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NTE7000 Integrated Circuit 5W Audio Amplifier with Muting

Description:

The NTE7000 is a monolithic integrated circuit in a 16-Lead DIP type package intended for use as a low frequency power amplifier in a wide range of applications in radio and TV sets.

Features:

- Muting Facility
- Protection Against Chip Over Temperature
- Very Low Noise
- High Supply Voltage Rejection
- Low “Switch-On” Noise
- Voltage Range: 4V to 30V

Absolute Maximum Ratings:

Supply Voltage, V_S	30V
Output Peak Current, I_O	
Non-Repetitive	3A
Repetitive	2.5A
Input Voltage, V_I	0 to $+V_S$ V
Differential Input Voltage, V_{I1}	$\pm 7V$
Muting Threshold Voltage, V_{11}	V_S V
Power Dissipation, P_{tot}	
$T_A = +80^\circ C$	1W
$T_C = +60^\circ C$	6W
Junction Temperature Range, T_j	-40° to $+150^\circ C$
Storage Temperature Range, T_{stg}	-40° to $+150^\circ C$

Electrical Characteristics: ($T_A = +25^\circ C$, $R_{th}(\text{heatsink}) = 20^\circ C/W$, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Supply Voltage	V_S		4	–	30	V
Quiescent Output Voltage	V_O	$V_S = 4V$	1.6	2.1	2.5	V
		$V_S = 14V$	6.7	7.2	7.8	V
		$V_S = 30V$	14.4	15.5	16.8	V

Electrical Characteristics (Cont'd): ($T_A = +25^\circ\text{C}$, $R_{th}(\text{heatsink}) = 20^\circ\text{C/W}$, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Quiescent Drain Current	I_d	$V_S = 4V$	–	15	–	mA
		$V_S = 14V$	–	17	–	mA
		$V_S = 30V$	–	21	35	mA
Output Stage Saturation Voltage	V_{CEsat}	$I_C = 1A$	–	0.5	–	V
		$I_C = 2A$	–	1	–	V
Output Power	P_O	$d = 10\%$, $f = 1\text{kHz}$ $V_S = 9V, R_L = 4\Omega$, Note 1	2.2	2.5	–	W
		$V_S = 14V, R_L = 4\Omega$	5	5.5	–	W
		$V_S = 18V, R_L = 8\Omega$	5	5.5	–	W
		$V_S = 24V, R_L = 16\Omega$	4.5	5.3	–	W
Harmonic Distortion	d	$f = 1\text{kHz}$ $V_S = 9V, R_L = 4\Omega$, $P_O = 50\text{mW to } 1.5W$	–	0.1	–	%
		$V_S = 14V, R_L = 4\Omega$, $P_O = 50\text{mW to } 3W$	–	0.1	–	%
		$V_S = 18V, R_L = 8\Omega$, $P_O = 50\text{mW to } 3W$	–	0.1	–	%
		$V_S = 24V, R_L = 16\Omega$, $P_O = 50\text{mW to } 3W$	–	0.1	–	%
Input Sensitivity	V_i	$f = 1\text{kHz}$ $V_S=9V, R_L=4\Omega$, $P_O=2.5W$	–	37	–	mV
		$V_S=14V, R_L=4\Omega$, $P_O=5.5W$	–	49	–	mV
		$V_S=18V, R_L=8\Omega$, $P_O=5.5W$	–	73	–	mV
		$V_S=24V, R_L=16\Omega$, $P_O=5.3W$	–	100	–	mV
Input Saturation Voltage (rms)	V_i	$V_S = 9V$	0.8	–	–	V
		$V_S = 14V$	1.3	–	–	V
		$V_S = 18V$	1.8	–	–	V
		$V_S = 24V$	2.4	–	–	V
Input Resistance (Pin8)	R_i	$f = 1\text{kHz}$	60	100	–	K Ω

Note 1. With an external resistor of 100 Ω between Pin3 and + V_S .

