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## NTE778A & NTE778SM Integrated Circuit Dual Operational Amplifier

### **Description:**

The NTE778A (8-Lead DIP) and NTE778SM (SOIC-8 Surface Mount) are linear integrated circuits designed for use as a summing amplifier, integrator, or amplifier with operating characteristics as a function of the external feedback components.

### **Features:**

- No Frequency Compensation Required
- Short-Circuit Protection
- Wide Common-Mode and Differential Voltage Ranges
- Low Power Consumption
- No Latch Up

### **Absolute Maximum Ratings:** ( $T_A = +25^\circ\text{C}$ unless otherwise specified)

Power Supply Voltage, $V_{CC}, V_{EE}$ .....	$\pm 18\text{V}$
Input Differential Voltage, $V_{ID}$ .....	$\pm 30\text{V}$
Input Common Mode Voltage (Note 1), $V_{ICM}$ .....	$\pm 15\text{V}$
Output Short-Circuit Duration (Note 2), $t_S$ .....	Continuous
Operating Junction Temperature, $T_J$ .....	$+150^\circ\text{C}$
Operating Ambient Temperature Range, $T_A$ .....	$0^\circ$ to $+70^\circ\text{C}$
Storage Temperature Range, $T_{stg}$ .....	$-55^\circ$ to $+125^\circ\text{C}$

Note 1. For supply voltages less than  $\pm 15\text{V}$ , the absolute maximum input voltage is equal to the supply voltage.

Note 2. Supply voltage equal to or less than  $\pm 15\text{V}$ .

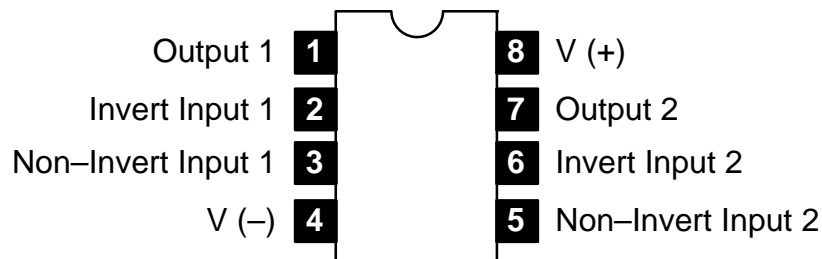
### **Electrical Characteristics:** ( $T_A = 0^\circ$ to $+70^\circ\text{C}$ , $V_{CC} = +15\text{V}$ , $V_{EE} = -15\text{V}$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input Offset Voltage	$V_{IO}$	$R_S \leq 10\text{k}\Omega$	-	-	7.5	V
		$R_S \leq 10\text{k}\Omega, T_A = +25^\circ\text{C}$	-	2.0	6.0	V
Input Offset Current	$I_{IO}$		-	-	300	nA
		$T_A = +25^\circ\text{C}$	-	20	200	nA
Input Bias Current	$I_{IB}$		-	-	800	nA
		$T_A = +25^\circ\text{C}$	-	80	500	nA

