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# NTE1500 & NTE1501
# Integrated Circuit
# 7–Step LED Driver Circuit

**Description:**

The NTE1500 and NTE1501 are integrated circuits designed for driving 7–dot LED displays. The NTE1500 responds logarithmically to the input signal while the NTE1501 responds linearly. Because an adjustment pin for output current is provided, the brightness of the LED can be controlled.

**Features:**

- Linear (NTE1501) and Logarithmic (NTE1500) Response
- 7–LED Bar Graph Display Driver
- Brightness is Externally Adjustable
- High Output Current: 25mA Max
- Series Connection Capable for Driving more than 7–Dot Displays

**Absolute Maximum Ratings:** ($T_A$ = +25°C unless otherwise specified)

Supply Voltage, $V_{CC}$ . . . . . 18V
Circuit Voltage, $V_I$ . . . . . 7.5V
Input Voltage, $V_I$ . . . . . 16V
Output Voltage, $V_O$ . . . . . 16V
Supply Current, $I_{CC}$ . . . . . 25mA
Output Current, $I_O$ . . . . . 25mA
Power Dissipation, $P_D$ . . . . . 1800mW
Operating Ambient Temperature Range, $T_{opr}$ . . . . . –30° to +75°C
Storage Temperature Range, $T_{stg}$ . . . . . –55° to +150°C

**Electrical Characteristics:** ($T_A$ = +25°C, $V_{CC}$ = 9V unless otherwise specified)

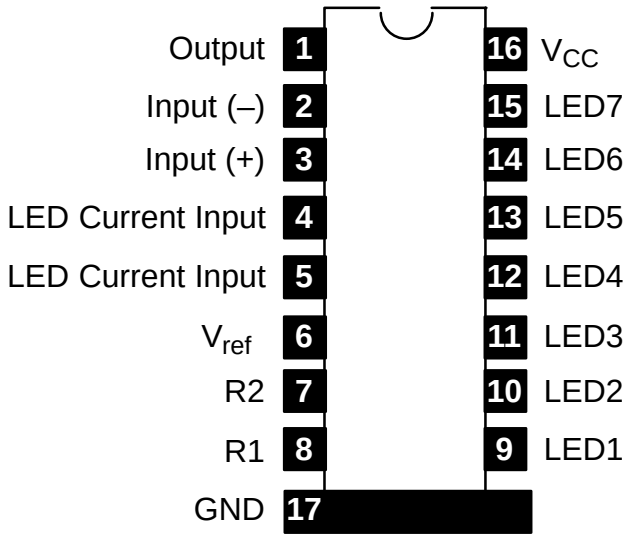
| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Supply Current | $I_{tot}$ | $V_2$ = 0 | 4 | – | 18 | mA |
| Output Inflow Current | $I_{(SINK)9–15}$ | $V_I$ = 3.55V, $V_7$ = 3.5V | 13 | – | 25 | mA |
| Reference Voltage | $V_{REF}$ | | 3.55 | 3.75 | 3.95 | V |
| Output Offset Voltage (Amp) | $V_{O(offset)}$ | $V_{CC}$ = 16V, $G_V$ = 20dB, $V_2$ = 0 | –150 | – | +150 | mV |
| Voltage Gain (Amp) | $G_V$ | $V_2$ = 50mV | 18 | 20 | 22 | dB |
| Output Pin Leakage Current | $I_{O(Leak)}$ | $V_{CC}$ = 18V | 0 | – | 20 | µA |

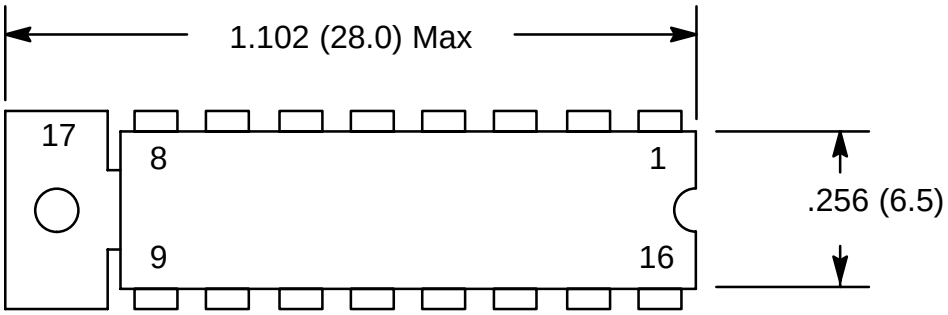
**Electrical Characteristics (Cont'd):** ($T_A$ = +25°C, $V_{CC}$ = 9V unless otherwise specified)