Electrical Characteristics (Cont'd): ($T_A = +25^\circ\text{C}$, $R_{th}(\text{heatsink}) = 20^\circ\text{C/W}$, unless otherwise specified)

Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit	
Drain Current	I_d	$f = 1\text{kHz}$	$V_S=9\text{V}$, $R_L=4\Omega$, $P_O=2.5\text{W}$	–	380	–	mA	
			$V_S=14\text{V}$, $R_L=4\Omega$, $P_O=5.6\text{W}$	–	550	–	mA	
			$V_S=18\text{V}$, $R_L=8\Omega$, $P_O=5.5\text{W}$	–	410	–	mA	
			$V_S=24\text{V}$, $R_L=16\Omega$, $P_O=5.3\text{W}$	–	295	–	mA	
Efficiency	η	$f = 1\text{kHz}$	$V_S=9\text{V}$, $R_L=4\Omega$, $P_O=2.5\text{W}$	–	73	–	%	
			$V_S=14\text{V}$, $R_L=4\Omega$, $P_O=5.5\text{W}$	–	71	–	%	
			$V_S=18\text{V}$, $R_L=8\Omega$, $P_O=5.6\text{W}$	–	74	–	%	
			$V_S=24\text{V}$, $R_L=16\Omega$, $P_O=5.3\text{W}$	–	75	–	%	
Small Signal Bandwidth (–3dB)	BW	$V_S = 14\text{V}$, $R_L = 4\Omega$, $P_O = 1\text{W}$		40 to 40,000		Hz		
Voltage Gain (Open Loop)	G_V	$V_S = 14\text{V}$, $f = 1\text{kHz}$		–	75	–	dB	
Voltage Gain (Closed Loop)	G_V	$V_S = 14\text{V}$, $R_L = 4\Omega$, $f = 1\text{kHz}$, $P_O = 1\text{W}$		39.5	40.0	40.5	dB	
Total Noise Input	e_N	$R_g = 50\Omega$		–	1.2	–	μV	
		$R_g = 1\text{k}\Omega$		–	1.3	–		
		$R_g = 10\text{k}\Omega$		–	1.5	4.0		
		Note 2	$R_g = 50\Omega$		–	2.0		–
			$R_g = 1\text{k}\Omega$		–	2.0		–
			$R_g = 10\text{k}\Omega$		–	2.2		5.0
Signal to Noise Ratio	S/N	$V_S = 14\text{V}$, $P_O = 5.5\text{W}$, $R_L = 4\Omega$	$R_g = 10\text{k}\Omega$	–	90	–	dB	
			$R_g = 0$	–	92	–		
			$R_g = 10\text{k}\Omega$, Note 2	–	87	–		
			$R_g = 0$, Note 2	–	87	–		
Supply Voltage Rejection	SVR	$V_S = 18\text{V}$, $R_L = 8\Omega$, $R_G = 10\text{k}\Omega$, $f_{\text{ripple}} = 100\text{Hz}$, $V_{\text{ripple}} = 0.5\text{V}_{\text{rms}}$		40	50	–	dB	
Thermal Shut-Down Case Temperature	T_{sd}	$P_{\text{tot}} = 2.5\text{W}$		–	115	–	$^\circ\text{C}$	

Note 2. Filter with noise bandwidth: 22Hz to 22kHz.

Muting Function:

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Muting-Off Threshold Voltage (Pin4)	$V_{T(OFF)}$		1.9	-	4.7	V
Muting-On Threshold Voltage (Pin4)	$V_{T(ON)}$		0	-	1.3	V
			6.2	-	V_S	
Input Resistance (Pin5)	R_5	Muting Off	80	200	-	$k\Omega$
		Muting On	-	10	30	Ω
Input Resistance (Pin4)	R_4		150	-	-	$k\Omega$
Muting Attenuation	A_T	$R_g + R_1 = 10k\Omega$	50	60	-	dB

Pin Connection Diagram

