GENNUM CORPORATION

Digitally Controlled Transconductance Block

LV560 DATA SHEET

T-74-05-01

FEATURES

- **1.0 to 5 V DC supply voltage**
- **70 μA of analog current drain (typical)**
- **6 μA of memory current drain (typical)**
- **single or dual switch control**
- **typical 42 dB range**
- **adjustable clock frequency increases or decreases time required to change diode impedance**

STANDARD PACKAGING

- 10 pin MICROpac
- 10 pin PLID®
- Chip (79 x 60 mils)

CIRCUIT DESCRIPTION

The LV560 is a low voltage transconductance block which can be used as an electronic volume control. The transconductance element consists of two diodes back-to-back, whose impedance is varied by changing the amount of current through the diodes.

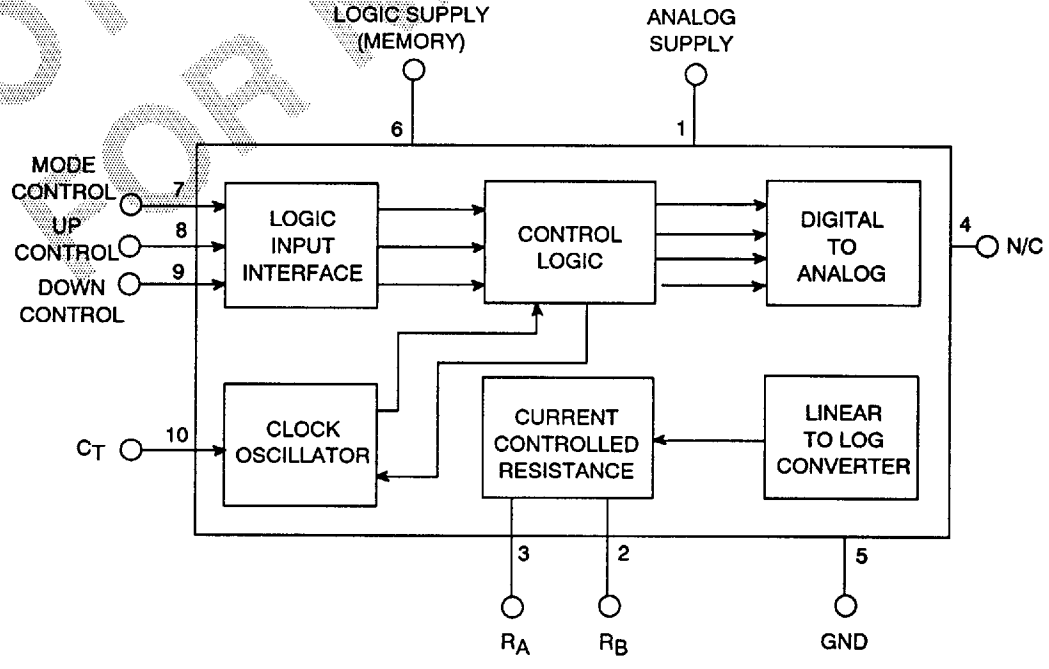
The impedance of the diodes is controlled by digital circuitry which consists of:

- an oscillator with an external capacitor, C_T, to set the ramp frequency f_c,

$$f_c = \frac{5 \times 10^{-7}}{C_T}$$

- logic interface, which senses the volume up-down controls
- a digital / analog converter
- the control logic/debounce logic
- synchronous up-down counter

To increase or decrease the LV560 impedance, the switching mechanism can be touch sensitive contacts or a mechanical switch. Gennum offers the higher performance digitally controlled transconductance block GT560 as a replacement for the LV560.



