

LM384

5W Audio Power Amplifier

General Description

The LM384 is a power audio amplifier for consumer applications. In order to hold system cost to a minimum, gain is internally fixed at 34 dB. A unique input stage allows ground referenced input signals. The output automatically self-centers to one-half the supply voltage.

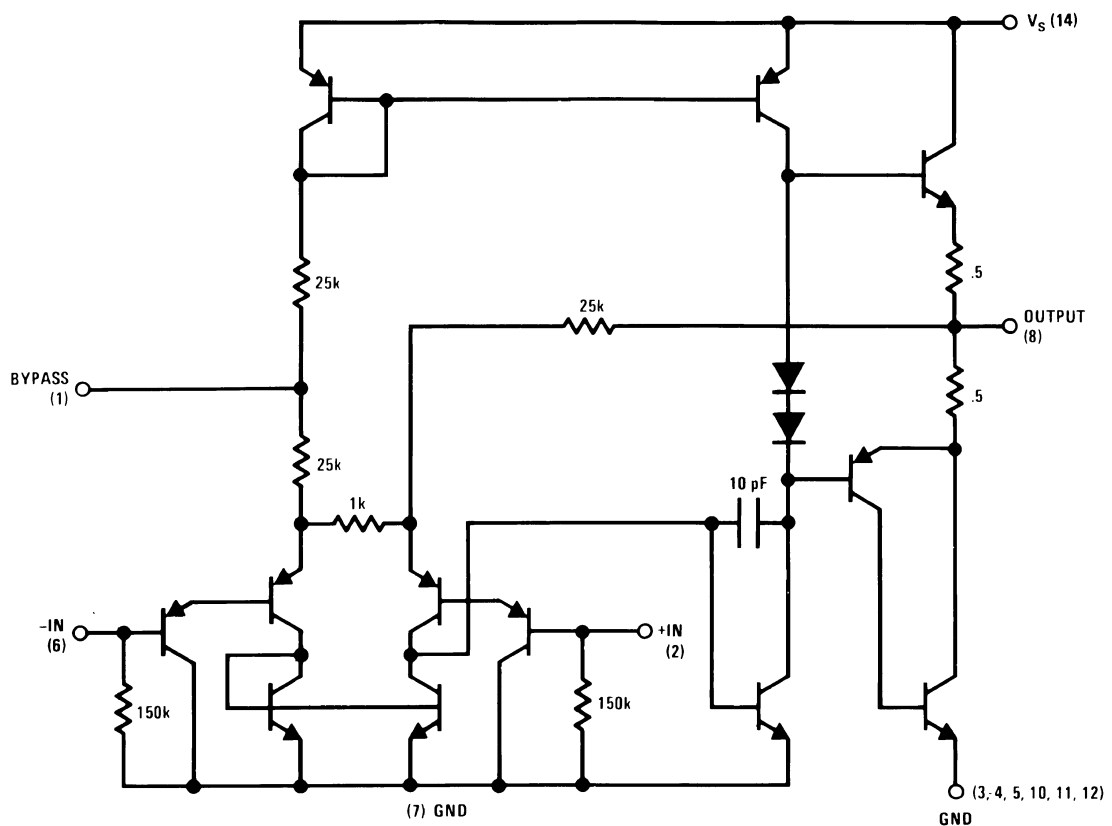
The output is short-circuit proof with internal thermal limiting. The package outline is standard dual-in-line. A copper lead frame is used with the center three pins on either side comprising a heat sink. This makes the device easy to use in standard p-c layout.

