

FEATURES

- 145 μ A typical current drain
- low noise and distortion
- 1.0 to 5 VDC operating range
- 2 independent preamplifiers
- Class A output stage
- variable transducer current
- 4 k Ω microphone decoupling resistor

STANDARD PACKAGING

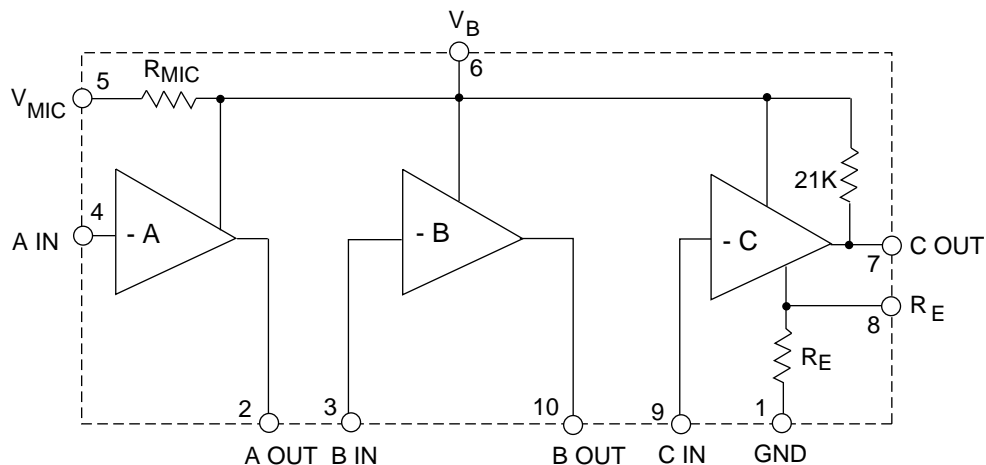
- 10 pin MICROpac
- 10 pin PLID[®]
- 10 pin SLT
- Chip (61 x 55 mils)
Au Bump

DESCRIPTION

The GC509 is a Class A amplifier utilizing Gennum's proprietary low voltage JFET technology. It consists of two single-ended, low noise inverting gain blocks, a Class A output stage, and an on-chip microphone decoupling resistor.

Blocks A and B typically have an open loop voltage gain of 56 dB, with the closed loop gain set by the ratio of the feedback resistor to the source impedance. It is recommended that the maximum closed loop gain be 20 dB lower than the open loop gain. All blocks of the device are internally bias compensated, preventing any DC current flow via external feedback resistors. Without this compensation, audible scratchiness would be present during changes in volume control settings.

The output stage of the GC509 is a Class A current drive. It has a fixed reference voltage of typically 55 mV at pin 8 of the device. The current that flows in the transducer is the ratio of the 55 mV reference voltage and the on-chip emitter resistor (R_E). To increase the bias current in the transducer, simply place an external R_E resistor from pin 8 to ground, thereby decreasing the equivalent emitter resistance and increasing the current.



All resistors in ohms, all capacitors in Farads unless otherwise stated

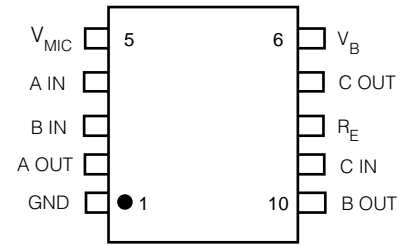
BLOCK DIAGRAM

ABSOLUTE MAXIMUM RATINGS

PARAMETER	VALUE / UNITS
Supply Voltage	5V DC
Power Dissipation	25 mW
Operating Temperature	-10° to + 40°C
Storage Temperature	-20° to + 70°C

CAUTION
CLASS 1 ESD SENSITIVITY

PIN CONNECTION



ELECTRICAL CHARACTERISTICS

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

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Amplifier Current	I_{AMP}		80	145	210	μA
Transducer Current	I_{TRANS}	$R_E = \infty$	200	275	350	μA
Maximum Transducer Current	$I_{TRANS(MAX)}$	$R_E = 0 \Omega$	2	-	-	mA
Input Bias Current	I_{BIAS}	$R_{FA} = 1M, R_{FB} = 1M$	-50	0	50	nA
Input Referred Noise	IRN	NFB 0.2 to 10kHz at 12dB/Oct	-	1	2	$\mu VRMS$
Harmonic Distortion	THD	S1 = b, $V_{OUT} = 500 mVRMS$	-	1	4	%
Voltage Gain	A_V	S1 = b, $V_{OUT} = 500 mVRMS$	70	73	76	dB
Stable with Battery Resistance Resistance (R_B) to:	Stability	$R_B = 22 \Omega$	-	-	22	Ω
Emitter Bias Voltage (Pin 8)	V_{RE}		-	55	-	mV
Microphone Resistance	R_{MIC}		3	4	5	k Ω
On Chip Emitter Resistor	R_E		-	200	-	Ω
Preamp Current Drive Capability	I_{OUT}		-	30	-	μA

All switches remain as shown in Test Circuit unless otherwise stated in CONDITIONScolumn.

