



ELECTRONICS, INC.
 44 FARRAND STREET
 BLOOMFIELD, NJ 07003
 (973) 748-5089
<http://www.nteinc.com>

NTE944 & NTE944M Integrated Circuit Programmable Operational Amplifier

Description:

The NTE944 (8-Lead Metal Can) and NTE944M (8-Lead MiniDIP) are extremely versatile programmable monolithic operational amplifiers. A single external master bias current setting resistor programs the input bias current, input offset current, quiescent power consumption, slew rate, input noise, and the gain-bandwidth product. These devices are truly general purpose operational amplifiers.

Features:

- $\pm 1V$ to $\pm 18V$ power supply operation
- 3nA input offset current
- Standby power consumption as low as 500nW
- No frequency compensation required
- Programmable electrical characteristics
- Offset voltage nulling capability
- Can be powered by two flashlight batteries
- Short circuit protection

Absolute Maximum Ratings:

Supply Voltage	$\pm 18V$
Power Dissipation (Note 1)	500mW
Differential Input Voltage	$\pm 30V$
Input Voltage (Note 2)	$\pm 15V$
I_{SET} Current	150 μA
Output Short Circuit Duration	Indefinite
Operating Temperature Range	$0^{\circ} \leq T_A \leq +70^{\circ}C$
Storage Temperature Range	-65° to $+150^{\circ}C$
Lead Temperature (Soldering, 10sec)	$+300^{\circ}C$

Note 1. The maximum junction temperature of the NTE944 is 100°C. For operating at elevated temperatures, the NTE944 must be derated based on a thermal resistance of 150°C/W junction to ambient, or 45°C/W junction to case. The thermal resistance of the NTE944M is +125°C/W.

Note 2. For supply voltages less than $\pm 15V$, the absolute maximum input voltage is equal to the supply voltage.

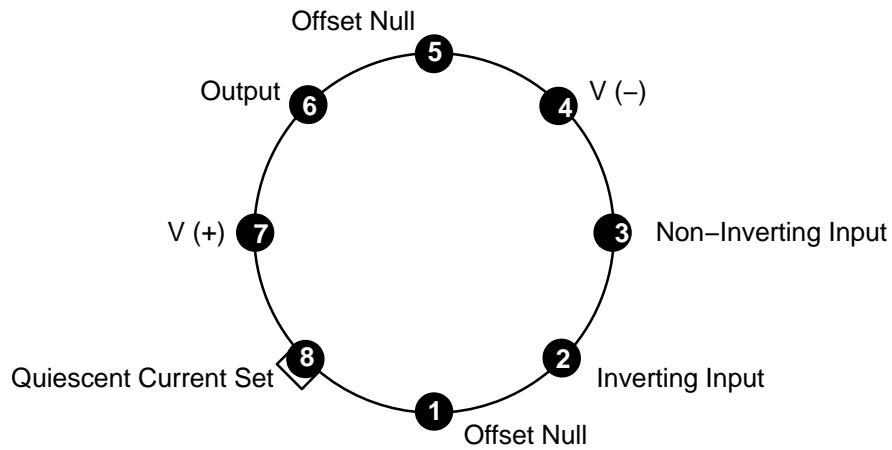
Electrical Characteristics: ($0^{\circ} \leq T_A \leq +70^{\circ}\text{C}$, unless otherwise specified)

Parameter	Test Conditions		$I_{SET} = 1\mu\text{A}$		$I_{SET} = 10\mu\text{A}$		Unit
			Min	Max	Min	Max	
V_{OS}	$V_S = \pm 1.5\text{V}$	$T_A = +25^{\circ}\text{C}, R_S \leq 100\text{k}\Omega$	-	5	-	6	mV
	$V_S = \pm 15\text{V}$		-	5	-	6	mV
	$V_S = \pm 1.5\text{V}$	$R_S \leq 10\text{k}\Omega$	-	6.5	-	7.5	mV
	$V_S = \pm 15\text{V}$		-	6.5	-	7.5	mV
I_{OS}	$V_S = \pm 1.5\text{V}$	$T_A = +25^{\circ}\text{C}$	-	6	-	20	nA
	$V_S = \pm 15\text{V}$		-	6	-	20	nA
	$V_S = \pm 1.5\text{V}$		-	8	-	25	nA
	$V_S = \pm 15\text{V}$		-	8	-	25	nA
I_{bias}	$V_S = \pm 1.5\text{V}$	$T_A = +25^{\circ}\text{C}$	-	10	-	75	nA
	$V_S = \pm 15\text{V}$		-	10	-	75	nA
	$V_S = \pm 1.5\text{V}$		-	10	-	80	nA
	$V_S = \pm 15\text{V}$		-	10	-	80	nA
Large Signal Voltage Gain	$V_S = \pm 1.5\text{V}$	$T_A = +25^{\circ}\text{C}, R_L \leq 100\text{k}\Omega$	25k	-	-	-	
		$V_O = \pm 0.6\text{V}, R_L \leq 10\text{k}\Omega$	-	-	25k	-	
	$V_S = \pm 15\text{V}$	$T_A = +25^{\circ}\text{C}, R_L \leq 100\text{k}\Omega$	60k	-	-	-	
		$V_O = \pm 10\text{V}, R_L \leq 10\text{k}\Omega$	-	-	60k	-	
	$V_S = \pm 1.5\text{V}$	$V_O = \pm 0.5\text{V}, R_L = 100\text{k}\Omega$	25k	-	-	-	
		$R_L = 10\text{k}\Omega$	-	-	25k	-	
	$V_S = \pm 15\text{V}$	$V_O = \pm 10\text{V}, R_L = 100\text{k}\Omega$	50k	-	-	-	
		$R_L = 10\text{k}\Omega$	-	-	50k	-	
Supply Current	$V_S = \pm 1.5\text{V}$	$T_A = +25^{\circ}\text{C}$	-	8	-	90	μA
	$V_S = \pm 15\text{V}$		-	11	-	100	μA
	$V_S = \pm 1.5\text{V}$		-	8	-	90	μA
	$V_S = \pm 15\text{V}$		-	11	-	100	μA
Power Consumption	$V_S = \pm 1.5\text{V}$	$T_A = +25^{\circ}\text{C}$	-	24	-	270	μW
	$V_S = \pm 15\text{V}$		-	330	-	3k	μW
	$V_S = \pm 1.5\text{V}$		-	24	-	270	μW
	$V_S = \pm 15\text{V}$		-	330	-	3k	μW
Output Voltage Swing	$V_S = \pm 1.5\text{V}$	$R_L = 100\text{k}\Omega$	± 0.6	-	-	-	V
		$R_L = 10\text{k}\Omega$	-	-	± 0.6	-	V
	$V_S = \pm 15\text{V}$	$R_L = 100\text{k}\Omega$	± 12	-	-	-	V
		$R_L = 10\text{k}\Omega$	-	-	± 12	-	V
Common Mode Rejection Ratio	$V_S = \pm 1.5\text{V}$	$R_S \leq 10\text{k}\Omega$	70	-	70	-	dB
	$V_S = \pm 15\text{V}$		70	-	70	-	dB
Supply Voltage Rejection Ratio	$V_S = \pm 1.5\text{V}$	$R_S \leq 10\text{k}\Omega$	74	-	74	-	dB
	$V_S = \pm 15\text{V}$		74	-	74	-	dB

