LM384 5W Audio Power Amplifier

General Description
The LM384 is a power audio amplifier for consumer application. In order to hold system cost to a minimum, gain is internally fixed at 34 dB. A unique input stage allows inputs to be ground referenced. The output is automatically self-centering to one half the supply voltage. The output is short-circuit proof with internal thermal limiting. The package outline is standard dual-in-line. A copper lead frame is used with the center three pins on either side comprising a heat sink. This makes the device easy to use in standard p-c layout. Uses include simple phonograph amplifiers, intercoms, line drivers, teaching machine outputs, alarms, ultrasonic drivers, TV sound systems, AM-FM radio, sound projector systems, etc. See AN-69 for circuit details.

Features
- Wide supply voltage range
- Low quiescent power drain
- Voltage gain fixed at 50
- High peak current capability
- Input referenced to GND
- High input impedance
- Low distortion
- Quiescent output voltage is at one half of the supply voltage
- Standard dual-in-line package

Schematic Diagram
Absolute Maximum Ratings

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

- Supply Voltage: 28V
- Peak Current: 1.3A
- Power Dissipation (See Notes 3 and 4): 1.67W
- Input Voltage: ±0.5V
- Operating Temperature: 0°C to +70°C
- Lead Temperature (Soldering, 10 sec.): 260°C
- Storage Temperature: −65°C to +150°C
- Thermal Resistance: 
  - $\theta_{JC}$: 30°C/W
  - $\theta_{JA}$: 79°C/W

Electrical Characteristics (Note 1)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>$Z_{IN}$</td>
<td>Input Resistance</td>
<td></td>
<td>150</td>
<td></td>
<td></td>
<td>kΩ</td>
</tr>
<tr>
<td>$I_{BIAS}$</td>
<td>Bias Current</td>
<td>Inputs Floating</td>
<td>100</td>
<td></td>
<td></td>
<td>nA</td>
</tr>
<tr>
<td>$A_V$</td>
<td>Gain</td>
<td></td>
<td>40</td>
<td>50</td>
<td>60</td>
<td>V/V</td>
</tr>
<tr>
<td>$P_{OUT}$</td>
<td>Output Power</td>
<td>THD = 10%, $R_L$ = 8Ω</td>
<td>5</td>
<td>5.5</td>
<td></td>
<td>W</td>
</tr>
<tr>
<td>$I_Q$</td>
<td>Quiescent Supply Current</td>
<td></td>
<td>8.5</td>
<td>25</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>$V_{OUT}$</td>
<td>Quiescent Output Voltage</td>
<td></td>
<td>11</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>$B_W$</td>
<td>Bandwidth</td>
<td>$P_{OUT} = 2W, R_L = 8Ω$</td>
<td>450</td>
<td></td>
<td></td>
<td>kHz</td>
</tr>
<tr>
<td>$V^+$</td>
<td>Supply Voltage</td>
<td></td>
<td>12</td>
<td>26</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>$I_{SC}$</td>
<td>Short Circuit Current (Note 5)</td>
<td></td>
<td>1.3</td>
<td></td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>PSRR (Note 2)</td>
<td>Power Supply Rejection Ratio</td>
<td></td>
<td>31</td>
<td></td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>THD</td>
<td>Total Harmonic Distortion</td>
<td>$P_{OUT} = 4W, R_L = 8Ω$</td>
<td>0.25</td>
<td>1.0</td>
<td></td>
<td>%</td>
</tr>
</tbody>
</table>

Note 1: $V^+ = 22V$ and $T_A = 25°C$ operating with a Staver V7 heat sink for 30 seconds.

Note 2: Rejection ratio referred to the output with $C_{PAS}$ = 5 μF, freq = 120 Hz.

Note 3: The maximum junction temperature of the LM384 is 150°C.

Note 4: The package is to be derated at 15°C/W junction to heat sink pins.

Note 5: Output is fully protected against a shorted speaker condition at all voltages up to 22V.

Heat Sink Dimensions

Staver Company
41 Saxon Ave.
P.O. Drawer H
Bay Shore, N.Y.
Tel: (516) 666-8000
Typical Performance Characteristics

- Device Dissipation vs Ambient Temperature
- Thermal Resistance vs Square Inches
- Supply Decoupling vs Frequency
- Total Harmonic Distortion vs Output Power
- Output Voltage Gain vs Frequency
- Power Supply Current vs Supply Voltage
- Device Dissipation vs Output Power—16Ω Load
- Device Dissipation vs Output Power—8Ω Load
- Device Dissipation vs Output Power—4Ω Load
Block and Connection Diagrams

Dual-In-Line Package

Top View

Order Number LM384N
See NS Package Number N14A

Typical Applications

Typical 5W Amplifier

Bridge Amplifier
Typical Applications (Continued)

Intercom

Phase Shift Oscillator

*For stability with high current loads
**Physical Dimensions** inches (millimeters)

![Diagram of LM384 5W Audio Power Amplifier](image)

**Order Number** LM384N  
**NS Package Number** N14A

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2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.