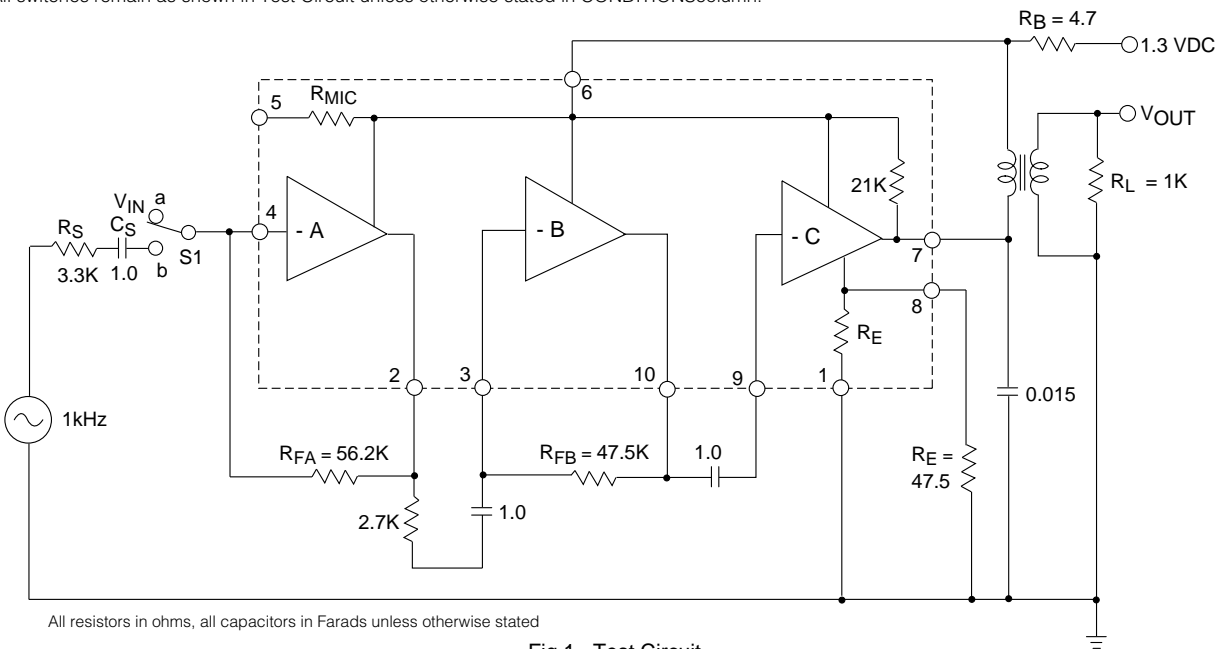


Fig.1 Test Circuit

