

## NTE825 Integrated Circuit Battery Operated Audio Amp

**Description:**

The NTE825 amplifier is an integrated circuit in a 14-Lead DIP type package optimized for 6V, 7.5V, and 9V operation into low impedance loads. The gain is internally set at 20 to keep the external part count low, but the addition of an external resistor and capacitor between Pin2 and Pin6 will increase the gain to any value up to 200. The inputs are ground referenced while the output is automatically biased to one half the supply voltage.

**Features:**

- Battery Operation
- 1W Output Power
- Excellent Supply Rejection
- Low Distortion

**Applications:**

- AM-FM Radio Amplifiers
- Portable Tape Player Amplifiers
- TV Sound Systems

**Absolute Maximum Ratings:** (Note 1)

Supply Voltage, $V_S$ .....	10V
Power Dissipation, $P_D$ .....	8.3W
Input Voltage, $V_I$ .....	$\pm 0.4V$
Storage Temperature Range, $T_{stg}$ .....	$-65^\circ$ to $+150^\circ C$
Operating Temperature Range, $T_{opr}$ .....	$0^\circ$ to $+70^\circ C$
Junction Temperature, $T_J$ .....	$+150^\circ C$
Lead Temperature (During Soldering, 10 seconds), $T_L$ .....	$+300^\circ C$

Note 1. Pins 3, 4, 5, 10, 11, 12 at  $T_C = +25^\circ C$ . Derate at  $15^\circ C/W$  above  $T_C = +25^\circ C$ .

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Operating Supply Voltage	$V_S$		4	–	9	V
Quiescent Current	$I_Q$	$V_S = 6\text{V}$ , $R_L = 4\Omega$ , THD = 10%, Note 2	–	10	20	mA
Output Power	$P_{OUT}$	$V_S = 6\text{V}$ , $R_L = 4\Omega$ , THD = 10%, Note 2	0.8	1.0	–	W
Voltage Gain	$A_V$	$V_S = 6\text{V}$ , $f = 1\text{kHz}$ $10\mu\text{F}$ from Pin2 to Pin6	23	26	30	dB
Bandwidth	BW	$V_S = 6\text{V}$ , Pin2 and Pin6 Open	–	46	–	kHz
Total Harmonic Distortion	THD	$V_S = 6\text{V}$ , $R_L = 4\Omega$ , $P_{OUT} = 500\text{mW}$ , $f = 1\text{kHz}$ , Pin2 and Pin6 Open	–	0.2	1	%
Power Supply Rejection Ratio	PSRR	$V_S = 6\text{V}$ , $f = 1\text{kHz}$ , $C_{BYPASS} = 10\mu\text{F}$ , Pin2 and Pin6 Open, Referred to Output, Note 3	–	50	–	dB
Input Resistance	$R_{IN}$		10	50	–	$\text{k}\Omega$
Input Bias Current	$I_{BIAS}$	$V_S = 6\text{V}$ , Pins 7 and 8 Open	–	250	–	mA

Note 2. If oscillation exists under some load conditions, add a  $2.7\Omega$  and  $0.05\mu\text{F}$  series network from Pin13 to GND.

Note 3. If load and bypass capacitor are returned to  $V_S$  rather than GND, PSRR is typically 30dB.

**Application Hints:****Gain Control**

To make the NTE825 a more versatile amplifier, two pins (Pin2 and Pin6) are provided for gain control. With Pin2 and Pin6 open, the gain is 20 (26dB). If a capacitor is put from Pin2 to Pin6, 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. A  $10\mu\text{F}$  Electrolytic with positive to Pin6 is a usual value.

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, a series RC from Pin6 to Pin13 (paralleling the internal  $15\text{k}\Omega$  resistor) yields 6dB effective bass boost if  $R \cong 15\text{k}\Omega$  and Pin2 is open. If Pin2 and Pin6 are bypassed, then R as low as  $2\text{k}\Omega$  can be used. This restriction is because the amplifier is only compensated for closed-loop gains greater than  $9\text{V/V}$ .

**Input Biasing**

When using NTE825 with higher gains (bypassing the internal  $1.35\text{k}\Omega$  resistor between Pin2 and Pin6) 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.

### Pin Connection Diagram

