

PRODUCT REVIEW

Audio SIP-1

Reviewed by Charles Hansen

Sescom, Inc. 2100 Ward Drive,
Henderson, NV 89051, (702)
565-3400, www.sescom.com;
Audio SIP-1 \$20.

The Sescom Audio SIP-1 is a dual general-purpose noninverting gain amplifier. The single in-line PC board (SIP) measures only 1.06" × 0.875", with nine pins on standard 0.1" in-line spacings (Photo 7). This allows the SIP-1 to plug into a standard SIP socket.

Sescom advertises the SIPs as audio subsystems that you can place together to form a larger system. There are a total of 24 PC boards in the SIP family, along with two power-supply modules (more on this later).

The low-profile surface-mount components result in a board that is only ¼" high. The single-layer tracks are on the component side of the board. The rear of the board has a stick-on label that defines all the pin connections.

Circuit Description

The schematic diagram for the Audio SIP-1 is shown in Fig. 1. The board uses the

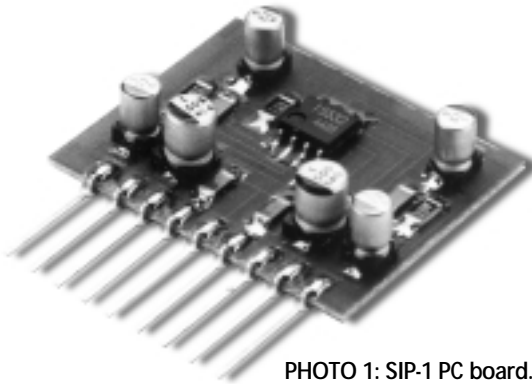


PHOTO 1: SIP-1 PC board.

Rohm version of the NE5532 dual-audio op amp, the BA15532, in a SOP8 surface-mount package. The 5532 has a maximum supply-voltage rating of ±22V DC rather than the ±18V DC limit of many op amps.

The power-supply boards that support the SIP-1 (and the other SIPs in the family) are designed to furnish a conservative ±18V DC to the SIP-1 at pin 4 (V-) and pin 6 (V+). The board has local 100nF ceramic decoupling capacitors for the op-amp supply pins. The quality of the soldering and the symmetrical board layout are excellent.

Since each half of the dual op-amp circuit has the same layout, I will explain only one. The audio input signal at pin 3 (IN) is coupled through C1 to the nonin-

verting input of U1A, with R1 establishing an input impedance of 100k. Feedback is provided by R2 and C2, which sets a feedback zero at 72kHz.

You then add an external resistor from pin 2 (GS) to ground pin 5 to increase the gain to as much as 30dB, at which the combination of the 3k3 gain resistor and C3 will set the LF 3dB response to 2.2Hz. The output is coupled by C4 to output pin 1 (OUT). All the coupling caps are aluminum electrolytics, and the 22pF feedback caps appear to be NPO ceramic chips.

While the 5532 itself can drive a 600Ω load, this would raise the output LF 3dB response (C4 and the 600Ω load) to 12Hz. In order to ensure a flat response down to 20Hz, the output load should be 2k or higher.

Measurements

There was a bit of confusion when I began building a test fixture for the SIP-1. The pin connections in the booklet did not agree with the decal on the back of the PC board. I traced the circuit with my ohmmeter before I made any of the connections.

I didn't make any rigorous audio measurements. The 5532 has been available for over 20 years and is a known entity, and the SIP-1 circuit is quite simple. I used a regulated lab-type dual power supply set to ±18V DC in place of the Sescom power-supply modules. I plugged the SIP-1 into a socket and wire-wrapped my connections.

First I wired the SIP-1 as a pair of 6dB gain amplifiers (the lowest gain recommended by Sescom) by installing 100k resistors from pin 2 and pin 8 to pin 5 (ground). I used 5% carbon film resistors, since the values in the SIP-1 gain table are standard 5% values. Then I connected the two amplifiers on the SIP-1 in series, for a total of 12dB gain. I used load resistors of 47k, 2k, and 600Ω.

I adjusted the sine oscillator for a 2V RMS output at 1kHz with a 47k load, and left it at that level throughout the tests. I

