

# 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.

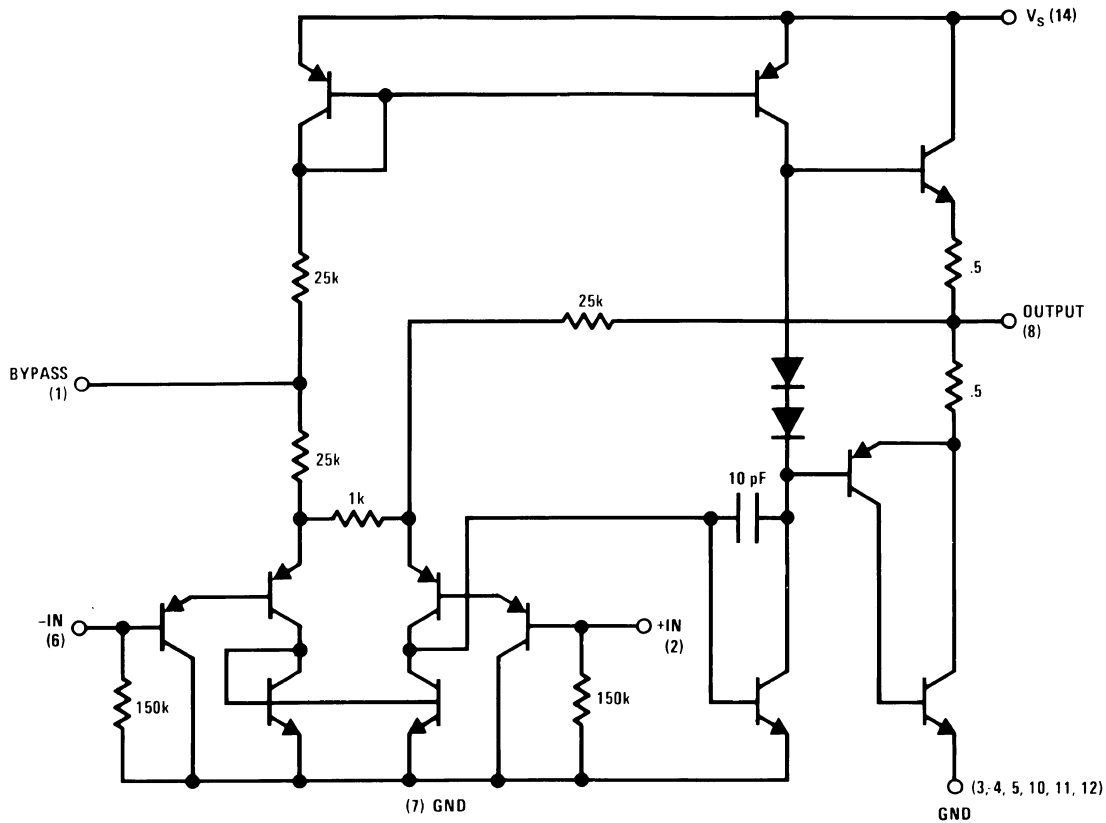
The output is short-circuit proof with internal thermal limiting. The package outline is standard dual-in-line. A copper lead frame is used with the center three pins on either side comprising a heat sink. This makes the device easy to use in standard p-c layout.

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 $\Omega$
- 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



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**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	±0.5V
Storage Temperature	-65°C to +150°C

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

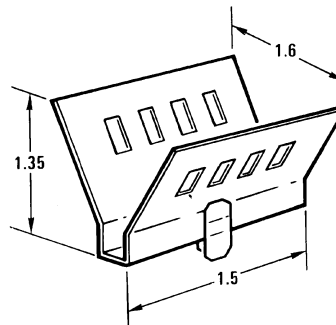
**Note 4:** The maximum junction temperature of the LM384 is 150°C.

**Note 5:** The package is to be derated at 15°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

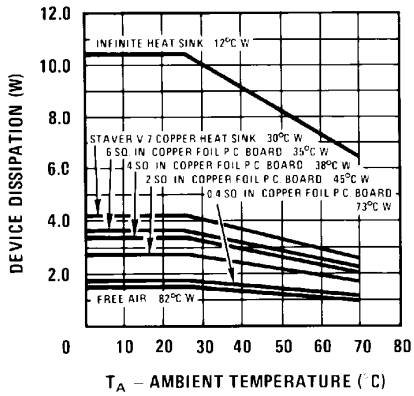


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Staver Company  
41 Saxon Ave.  
P.O. Drawer H  
Bay Shore, N.Y.  
Tel: (516) 666-8000