BLOCK DIAGRAM

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ABSOLUTE MAXIMUM RATINGS

Parameter	Value & Units
Supply Voltage	5 VDC
Power dissipation at $T_A \leq 70°C$	25 mW
Operating Temperature	-10°C to + 40°C
Storage Temperature	-20°C to + 70°C

CAUTION
CLASS 1 ESD SENSITIVITY

PIN CONNECTION

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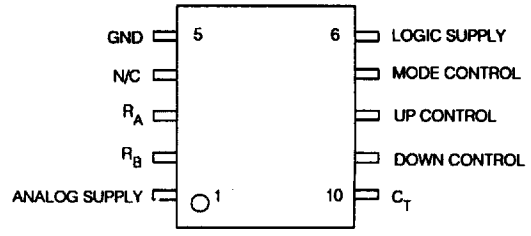


ELECTRICAL CHARACTERISTICS

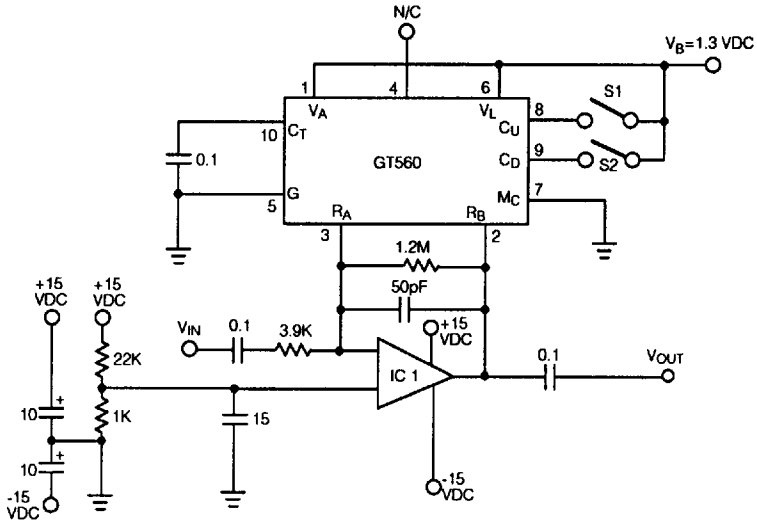
Conditions: Temperature = 25 °C, Frequency = 1 kHz, Supply Voltage = 1.3 VDC

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Total Current	I_{TOT}	Minimum Impedance	10	70	130	µA
Logic Current	I_{LOGIC}		-	6	10	µA
Distortion	THD	V_{OUT} = 10 mVRMS	-	1	2.9	%
Step Size			1.0	2.5	4.0	dB
Impedance :						
Low	Z_{LOW}	Minimum Impedance, V_{OUT} = 15 mVRMS, See Note 1	2.5	4	6	kΩ
High	Z_{HIGH}	Maximum Impedance, V_{OUT} = 15 mVRMS, See Note 1	250	500	700	kΩ
Volume Control Range			36	42	48	dB

Note: All parameters and switches remain as shown in Test Circuit unless otherwise stated in Conditions column

NOTES: 1 Measure V_{IN},

$$Z = \frac{V_{OUT} \times 3.9K}{V_{IN}}$$



All resistors in ohms, all capacitors in µF unless otherwise stated
IC1 = CA 3140 Operational Amplifier

