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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.

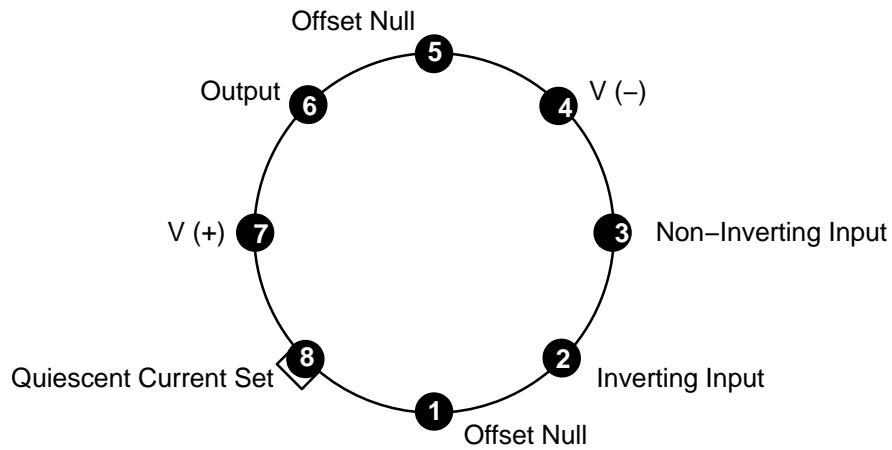
Electrical Characteristics: ($0^{\circ} \leq T_A \leq +70^{\circ}\text{C}$, unless otherwise specified)

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

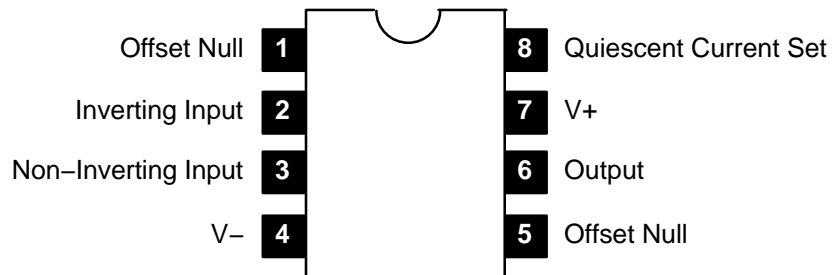
Resistor Biasing: (Set Current Setting Resistor to V-)

V_s	I_{SET}				
	0.1 μ A	0.5 μ A	1.0 μ A	5 μ A	10 μ A
$\pm 1.5V$	25.6M Ω	5.04M Ω	2.5M Ω	492.0k Ω	244.0k Ω
$\pm 3.0V$	55.6M Ω	11.0M Ω	5.5M Ω	1.09M Ω	544.0k Ω
$\pm 6.0V$	116.0M Ω	23.0M Ω	11.5M Ω	2.29M Ω	1.14M Ω
$\pm 9.0V$	176.0M Ω	35.0M Ω	17.5M Ω	3.49M Ω	1.74M Ω
$\pm 12.0V$	236.0M Ω	47.0M Ω	23.5M Ω	4.69M Ω	2.34M Ω
$\pm 15.0V$	296.0M Ω	59.0M Ω	29.5M Ω	5.89M Ω	2.94M Ω

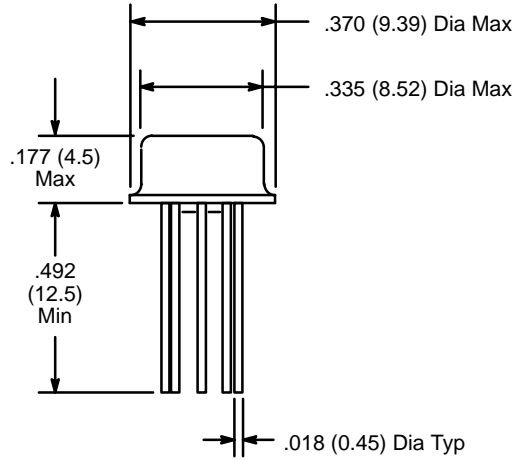
Pin Connection Diagram
NTE944
 (Top View)



Pin Connection Diagram
NTE944M



**Dimensional Drawing
NTE944**



**Dimensional Drawing
NTE944M**

