

## NTE823 Integrated Circuit Low Voltage Audio Amplifier

**Description:**

The NTE823 is an audio power amplifier in an 8-Lead DIP type package designed for use in low voltage consumer applications.

**Absolute Maximum Ratings:**

Supply Voltage,  $V_S$  ..... 15V  
 Power Dissipation,  $P_D$  ..... 660mW  
 Input Voltage,  $V_I$  .....  $\pm 0.4$  Volts  
 Storage Temperature Range,  $T_{stg}$  .....  $-65^\circ\text{C}$  to  $+150^\circ\text{C}$   
 Operating Temperature Range,  $T_{opr}$  .....  $0^\circ\text{C}$  to  $+70^\circ\text{C}$   
 Operating Junction Temperature,  $T_J$  .....  $+150^\circ\text{C}$   
 Lead Temperature (During Soldering, 10 sec),  $T_L$  .....  $+300^\circ\text{C}$

**Electrical Characteristics:** ( $T_A = +25^\circ\text{C}$ ,  $V_S = 6\text{V}$  unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Operating Supply Voltage	$V_S$		4	–	12	V
Quiescent Current	$I_{CC}$	$V_{IN} = 0$	–	4	8	mA
Power Output	$P_O$	$R_L = 8\Omega$	250	325	–	mW
Voltage Gain	$A_V$	$f = 1\text{kHz}$ , $10\mu\text{f}$ from Pin1 to Pin8	–	26	–	dB
Bandwidth	BW	Pin1 and Pin8 Open	–	300	–	kHz
Total Harmonic Distortion	THD	$R_L = 8\Omega$ , $P_O = 125\text{mW}$ , $f = 1\text{kHz}$ , Pin1 and Pin8 Open	–	0.2	–	%
Power Supply Rejection Ratio	PSRR	$f = 1\text{kHz}$ , $C_{bypass} = 10\mu\text{f}$ , Pin1 and Pin8 Open	250	–	–	dB
Output Resistance	$Z_O$		–	50	–	k $\Omega$
Output Bias Current		Pin2 and Pin3 Open	–	250	–	nA

### **Application Hints:**

To make the NTE823 a more versatile amplifier, two pins (Pin1 and Pin8) are provided for gain control. With Pin1 and Pin8 open the 1.35k $\Omega$  resistor sets the gain at 20 (26dB). If a capacitor is put from Pin1 to Pin8, bypassing the 1.35k $\Omega$  resistor, the gain will go up to 200 (46dB). If a resistor is placed in series with the capacitor, the gain can be set to any value from 20 to 200. Gain control can also be done by capacitively coupling a resistor (or FET) from Pin1 to GND.

Additional external components can be placed in parallel with the internal feedback resistors to tailor the gain and frequency response for individual applications. For example, we can compensate poor speaker bass response by frequency shaping the feedback path. This is done with a series RC from Pin1 to Pin5 (paralleling the internal 15k $\Omega$  resistor). For 6dB effective bass boost:  $R \cong 15\text{k}\Omega$ , the lowest value for good stable operation is  $R = 10\text{k}\Omega$  if Pin8 is open. If Pin1 and Pin8 are bypassed then R as low as 2k $\Omega$  can be used. This restriction is because the amplifier is only compensated for closed-loop gains than 9V/V.

### **Input Biasing:**

Pin2 and Pin3 of the NTE823 are biased to GND with a 50k $\Omega$  resistor. The base current of the input transistors is about 250nA, so the inputs are at about 12.5mV when left open. If the DC source resistance driving the NTE823 is higher than 250k $\Omega$  it will contribute very little additional offset (about 2.5mV at the input, 50mV at the output). If the DC source resistance is less than 10k $\Omega$ , then shorting the unused input to GND will keep the offset low (about 2.5mV at the input, 50mV at the output). For DC source resistances between these values we can eliminate excess offset by putting a resistor from the unused input to ground, equal in value to the DC source resistance. Of course all offset problems are eliminated if the input is capacitively coupled.

When using the NTE823 with higher gains (bypassing the 1.35k $\Omega$  resistor between Pin1 and Pin8) it is necessary to bypass the unused input, preventing degradation of gain and possible instabilities. This is done with a 0.1 $\mu\text{F}$  capacitor or a short to GND depending on the DC source resistance on the driven input.