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: 12V to 26V
- Low quiescent power drain
- Voltage gain fixed at 50
- High peak current capability: 1.3A
- Input referenced to GND
- High input impedance: 150k Ω
- Low distortion: 0.25% ($P_O=4W$, $R_L=8\Omega$)
- Quiescent output voltage is at one half of the supply voltage
- Standard dual-in-line package

Schematic Diagram



DS007843-3

Absolute Maximum Ratings (Note 1)

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 4, 5)) | 1.67W |
| Input Voltage | $\pm 0.5V$ |
| Storage Temperature | $-65^{\circ}C$ to $+150^{\circ}C$ |

| | |
|--|--------------------------------|
| Operating Temperature | $0^{\circ}C$ to $+70^{\circ}C$ |
| Lead Temperature (Soldering, 10 sec.) | $260^{\circ}C$ |
| Thermal Resistance | |
| θ_{JC} | $30^{\circ}C/W$ |
| θ_{JA} | $79^{\circ}C/W$ |

Note 1: Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is functional, but do not guarantee specific performance limits.

Electrical Characteristics (Note 2)

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|--------------|--|-------------------------------|-----|------|-----|-----------|
| Z_{IN} | Input Resistance | | | 150 | | $k\Omega$ |
| I_{BIAS} | Bias Current | Inputs Floating | | 100 | | nA |
| A_V | Gain | | 40 | 50 | 60 | V/V |
| P_{OUT} | Output Power | THD = 10%, $R_L = 8\Omega$ | 5 | 5.5 | | W |
| I_Q | Quiescent Supply Current | | | 8.5 | 25 | mA |
| $V_{OUT Q}$ | Quiescent Output Voltage | | | 11 | | V |
| BW | Bandwidth | $P_{OUT} = 2W, R_L = 8\Omega$ | | 450 | | kHz |
| V^+ | Supply Voltage | | 12 | | 26 | V |
| I_{SC} | Short Circuit Current (Note 6) | | | 1.3 | | A |
| $PSRR_{RTO}$ | Power Supply Rejection Ratio (Note 3) | | | 31 | | dB |
| THD | Total Harmonic Distortion | $P_{OUT} = 4W, R_L = 8\Omega$ | | 0.25 | 1.0 | % |

Note 2: $V^+ = 22V$ and $T_A = 25^{\circ}C$ operating with a Staver V7 heat sink for 30 seconds.

Note 3: Rejection ratio referred to the output with $C_{BYPASS} = 5 \mu F$, freq = 120 Hz.

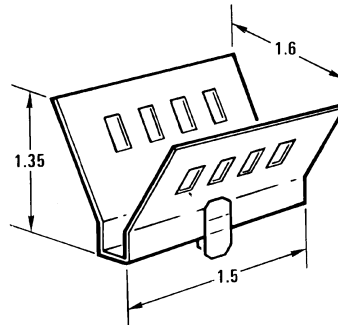
Note 4: The maximum junction temperature of the LM384 is $150^{\circ}C$.

Note 5: The package is to be derated at $15^{\circ}C/W$ junction to heat sink pins.

Note 6: Output is fully protected against a shorted speaker condition at all voltages up to 22V.

Heat Sink Dimensions

Staver "V7" Heat Sink

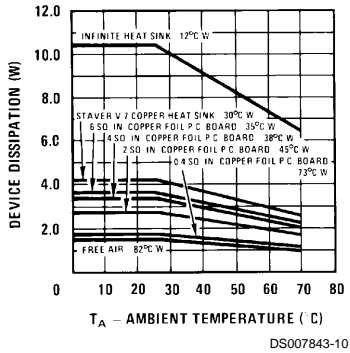


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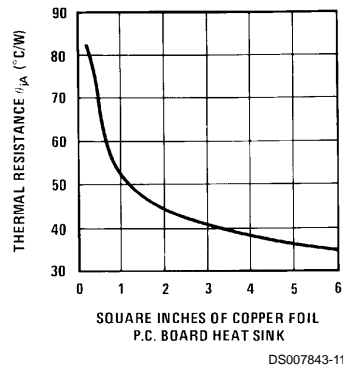
Staver Company
41 Saxon Ave.
P.O. Drawer H
Bay Shore, N.Y.
Tel: (516) 666-8000

Typical Performance Characteristics

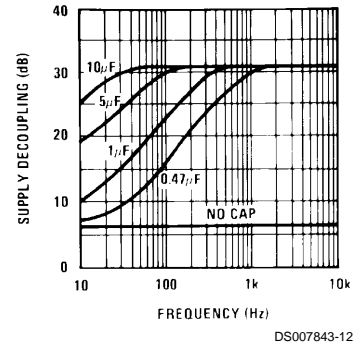
Device Dissipation vs Ambient Temperature