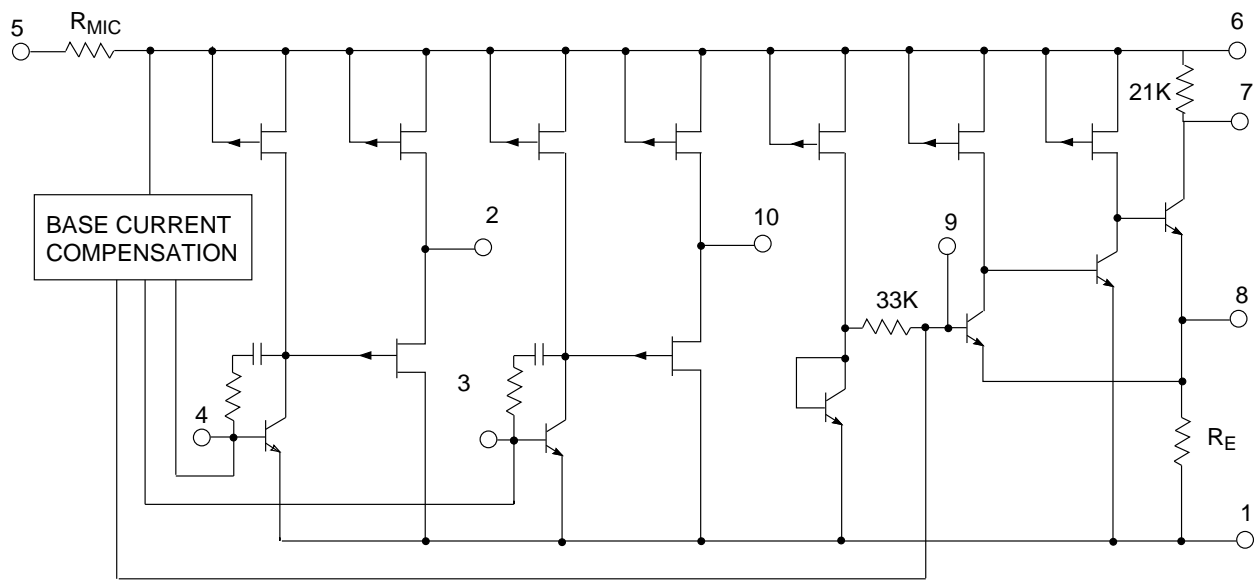
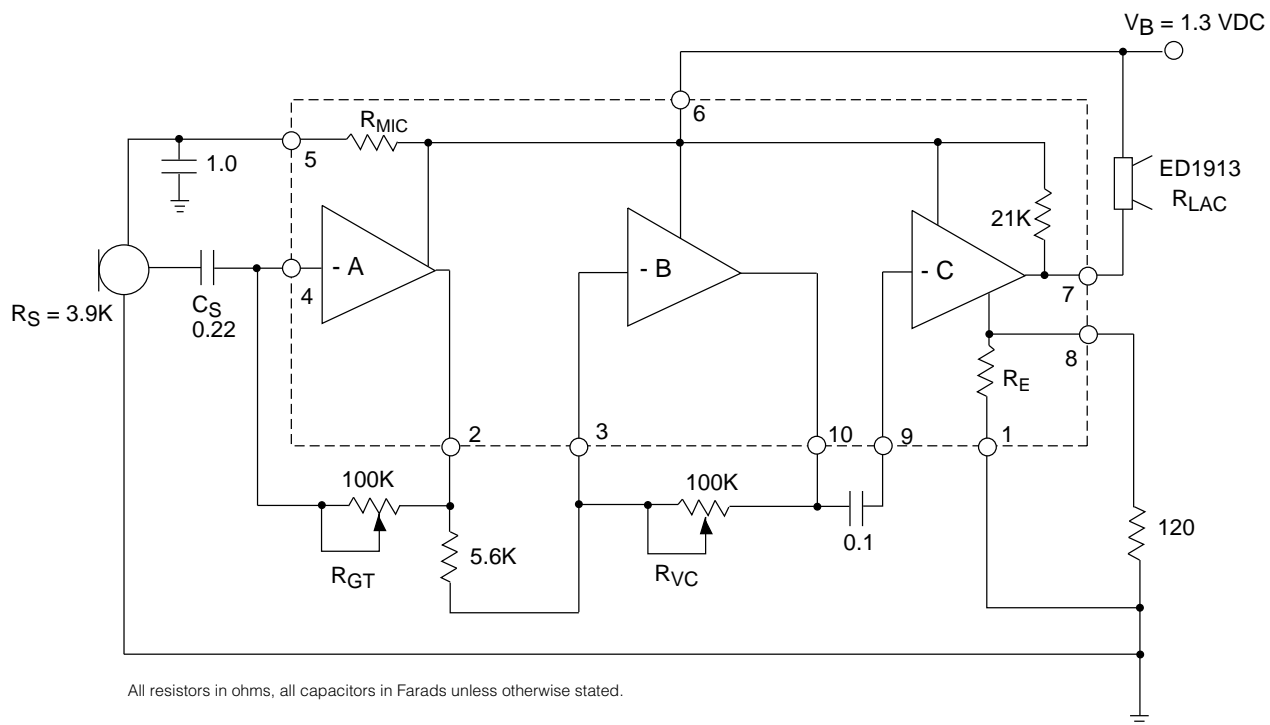


