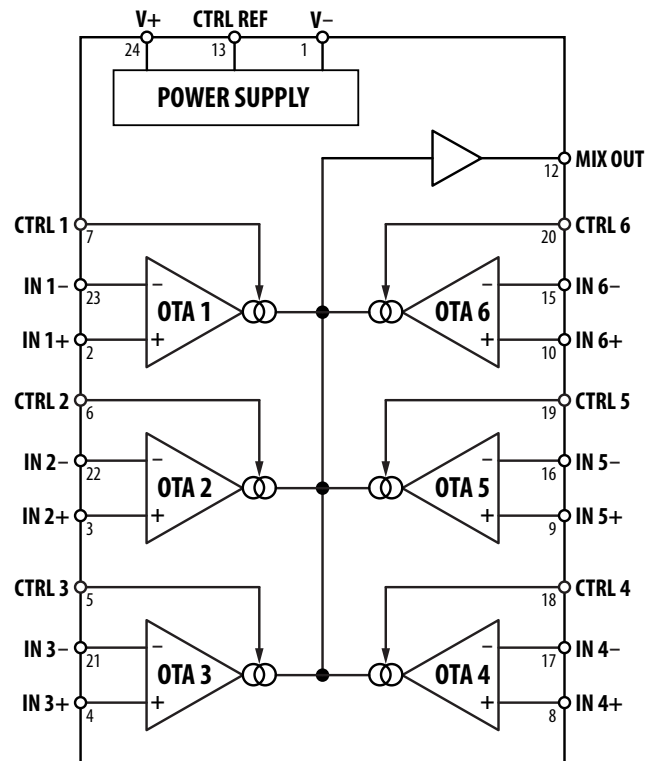
A wide supply voltage range (single or dual) allows use in a variety of audio gear from musical instruments and effects pedals to prosumer systems where large signal handling and headroom are desired.

### FEATURES

- Easy-to-Use Six Input into Single Output Audio Mixer
- Handles Input Signals up to 10V<sub>RMS</sub>
- Linear Control OTA’s
- Very Low Noise: Typical -91dBu
- Low Distortion – Typical 0.025%
- Mute Attenuation – Typical 100dB
- Low Control Feedthrough – Typical -60dB
- ±4V to ±18V Operation
- Very Few External Components Required



**PIN CONNECTIONS**  
24-LEAD SSOP



\*Patent Pending

The SSI2190 is available exclusively from Sound Semiconductor and its authorized resellers  
PO Box 1587, Arroyo Grande, CA 93421 USA, [www.soundsemiconductor.com](http://www.soundsemiconductor.com)

Rev. 1.5, October 2024

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**SPECIFICATIONS** ( $V_S = \pm 15V$ ,  $V_{IN} = 0.775V_{RMS}$ ,  $f = 1kHz$ ,  $V_C = 5V$ ,  $V_{CTRLREF} = GND$ ,  $T_A = 25^\circ C$ ; using Figure 1 circuit)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
<b>POWER SUPPLY</b>						
Supply Voltage Range	$V_S$		$\pm 4$		$\pm 18$	V
Supply Current - Positive	$I_{SY+}$	$V_{IN} = GND$ ; All channels active		+11.4	+12.5	mA
Supply Current - Negative	$I_{SY-}$	$V_{IN} = GND$ ; All channels active		-12.1	-13.0	mA
Power Supply Rejection Ratio	PSRR	60Hz; $V_{IN} = GND$		64		dB
<b>CONTROL PORTS</b>						
Control Current Range	$I_{CTRL}$	At CTRL pins, mute to full on	0		100	$\mu A$
Transconductance	$g_m$	$V_{IN} = \pm 1V$ ; After 60 seconds	7500	8100	8700	$\mu S$
Channel to Channel $g_m$ Matching				$\pm 0.1$		dB
Control Feedthrough*		$V_{IN} = GND$ ; $V_C = 5V_{P-P}$ Sine		-60		dB
Maximum Attention		$V_C = 0V$ ; $V_{IN} = +20dBu$ Sine; See Figure 2 Test Circuit		100		dB
<b>SIGNAL INPUTS</b>						
Maximum Input Voltage		At IN+ and IN- pins	$V- +2V$		$V+ -2V$	V
Maximum Differential Input Voltage		Between any IN+/IN- pair			$\pm 1$	V
Input Resistance				12		k $\Omega$
Input Bias Current	$I_B$	$V_{IN} = GND$		2.0		$\mu A$
Input Offset Current	$I_{OS}$	$V_{IN} = GND$		40		nA
Common Mode Rejection	CMRR	$V_{IN} = GND$		73		dB
<b>SIGNAL OUTPUT</b>						
Output Compliance		See Figure 2 Test Circuit	$V- +1V$		$V+ -1V$	V
Output Offset Current		$V_{IN} = GND$		$\pm 1.2$	$\pm 5.5$	$\mu A$
Max Recommended Output Current		THD = 1%			800	$\mu A$
<b>PERFORMANCE</b>						
Output Noise		$V_{IN} = GND$ ; See Figure 2		-91		dBu
Headroom	HR	@1% THD; See Figure 2		+22		dBu
Total Harmonic Distortion	THD	See Figure 2		0.025		%
Channel Separation		Any channel to another†		88		dB
Slew Rate	SR			130		$\mu A/\mu s$