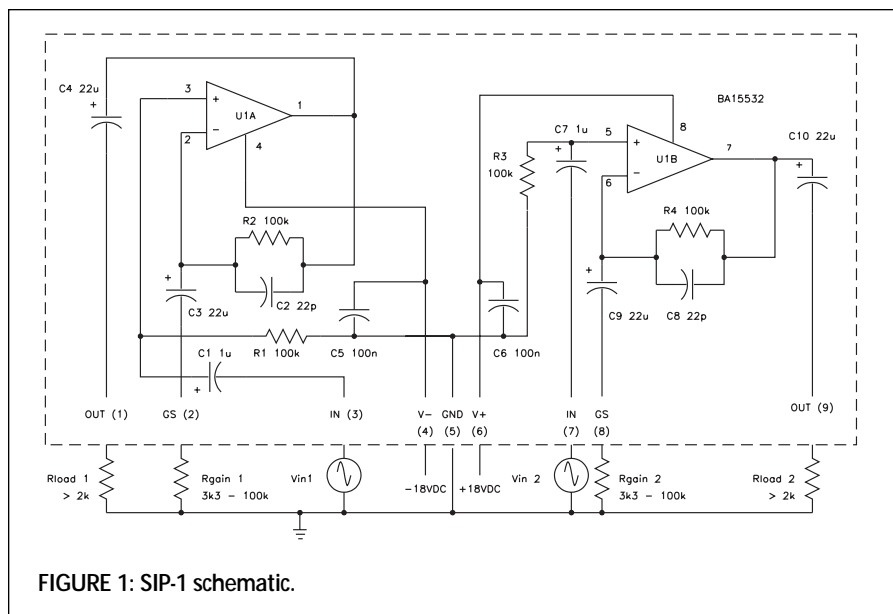


FIGURE 1: SIP-1 schematic.

used the distortion test set 80kHz low-pass filter during the distortion measurements to remove out-of-band distortion products. The frequency response and distortion (THD+N) are shown in *Table 1*.

Results with the 600Ω load are a bit better than expected because the 22μF output caps actually measured 25μF.

Square-wave response (2V pk-pk output with a 47k load) at 20Hz showed moderate tilt. The 1kHz square wave was just about perfect. The 20kHz square wave showed some rounding of the leading edges, with no overshoot or ringing.

Output clipping at 1% THD+N was 12.2V RMS from 20Hz–20kHz with the ±18V DC power supplies.

Next I connected one of the SIP-1 amplifiers for its maximum gain of 30dB by installing a 3k3 resistor from pin 2 to pin

TABLE 1: FREQUENCY RESPONSE AND THD+N

Two 6dB SIP-1 Amplifiers in Series

Test	47k Load	2k Load	600Ω Load
20Hz Vout	1.98V RMS	1.65V RMS	1.15V RMS
1kHz Vout	2.00V RMS	1.70V RMS	1.27V RMS
20kHz Vout	1.87V RMS	1.58V RMS	1.19V RMS
20Hz THD+N	0.0051%	0.0056%	0.017%
1kHz THD+N	0.0052%	0.0053%	0.0055%
20kHz THD+N	0.0095%	0.0098%	0.015%

TABLE 2: FREQUENCY RESPONSE AND THD+N

One 30dB SIP-1 Amplifier

Test	47k Load	2k Load	600Ω Load
20Hz Vout	1.97V RMS	1.65V RMS	1.17V RMS
1kHz Vout	2.00V RMS	1.71V RMS	1.29V RMS
20kHz Vout	1.90V RMS	1.62V RMS	1.23V RMS
20Hz THD+N	0.0068%	0.0071%	0.014%
1kHz THD+N	0.0068%	0.0066%	0.0067%
20kHz THD+N	0.0071%	0.0070%	0.0073%

5 (ground). I did not connect them in series as before, since 60dB of gain would have required an unrealistically low input signal level, and added to the noise portion of THD+N. I again adjusted the sine oscillator for 2V RMS output at 1kHz with a 47k load, and left it at that level throughout the tests. The results are shown in *Table 2*.

The square wave response and clipping levels were essentially the same as the tests performed at 12dB. ■

Manufacturer's Specifications

Frequency response: ±1dB 20–20kHz

Distortion: >0.01% 20–20kHz

Recommended gain range: 6dB–30dB (RGS 100k–3k3)

Other SIPs

As I said earlier, there are 24 SIP modules in the Sescom SIP family, and two power-supply modules. The complete family of products is given in *Table 3*. The Audio SIP Applications Guide has a number of schematics that show you how to implement a number of professional and consumer audio circuits.

For more information on the SIP family, consult the Sescom web page www.sescom.com/sips, where you can download schematics and PC board circuits.

TABLE 3: AUDIO SIP FAMILY

Model	Description
SIP-1	Dual general-purpose gain amps
SIP-2	Dual electronic mike input amps
SIP-3	Dual electronic line input amps
SIP-4	Dual electronic line output amps
SIP-5	Line amp with buffer stage
SIP-6	Dual summing amps
SIP-7	Dual headphone amps
SIP-8	Automatic level control—line level
SIP-9	Dual voltage-controlled amplifier
SIP-10	Four common buffer amps
SIP-11	Dual electronic switch
SIP-12	Video driver amplifier—three outputs
SIP-13	Ducker (one audio signal has control over another)
SIP-14	Electronic mike-line pad
SIP-15	Auto feedback controller
SIP-16	Function generator—sine/square wave
SIP-17	Audio oscillator/meter driver
SIP-18	Rumble scratch filter
SIP-19	Mike preamp/¼W amp
SIP-20	DC/DC converter
SIP-21	Dual gain amps—single supply
SIP-22	Dual summing amps—single supply
SIP-23	Limiters—fast attack/slow release
SIP-24	Dual unity gain buffers
SIP-PS	AC power supply ±18V DC output, 25mA
SIP-18V	AC to ±18V DC regulator circuit, 50mA