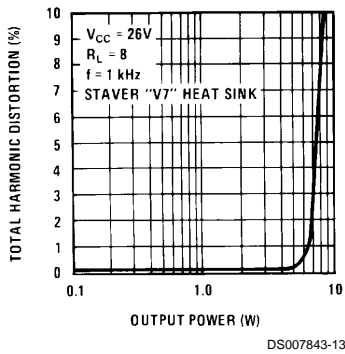
Thermal Resistance vs Square Inches



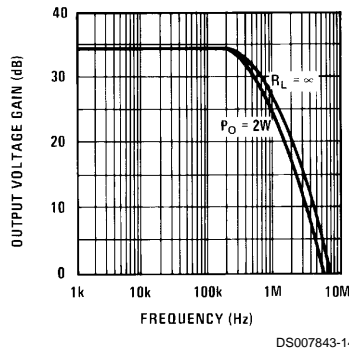
Supply Decoupling vs Frequency



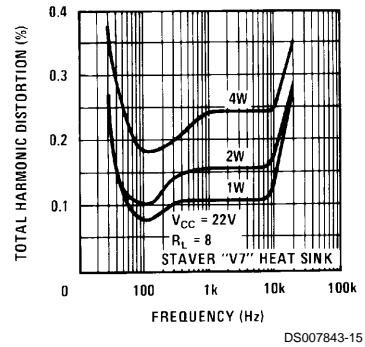
Total Harmonic Distortion vs Output Power



