

### LM384

# **5W Audio Power Amplifier**

### **General Description**

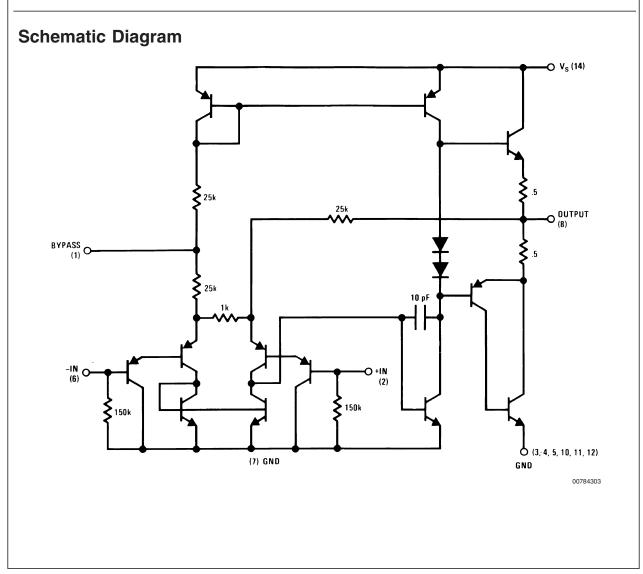
The LM384 is a power audio amplifier for consumer applications. In order to hold system cost to a minimum, gain is internally fixed at 34 dB. A unique input stage allows ground referenced input signals. The output automatically self-centers to one-half the supply voltage.

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: 150kΩ
- 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



### **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

 $\theta_{\text{JC}}$  30°C/W  $\theta_{\text{JA}}$  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	Тур	Max	Units
Z <sub>IN</sub>	Input Resistance			150		kΩ
I <sub>BIAS</sub>	Bias Current	Inputs Floating		100		nA
A <sub>V</sub>	Gain		40	50	60	V/V
P <sub>OUT</sub>	Output Power	THD = 10%, $R_L = 8\Omega$	5	5.5		W
IQ	Quiescent Supply Current			8.5	25	mA
V <sub>OUT Q</sub>	Quiescent Output Voltage			11		V
BW	Bandwidth	$P_{OUT} = 2W, R_L = 8\Omega$		450		kHz
V <sup>+</sup>	Supply Voltage		12		26	V
I <sub>sc</sub>	Short Circuit Current (Note 6)			1.3		Α
PSRR <sub>RTO</sub>	Power Supply Rejection Ratio			31		dB
	(Note 3))					
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

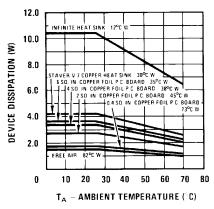
00784304

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

www.national.com

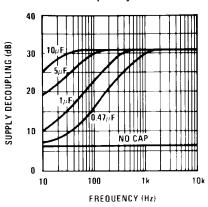
### **Typical Performance Characteristics**

#### **Device Dissipation vs Ambient Temperature**



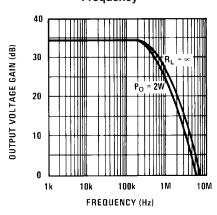
00784310

#### Supply Decoupling vs Frequency



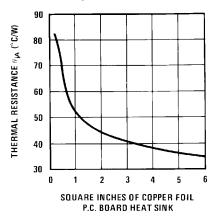
00784312

# Output Voltage Gain vs Frequency



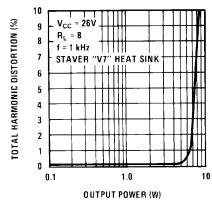
00784314

#### Thermal Resistance vs Square Inches



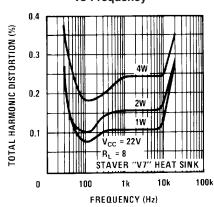
00784311

# Total Harmonic Distortion vs Output Power



00784313

# Total Harmonic Distortion vs Frequency



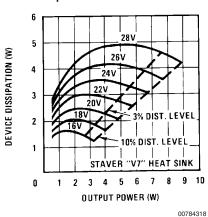
00784315

### **Typical Performance Characteristics** (Continued)

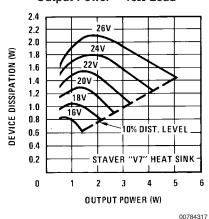
**Supply Voltage** 10 POWER SUPPLY CURRENT (mA) 8 7 6 5 4 3 2 0 10 18 22 26 30 SUPPLY VOLTAGE (V)

