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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:

- ±1V to ±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 . . . . ±18V
Power Dissipation (Note 1) 500mW
Differential Input Voltage . . . . ±30V
Input Voltage (Note 2) . . . . ±15V
I_{SET} Current 150μA
Output Short Circuit Duration . . . . Indefinite
Operating Temperature Range . . . . $0° \leq T_A \leq +70°C$
Storage Temperature Range . . . . −65° to +150°C
Lead Temperature (Soldering, 10sec) . . . . +300°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 ±15V, the absolute maximum input voltage is equal to the supply voltage.

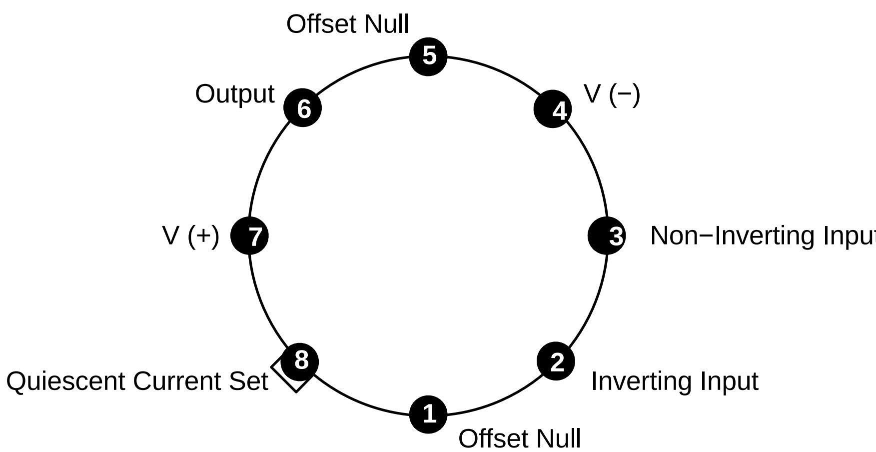
Electrical Characteristics: (0° ≤ T_A ≤+70°C, unless otherwise specified)

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

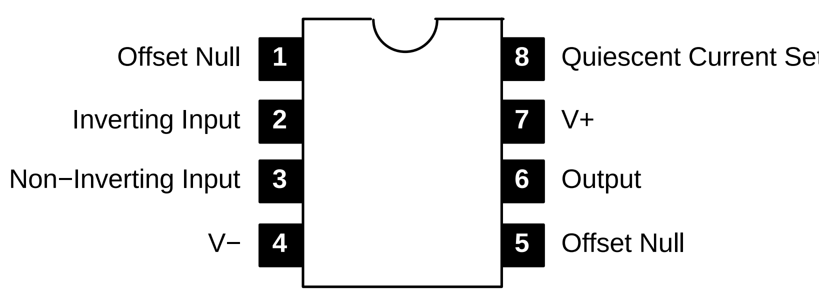
Resistor Biasing: (Set Current Setting Resistor to V−)

I_{SET}					
V_S	**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

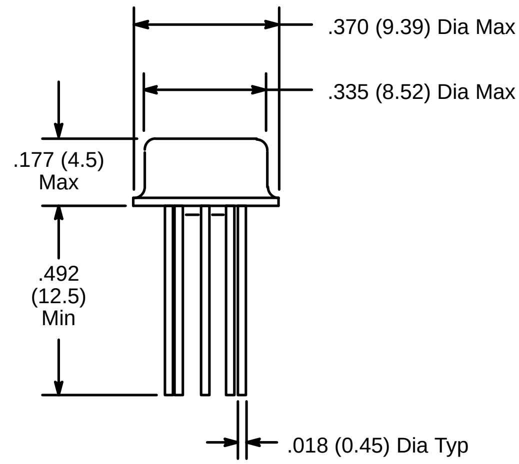
Pin Connection Diagram
NTE944
(Top View)

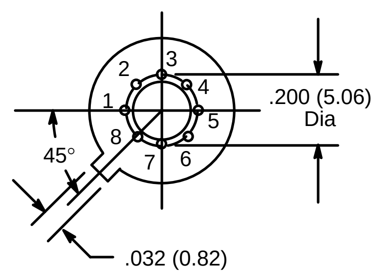


Pin Connection Diagram
NTE944M



Dimensional Drawing
NTE944





Dimensional Drawing
NTE944M