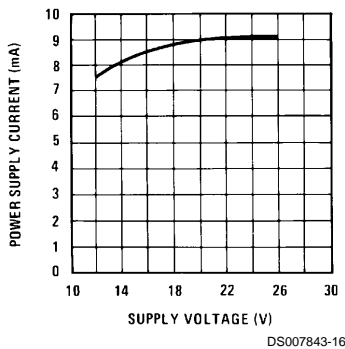
Output Voltage Gain vs Frequency



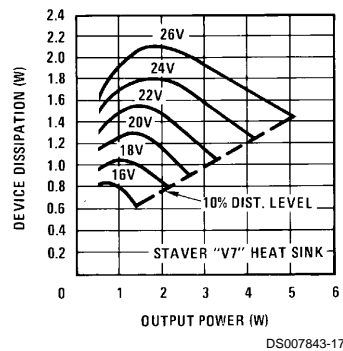
Total Harmonic Distortion vs Frequency



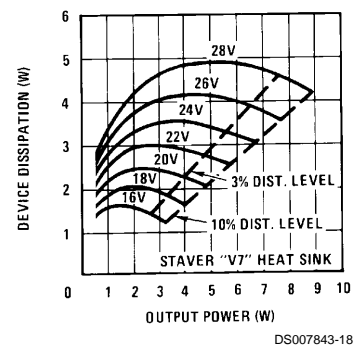
Power Supply Current vs Supply Voltage



Device Dissipation vs Output Power — 16Ω Load

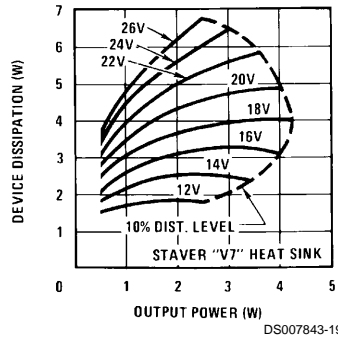


Device Dissipation vs Output Power — 8Ω Load

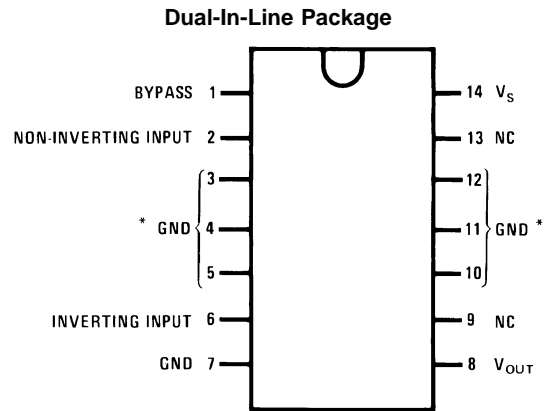
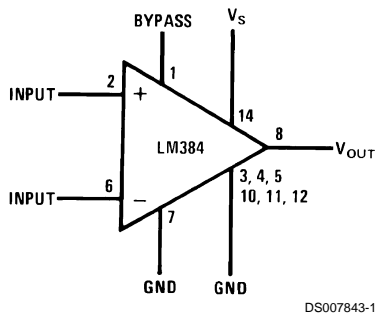


Typical Performance Characteristics (Continued)