Fig. 1 LV560 Test Circuit

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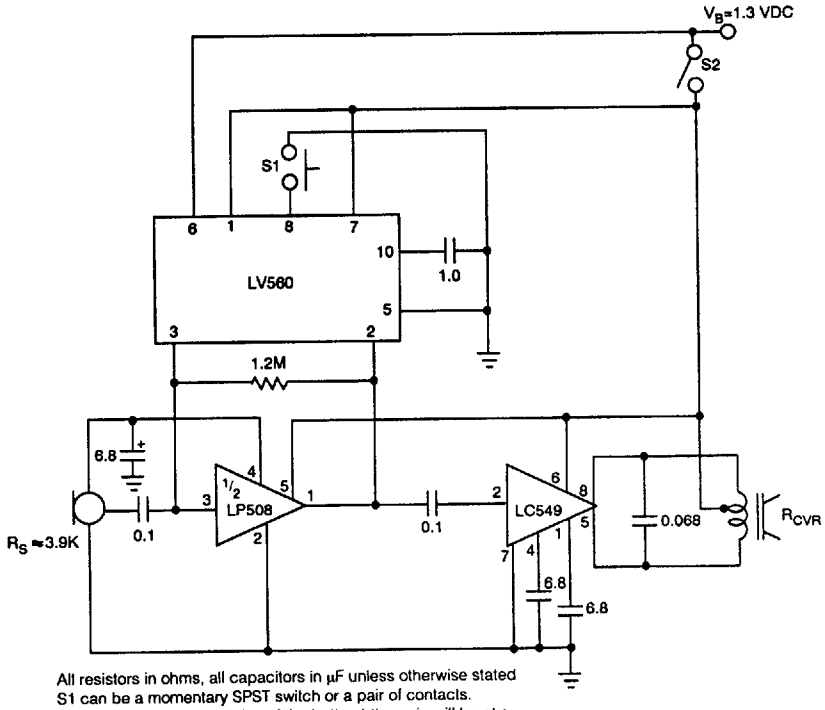
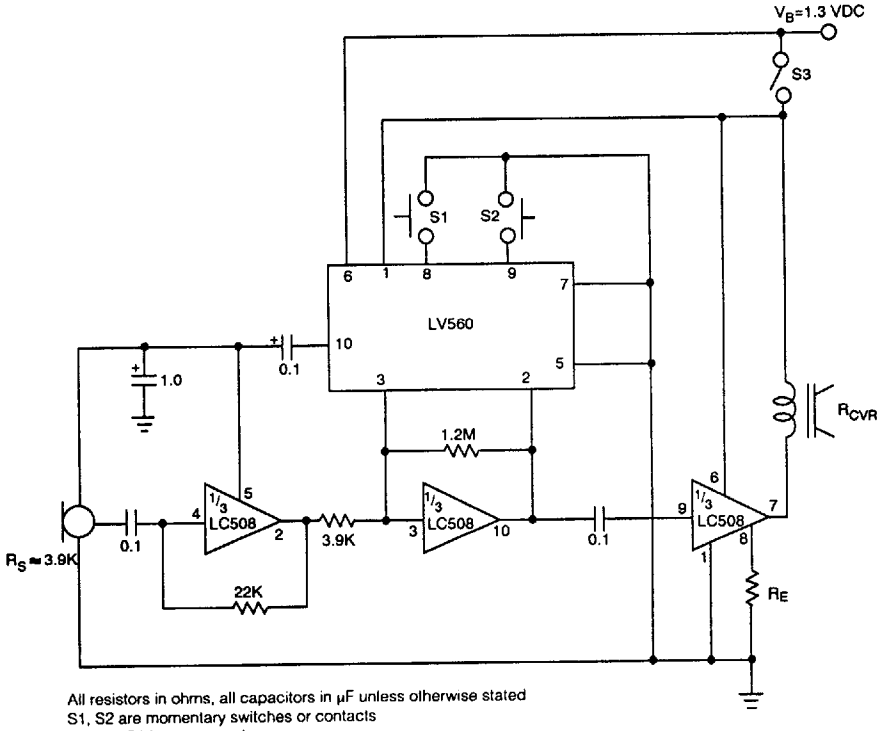


All resistors in ohms, all capacitors in μF unless otherwise stated
S1 can be a momentary SPST switch or a pair of contacts.
On initial power-up (insertion of the battery) the gain will be at a random setting

Fig. 2 Typical Hearing Aid Circuit



All resistors in ohms, all capacitors in μF unless otherwise stated
S1, S2 are momentary switches or contacts
Closing S1 increases gain
Closing S2 decreases gain