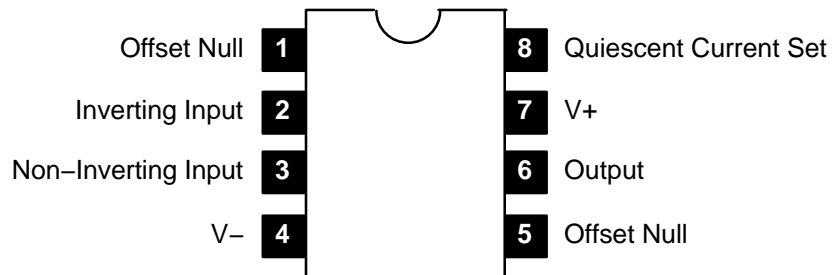
Resistor Biasing: (Set Current Setting Resistor to V₋)

V _S	I _{SET}				
	0.1μA	0.5μA	1.0μA	5μA	10μA
±1.5V	25.6MΩ	5.04MΩ	2.5MΩ	492.0kΩ	244.0kΩ
±3.0V	55.6MΩ	11.0MΩ	5.5MΩ	1.09MΩ	544.0kΩ
±6.0V	116.0MΩ	23.0MΩ	11.5MΩ	2.29MΩ	1.14MΩ
±9.0V	176.0MΩ	35.0MΩ	17.5MΩ	3.49MΩ	1.74MΩ
±12.0V	236.0MΩ	47.0MΩ	23.5MΩ	4.69MΩ	2.34MΩ
±15.0V	296.0MΩ	59.0MΩ	29.5MΩ	5.89MΩ	2.94MΩ

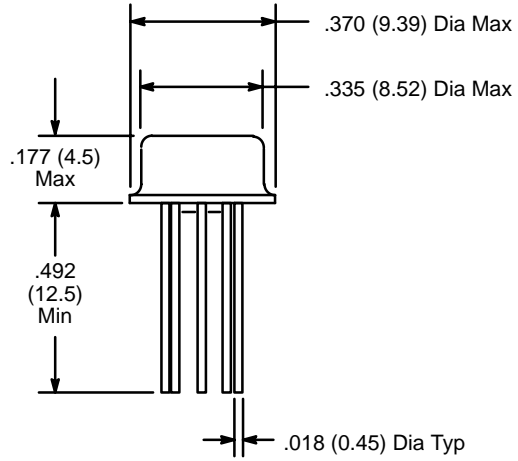
Pin Connection Diagram
NTE944
 (Top View)



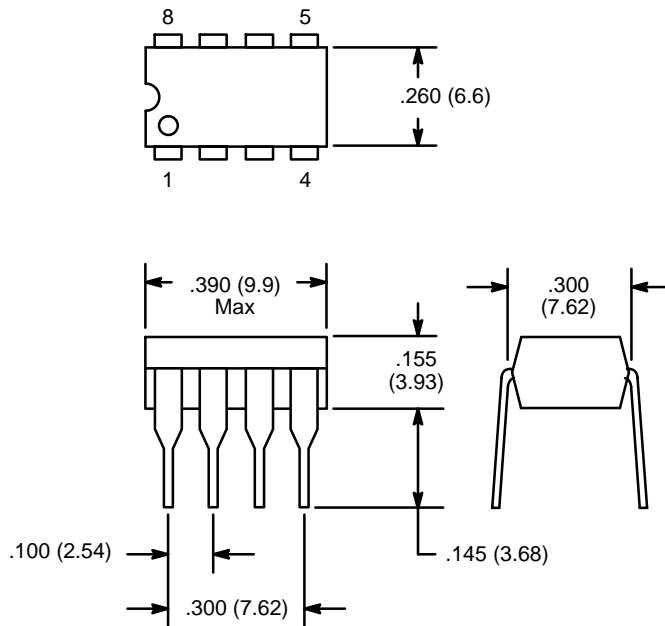
Pin Connection Diagram
NTE944M



**Dimensional Drawing
NTE944**



**Dimensional Drawing
NTE944M**



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