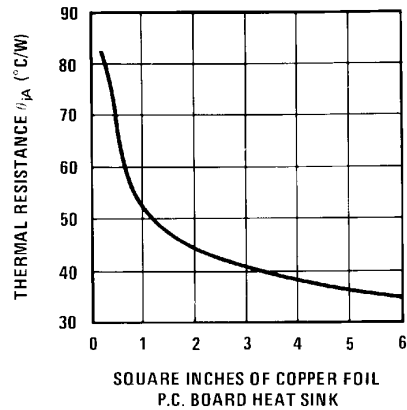
# Typical Performance Characteristics

**Device Dissipation vs Ambient Temperature**



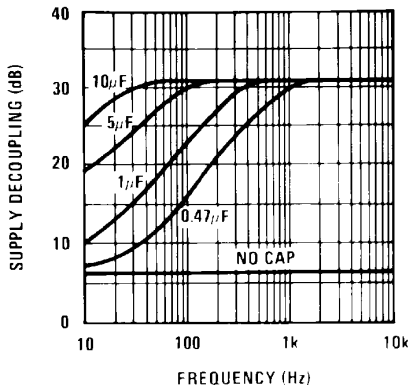
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**Thermal Resistance vs Square Inches**



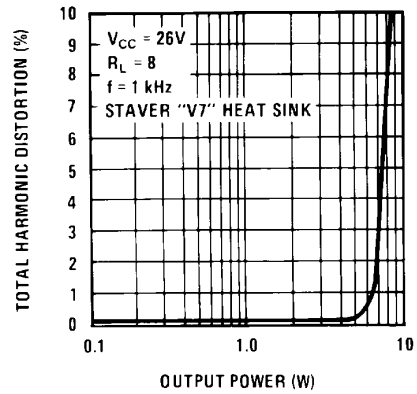
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**Supply Decoupling vs Frequency**



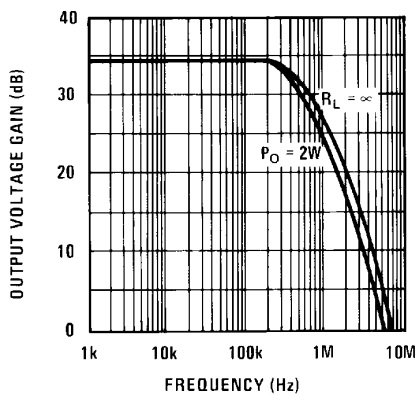
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**Total Harmonic Distortion vs Output Power**



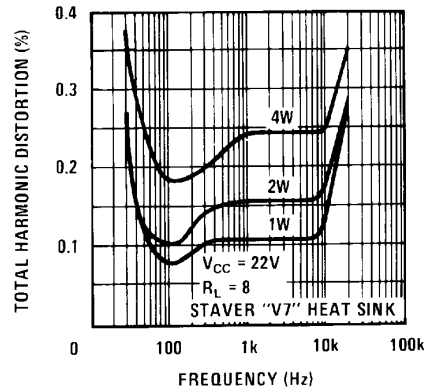
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**Output Voltage Gain vs Frequency**



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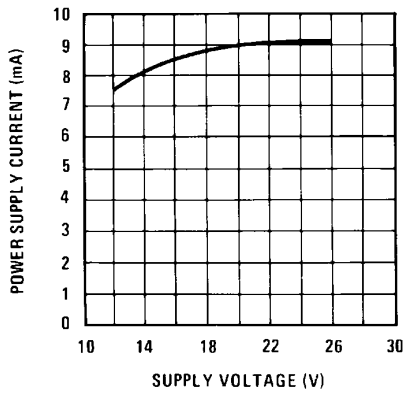
**Total Harmonic Distortion vs Frequency**



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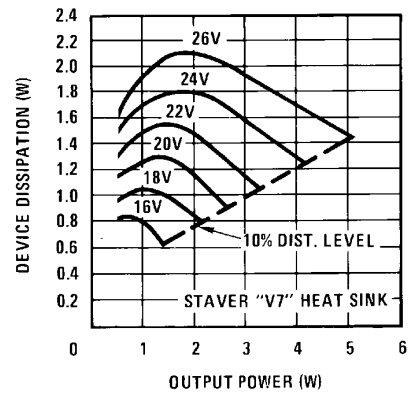
# Typical Performance Characteristics (Continued)