Fig. 2 Functional Schematic



$$\text{Gain of stage A} = 20 \text{ Log } 10 \frac{R_{GT}}{R_S}$$

$$\text{Gain of stage B} = 20 \text{ Log } 10 \frac{R_{VC}}{5.6K}$$

$$\text{Gain of stage C} = 20 \text{ Log } 10 \frac{R_{LAC}/21K}{R_E/120}$$

Fig. 3 Typical Hearing Aid Circuit

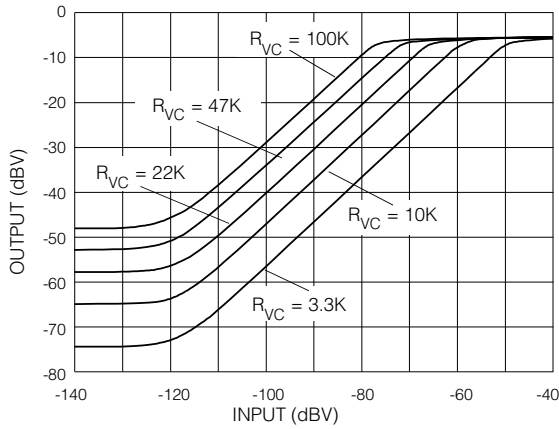


Fig. 4 I/O Curves at Various R_{vc} Settings

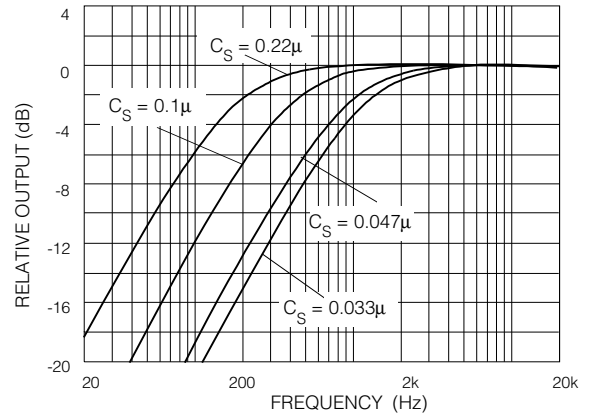


Fig. 5. Closed Loop Frequency Response with Various C_s Values

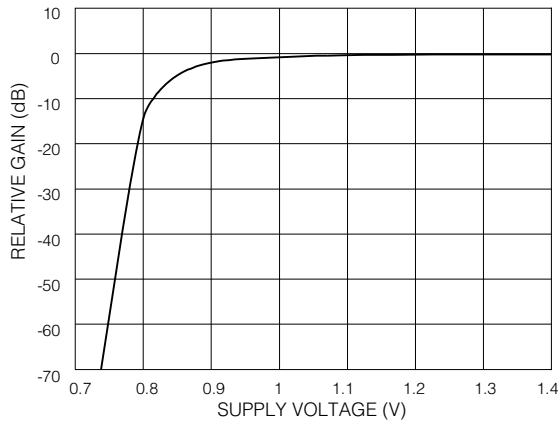


Fig. 6 Gain vs Supply Voltage

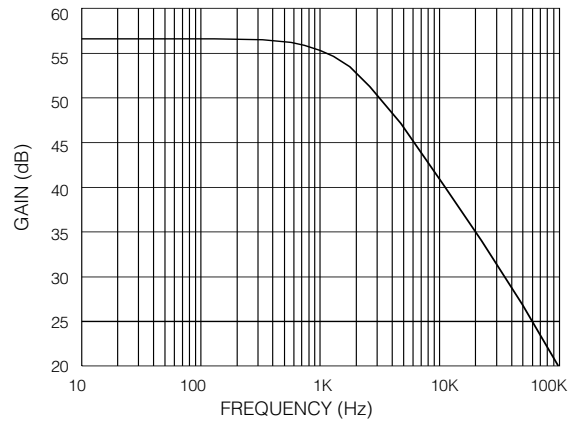


Fig. 7 Preamp Open Loop Frequency Response

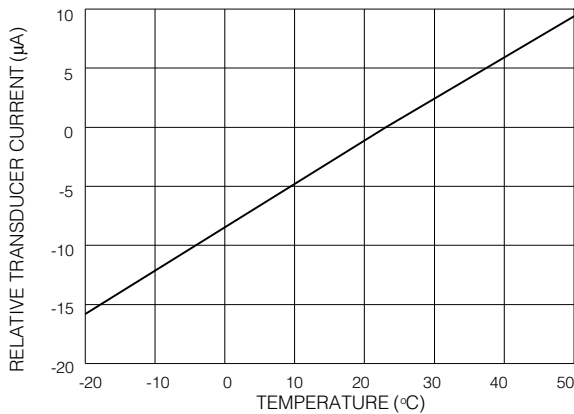


Fig. 8 Transducer Current vs Temperature

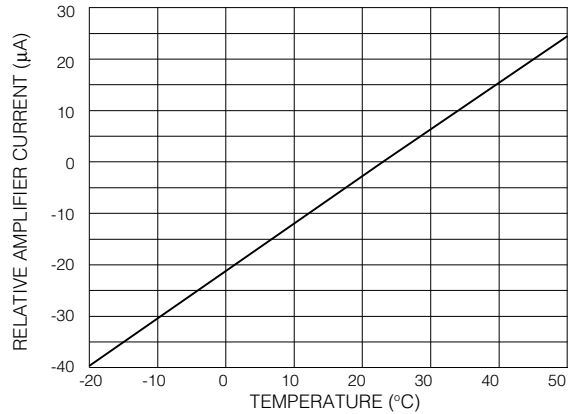


Fig. 9 Amplifier Current vs Temperature

REVISION NOTES

Changes to standard packaging.

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DOCUMENT IDENTIFICATION

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DATA SHEET

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