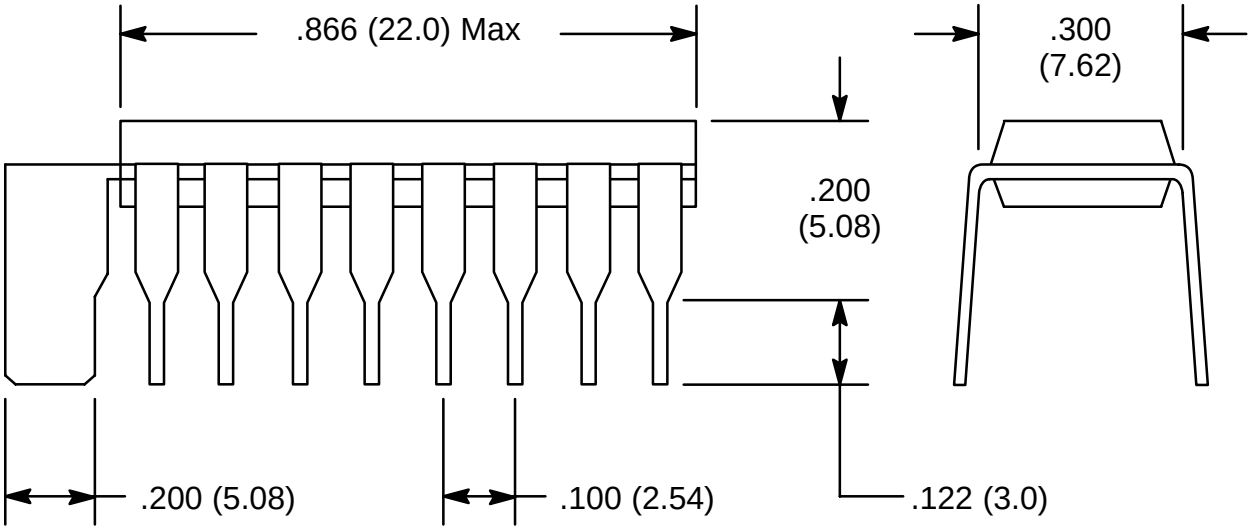
| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Input Bias Current (Amp) | $I_{Bias2}$ | $V_{CC}$ = 18V, $V_2$ = 0 | –2 | – | 0 | µA |
| | $I_{Bias3}$ | $V_{CC}$ = 18V, $V_3$ = 0 | –2 | – | 0 | µA |
| Input Bias Current (Comparator) | $I_{Bias7}$ | $V_{CC}$ = 18V, $V_2$ = 10V, $V_3$ = 0, $V_7$ = 0 | –10 | – | 0 | µA |
| | $I_{Bias1}$ | $V_{CC}$ = 18V, $V_3$ = 10V, $V_I$ = 0, $V_2$ = 0, $V_6$ = $V_7$ | –10 | – | 0 | µA |
| Comparator Level (NTE1500) | $GD_1$ * | $V_7$ = 3.5, $V_8$ = 0 | –17 | –15 | –13 | dB |
| | $GD_2$ | | –9 | –7 | –5 | dB |
| | $GD_3$ | | –4 | –3 | –2 | dB |
| | $GD_4$ | | –1 | 0 | 1 | dB |
| | $GD_5$ | | 1.5 | 2.0 | 2.5 | dB |
| | $GD_6$ | | 3.5 | 4.0 | 4.5 | dB |
| | $GD_7$ | | 4.5 | 5.0 | 5.5 | dB |
| Comparator Level (NTE1501) | $GD_1$ | $V_7$ = 3.65, $V_8$ = 0 | 0.4 | 0.5 | 0.6 | dB |
| | $GD_2$ | | 0.85 | 1.0 | 1.15 | dB |
| | $GD_3$ | | 1.35 | 1.5 | 1.65 | dB |
| | $GD_4$ | | 1.85 | 2.0 | 2.15 | dB |
| | $GD_5$ | | 2.35 | 2.5 | 2.65 | dB |
| | $GD_6$ | | 2.85 | 3.0 | 3.15 | dB |
| | $GD_7$ | | 3.35 | 3.5 | 3.65 | dB |

* The comparator reference voltage is 3.5V and 2.0V is 0dB ($V_{CC}$opr = 5V to 16V).

**Pin Connection Diagram**




1.102 (28.0) Max
17
8
1
9
16
.256 (6.5)


.866 (22.0) Max
.300
(7.62)
.200
(5.08)
.200 (5.08)
.100 (2.54)
.122 (3.0)