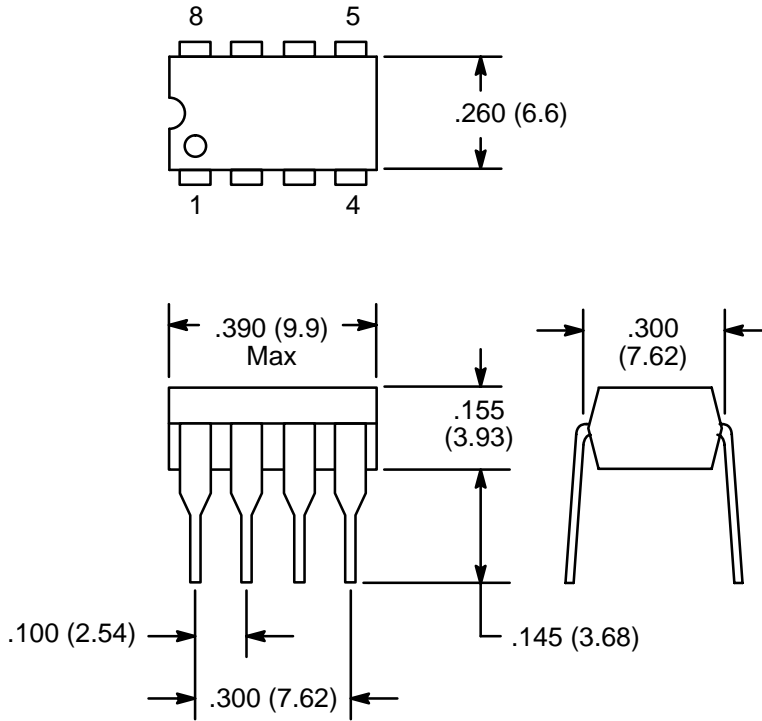
**Electrical Characteristics (Cont'd):** ( $T_A = 0^\circ$  to  $+70^\circ\text{C}$ ,  $V_{CC} = +15\text{V}$ ,  $V_{EE} = -15\text{V}$  unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input Capacitance	$C_i$	$T_A = +25^\circ\text{C}$	–	1.4	–	pF
Common–Mode Input Voltage Range	$V_{ICR}$	$T_A = +25^\circ\text{C}$	$\pm 12$	$\pm 13$	–	V
Large Signal Voltage Gain	$A_V$	$V_O = \pm 10\text{V}$ , $R_L = 2\text{k}\Omega$	15	–	–	V/mV
		$V_O = \pm 10\text{V}$ , $R_L = 2\text{k}\Omega$ , $T_A = +25^\circ\text{C}$	20	200	–	V/mV
Output Resistance	$t_o$	$T_A = +25^\circ\text{C}$	–	75	–	$\Omega$
Common–Mode Rejection Ratio	CMRR	$R_S \leq 10\text{k}\Omega$ , $T_A = +25^\circ\text{C}$	70	90	–	dB
Supply Voltage Rejection Ratio	PSRR	$R_S \leq 10\text{k}\Omega$ , $T_A = +25^\circ\text{C}$	–	30	150	$\mu\text{V/V}$
Output Voltage Swing	$V_O$	$R_S \geq 10\text{k}\Omega$	$\pm 12$	$\pm 14$	–	V
		$R_S \geq 10\text{k}\Omega$ , $T_A = +25^\circ\text{C}$	$\pm 12$	$\pm 14$	–	V
		$R_S \geq 2\text{k}\Omega$	$\pm 10$	$\pm 13$	–	V
		$R_S \geq 2\text{k}\Omega$ , $T_A = +25^\circ\text{C}$	$\pm 10$	$\pm 13$	–	V
Output Short–Circuit Current	$I_{os}$	$T_A = +25^\circ\text{C}$	10	20	40	mA
Supply Currents (Both Amplifiers)	$I_D$	$T_A = +25^\circ\text{C}$	–	2.3	5.6	mA
Power Consumption (Both Amplifiers)	$P_C$	$T_A = +25^\circ\text{C}$	–	70	170	mW
<b>Transient Response</b> (Unity Gain, $T_A = +25^\circ\text{C}$ )						
Rise Time	$t_{TLH}$	$V_I = 20\text{mV}$ , $R_L \geq 2\text{k}\Omega$ , $C_L \leq 100\text{pF}$	–	0.3	–	$\mu\text{s}$
Overshoot	os		–	15	–	%
Slew Rate NTE778A	SR	$V_I = 10\text{V}$ , $R_L \geq 2\text{k}\Omega$ , $C_L \leq 100\text{pF}$	–	0.5	–	V/ $\mu\text{s}$
			NTE778SM	1.0	1.6	–

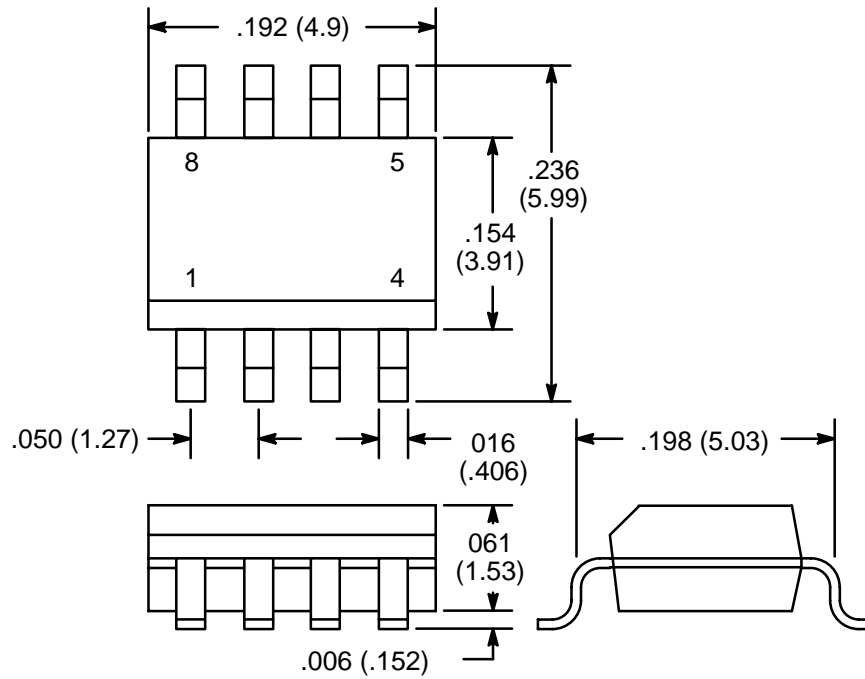
**Pin Connection Diagram**



### NTE778A



### NTE778SM



NOTE: Pin1 on Beveled Edge