\*see "Control Feedthrough" for a detailed discussion

†Driven channel  $V_{IN} = 10V_{RMS}$  and  $V_C = 0V$ , measured channel  $V_{IN} = GND$  and  $V_C = 5V$

**ABSOLUTE MAXIMUM RATINGS**

Supply Voltage	$\pm 20V$
Maximum Control Current	500 $\mu A$
Maximum Differential Input Voltage	$\pm 4V$
Storage Temperature Range	-65 $^\circ C$ to +150 $^\circ C$
Operating Temperature Range	-40 $^\circ C$ to +85 $^\circ C$
Lead Temperature (Soldering, 10 sec)	260 $^\circ C$

**ORDERING INFORMATION**

Part Number	Package Type/Container	Quantity
SSI2190SS-TU	24-Lead SSOP* - Tube	58
SSI2190SS-RT	24-Lead SSOP* - Tape and Reel	4000

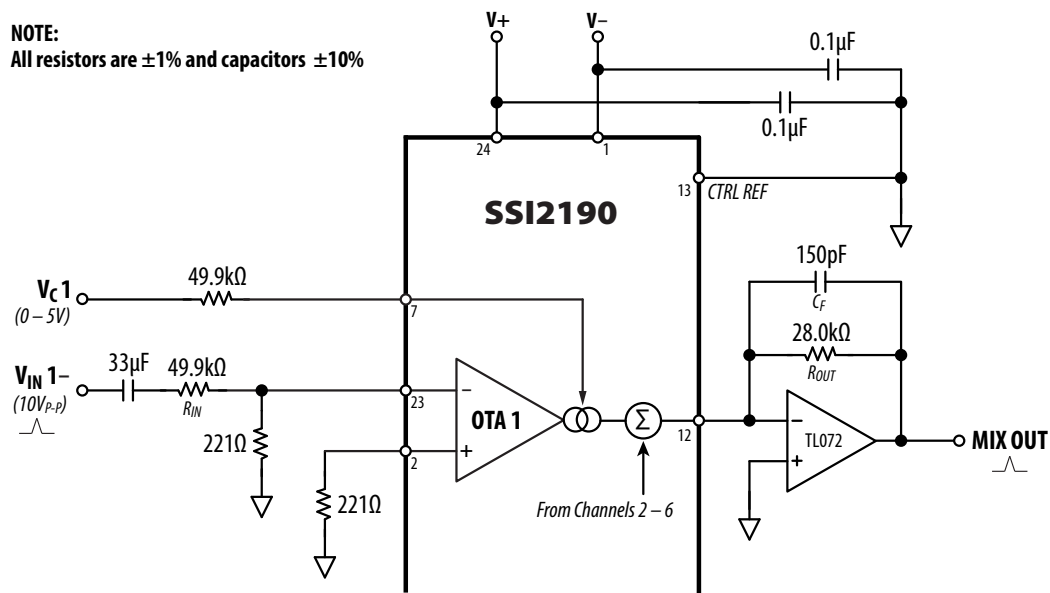
\*SSI Package ID "PSSL24"; compliant with JEDEC MO-137-AE  
Mechanical drawing available at [www.soundsemiconductor.com](http://www.soundsemiconductor.com)

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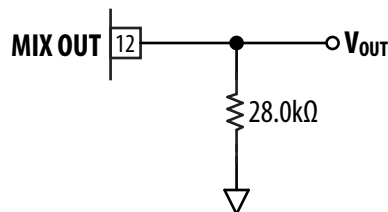
**PIN DESCRIPTIONS** ("x" refers to one of the six channels)

Pin(s)	Name	Description
1	V-	Negative supply. Recommend 100nF local decoupling capacitor placed as close to package as possible with a low inductance trace to ground.
2, 3, 4, 8, 9, 10	IN x+	Non-Inverting voltage signal inputs.
5, 6, 7, 18, 19, 20	CTRL x	Control current input referenced to CTRL REF.
11, 14	NC	Leave these pins unconnected.
12	MIX OUT	High-compliance current output.
13	CTRL REF	Common reference for the control inputs. In a bipolar power supply system connect to control ground; if single supply to a pseudo ground. See Control Reference for more information about use of this pin.
15, 16, 17, 21, 22, 23	IN x-	Inverting voltage signal input. Differential input should not exceed $\pm 100\text{mV}$ .
24	V+	Positive supply. Recommend 100nF local decoupling capacitor placed as close to package as possible with a low inductance trace to ground.

**NOTE:**  
All resistors are  $\pm 1\%$  and capacitors  $\pm 10\%$



**Figure 1: Typical Application Circuit**



**Figure 2: Test Circuit**