Device Dissipation vs
Output Power — 4Ω Load



Block and Connection Diagrams

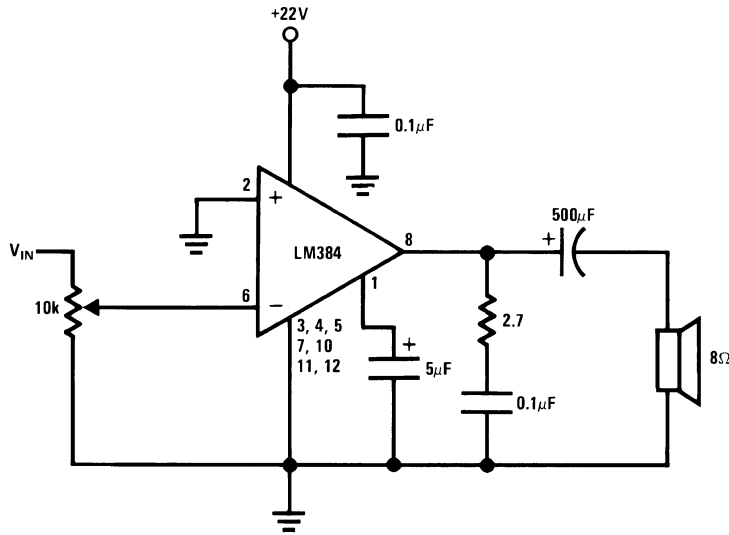


Note 7: Heatsink Pins

Top View
Order Number LM384N
See NS Package Number N14A

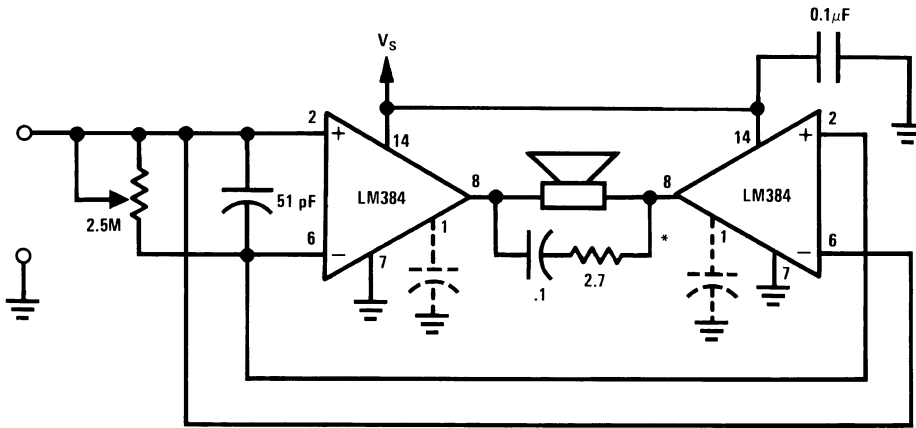
Typical Applications

Typical 5W Amplifier



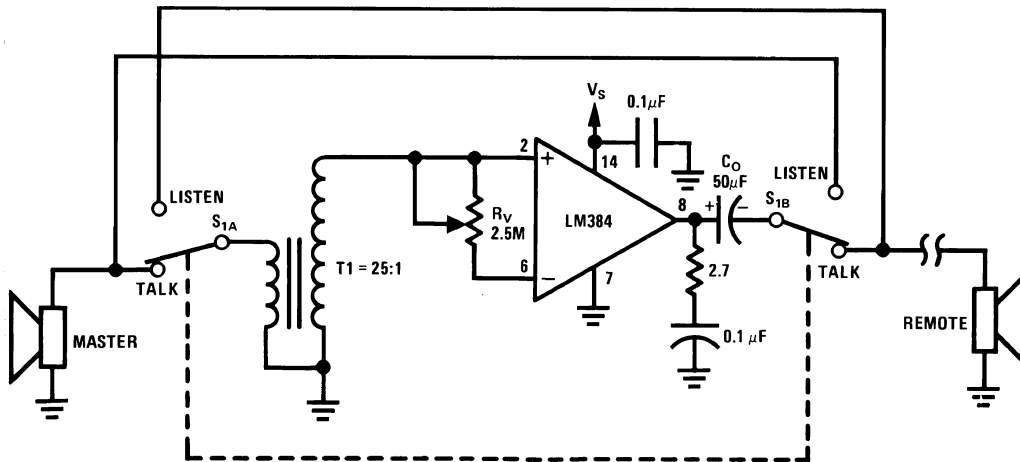
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Bridge Amplifier



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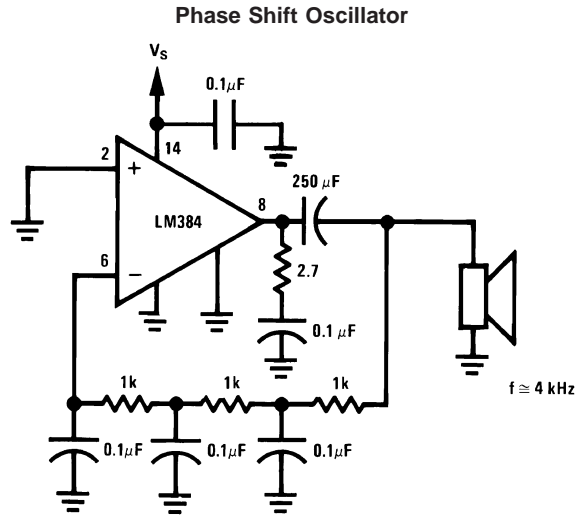
Intercom



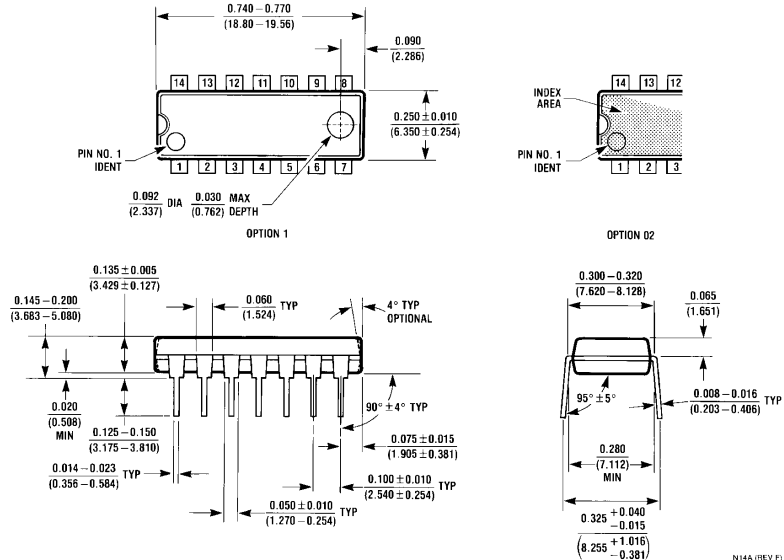
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*For stability with high current loads

Typical Applications (Continued)



Physical Dimensions inches (millimeters) unless otherwise noted



Molded Dual-In-Line Package (N)
Order Number LM384N
NS Package Number N14A

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