Power Supply Current vs Supply Voltage



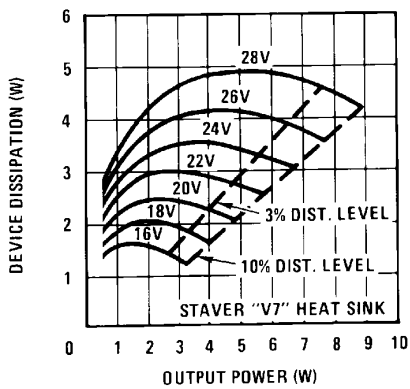
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Device Dissipation vs Output Power—16Ω Load



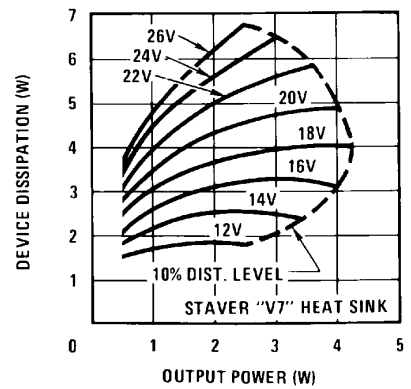
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Device Dissipation vs Output Power—8Ω Load



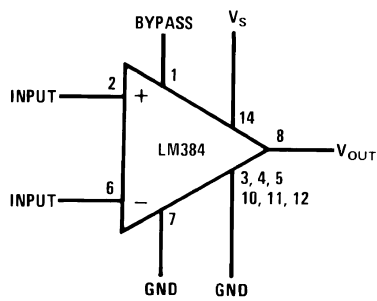
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Device Dissipation vs Output Power—4Ω Load



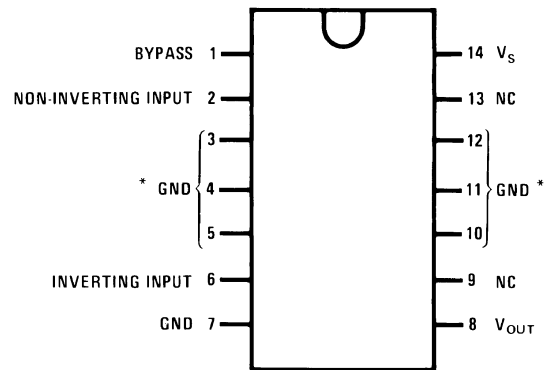
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## Block and Connection Diagrams



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Dual-In-Line Package



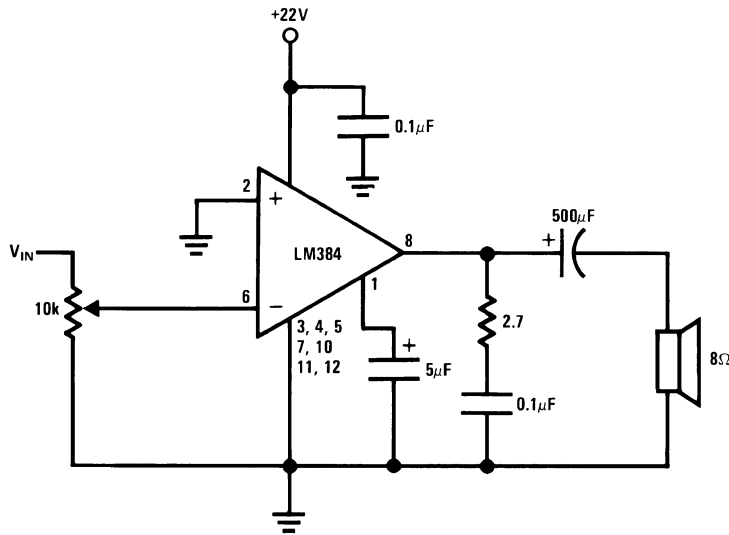
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Note 7: Heatsink Pins