Fig. 3 Typical Hearing Aid Application

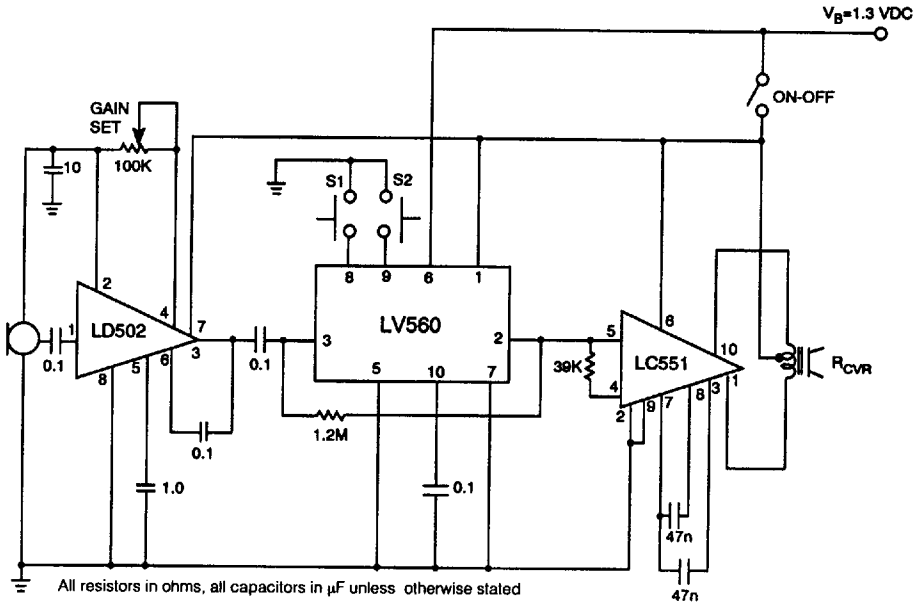


Fig. 4 LD502 / LV560 / LC551 Typical Application

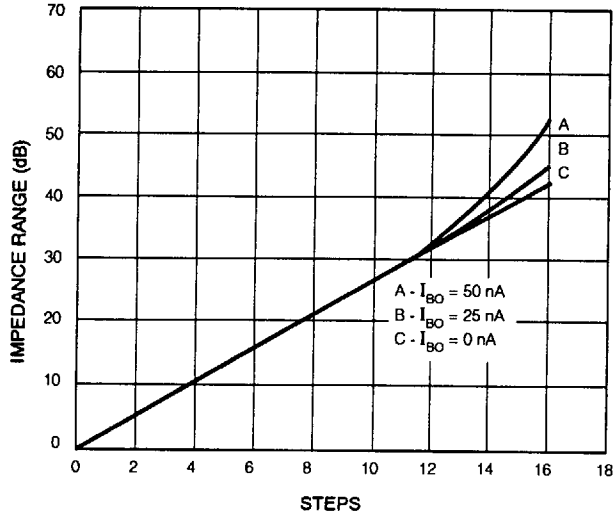
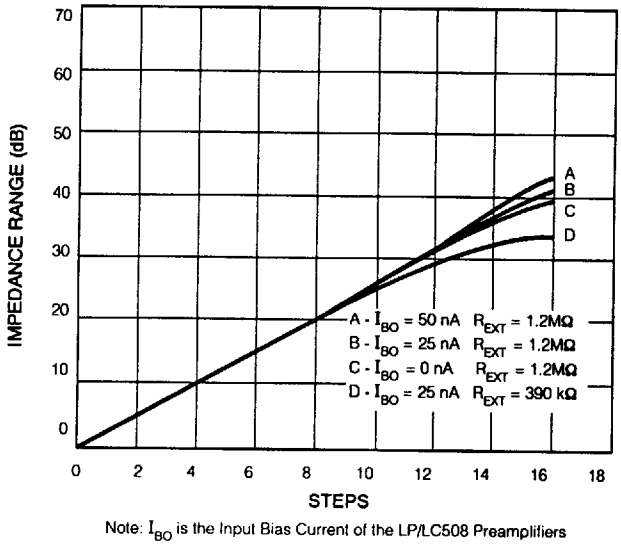


Fig. 5 Output Impedance Characteristics without External Shunt Resistor



Note: I_{BO} is the Input Bias Current of the LP/LC508 Preamplifiers

Fig. 6 Output Impedance Characteristics with R_{EXT} = 1.2 MΩ

DOCUMENT IDENTIFICATION

PRODUCT PROPOSAL
This data has been compiled for market investigation purposes only, and does not constitute an offer for sale.

PRELIMINARY
The product is in a development phase and specifications are subject to change without notice.

DATA SHEET
The product is in production. Gennum reserves the right to make changes at any time to improve reliability, function or design, in order to provide the best product possible.