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## NTE871 Integrated Circuit Wideband High Speed Operational Amp

### **Description:**

The NTE871 is a large-signal wideband, high speed operational amplifier which has a unity gain crossover frequency ( $f_T$ ) of approximately 38MHz and an open-loop, 3dB corner frequency of approximately 110kHz. It can operate at a total supply voltage of from 14 to 36 volts ( $\pm 7$  to  $\pm 18$  volts when using split supplies) and can provide at least 18V<sub>P-P</sub> and 30mA<sub>P-P</sub> at the output when operating from  $\pm 15$  volt supplies. The NTE871 can be compensated with a single external capacitor and has DC offset adjust terminals for those applications requiring offset null.

The NTE871 circuit contains both bipolar and PMOS transistors on a single monolithic chip and is supplied in a 8-Lead TO5 package.

### **Features:**

- High Open-Loop Gain at Video Frequencies: 42dB Typ. at 1MHz
- High Unity-Gain Crossover Frequency:  $f_T = 38\text{MHz}$  Typ.
- Wide Power Bandwidth;  
     $V_O = 18\text{V}_{P-P}$ : 1.2MHz Typ.
- High Slew Rate;  
    20dB Amplifier: 70V/ $\mu\text{s}$  Typ.  
    Unity-Gain Amplifier: 25V/ $\mu\text{s}$  Typ.
- Fast Setting Time: 0.6 $\mu\text{s}$  Typ.
- High Output Current:  $\pm 15\text{mA}$  Min.
- Single Capacitor Compensation
- Offset Null Terminals

### **Absolute Maximum Ratings:**

Supply Voltage (Between V+ and V- terminals)	36V
Differential Input Voltage	$\pm 12\text{V}$
Input Voltage to GND (Note 1)	$\pm 15\text{V}$
Offset Terminal to V- Terminal Voltage	$\pm 0.5\text{V}$
Output Current (Note 2)	50mA
Device Dissipation (Up to $T_A = +55^\circ\text{C}$ ), $P_D$	630mW
Derate Above $T_A = +55^\circ\text{C}$	6.67mW/ $^\circ\text{C}$
Operating Temperature Range, $T_{opr}$	$-55^\circ$ to $+125^\circ\text{C}$
Storage Temperature range, $T_{stg}$	$-65^\circ$ to $+150^\circ\text{C}$
Lead Temperature (During Soldering), $T_L$	
At distance 1/16" $\pm$ 1/32" (1.59 $\pm$ 0.79mm) from case for 10s max	$+265^\circ\text{C}$

Note 1. If the supply voltage is less than  $\pm 15$  volts, the maximum input voltage to GND is equal to the supply voltage.

Note 2. The NTE871 does not contain circuitry to protect against short circuits in the output.



**Electrical Characteristics:** ( $T_A = +25^\circ\text{C}$ ,  $V_{CC} = \pm 15\text{V}$  unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Static</b>						
Input Offset Voltage	$V_{IO}$	$V_O = 0 \pm 0.1\text{V}$	–	$\pm 1$	$\pm 5$	mV
Input Bias Current	$I_{IB}$	$V_O = 0 \pm 0.1\text{V}$	–	0.7	2.0	$\mu\text{A}$
Input Offset Current	$I_{IO}$	$V_O = 0 \pm 0.1\text{V}$	–	$\pm 0.05$	$\pm 0.4$	$\mu\text{A}$
Low-Frequency Open-Loop Voltage Gain	$A_{OL}$	$V_O = \pm 1\text{V Peak}$ , $F = 1\text{kHz}$ , Note 3	56	61	–	dB
Common-Mode Input Voltage Range	$V_{ICR}$	$\text{CMRR} \geq 76\text{dB}$	$\pm 12$	+14 –13	–	V
Common-Mode Rejection Ratio	CMRR	$V_I$ Common Mode = $\pm 12\text{V}$	76	90	–	dB
Maximum Output Voltage: Positive	$V_{OM+}$	Differential Input Voltage = $0 \pm 0.1\text{V}$ $R_L = 2\text{k}\Omega$	+9	+11	–	V
Negative	$V_{OM-}$		–9	–11	–	
Maximum Output Current: Positive	$V_{OM+}$	Differential Input Voltage = $0 \pm 0.1\text{V}$ $R_L = 250\text{k}\Omega$	+15	+30	–	mA
Negative	$V_{OM-}$		–15	–30	–	
Supply Current	$I_+$	$V_O = 0 \pm 0.1\text{V}$ , $R_L \geq 10\text{k}\Omega$	–	8.5	10.5	mA
Power Supply Rejection Ratio	PSRR	$\Delta V_+ = \pm 1\text{V}$ , $\Delta V_- = \pm 1\text{V}$	60	70	–	dB
<b>Dynamic</b>						
Unity-Gain Crossover Frequency	$f_T$	$C_C = 0$ , $V_O = 0.3V_{P-P}$	–	38	–	MHz
1MHz Open-Loop Voltage Gain	$A_{OL}$	$f = 1\text{MHz}$ , $C_C = 0$ , $V_O = 10V_{P-P}$	36	42	–	dB
Slew Rate 20dB Amplifier	SR	$A_V = 10$ , $C_C = 0$ , $V_I = 1\text{V}$ (Pulse)	50	70	–	$\text{V}/\mu\text{s}$
Follower Mode		$A_V = 1$ , $C_C = 10\text{pF}$ , $V_I = 10\text{V}$ (Pulse)	–	25	–	
Power Bandwidth 20dB Amplifier	PBW (Note 4)	$A_V = 10$ , $C_C = 0$ , $V_O = 10V_{P-P}$	0.8	1.2	–	MHz
Follower Mode		$A_V = 1$ , $C_C = 10\text{pF}$ , $V_O = 10V_{P-P}$	–	0.4	–	
Open-Loop Differential Impedance	$Z_I$	$F = 1\text{MHz}$	–	30	–	$\text{k}\Omega$
Open-Loop Output Impedance	$Z_O$	$F = 1\text{MHz}$	–	110	–	$\Omega$
Wideband Noise Voltage Referred to Input	$e_N(\text{Total})$	$\text{BW} = 1\text{MHz}$ , $R_S = 1\text{k}\Omega$	–	8	–	$\mu\text{V}_{\text{RMS}}$
Setting Time (To Within $\pm 50\text{mV}$ of 9V Output Swing)	$t_s$	$R_L = 2\text{k}\Omega$ , $C_L = 20\text{pF}$	–	0.6	–	$\mu\text{s}$

Note 3. Low-frequency dynamic characteristics.

Note 4. Power Bandwidth = 
$$\frac{\text{Slew Rate}}{\pi V_O (\text{P-P})}$$

**Pin Connection Diagram**  
(Top View)