Top View Order Number LM384N See NS Package Number N14A

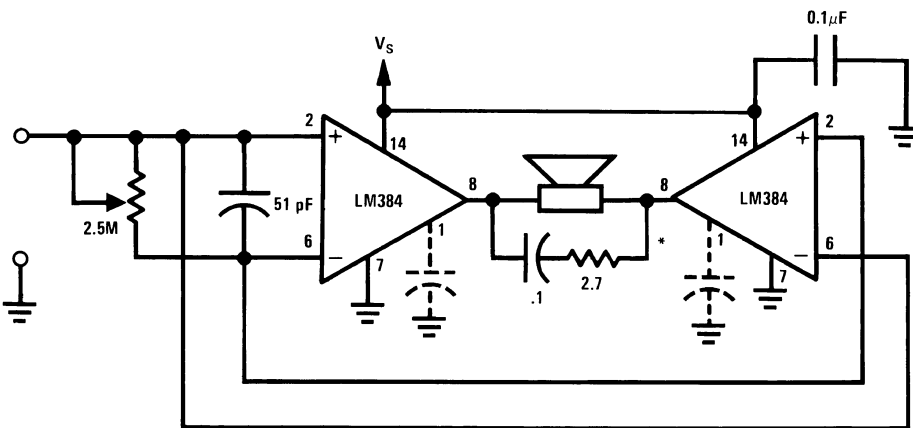
# Typical Applications

Typical 5W Amplifier



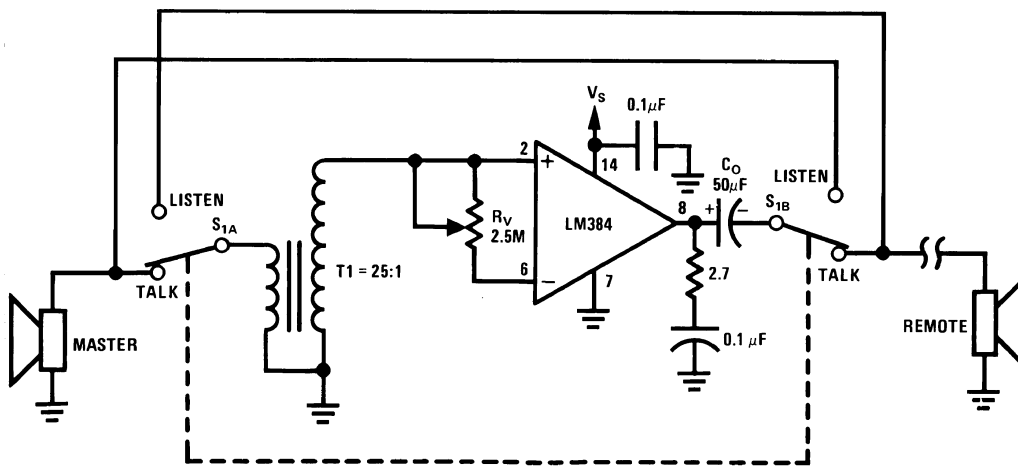
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Bridge Amplifier



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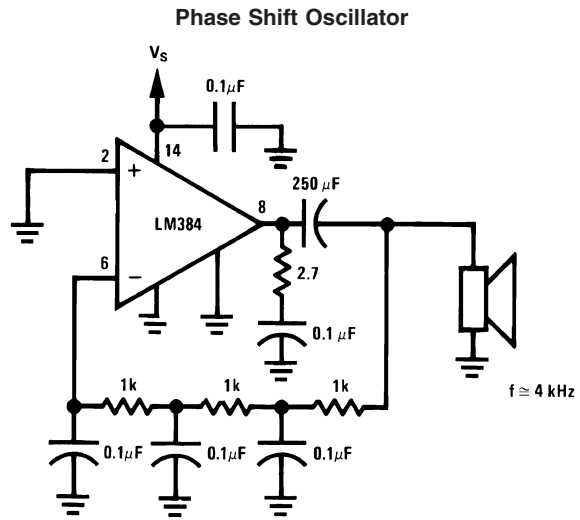
Intercom



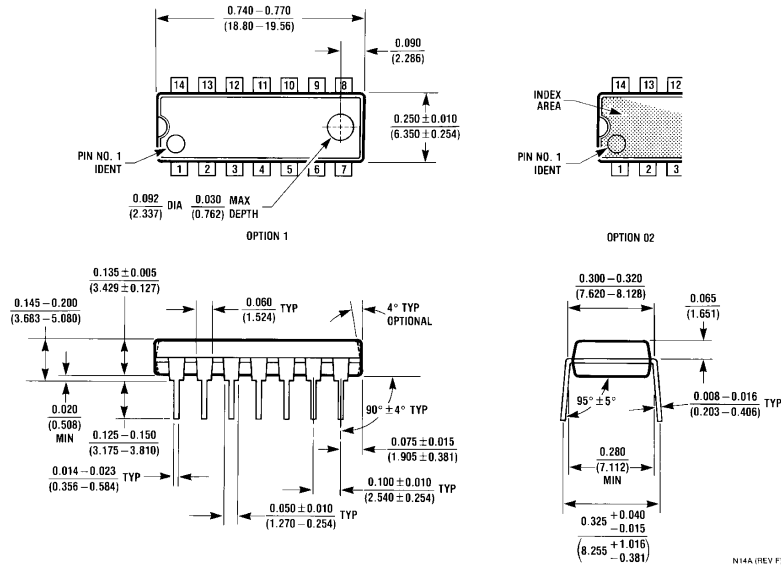
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\*For stability with high current loads

## 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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