**Power Supply Current vs** 

Device Dissipation vs Output Power —  $8\Omega$  Load

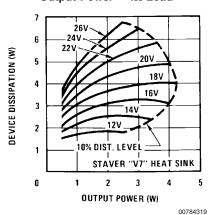


Device Dissipation vs Output Power —  $16\Omega$  Load

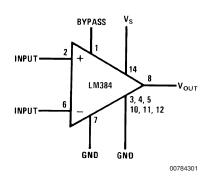


007843

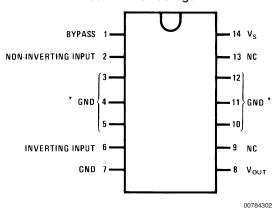
Device Dissipation vs Output Power— $4\Omega$  Load



**Block and Connection Diagrams** 



**Dual-In-Line Package** 



Note 7: Heatsink Pins

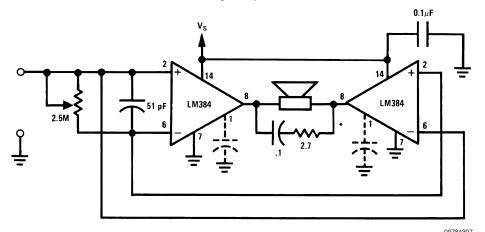
Top View Order Number LM384NSee NS Package Number N14A

www.national.com

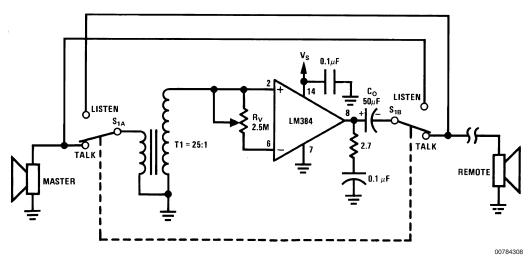
# **Typical Applications**

# 

### **Bridge Amplifier**



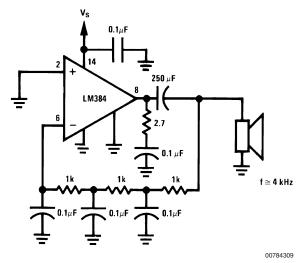
### Intercom



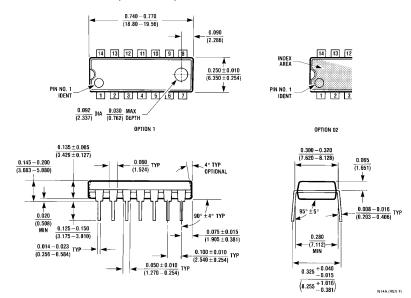
\*For stability with high current loads

# Typical Applications (Continued)

### **Phase Shift Oscillator**



### Physical Dimensions inches (millimeters) unless otherwise noted



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

National does not assume any responsibility for use of any circuitry described, no circuit patent licenses are implied and National reserves the right at any time without notice to change said circuitry and specifications.

For the most current product information visit us at www.national.com.

#### LIFE SUPPORT POLICY

NATIONAL'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT AND GENERAL COUNSEL OF NATIONAL SEMICONDUCTOR CORPORATION. As used herein:

- Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
- 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.

#### **BANNED SUBSTANCE COMPLIANCE**

National Semiconductor certifies that the products and packing materials meet the provisions of the Customer Products Stewardship Specification (CSP-9-111C2) and the Banned Substances and Materials of Interest Specification (CSP-9-111S2) and contain no "Banned Substances" as defined in CSP-9-111S2.



National Semiconductor Americas Customer Support Center

Email: new.feedback@nsc.com Tel: 1-800-272-9959

www.national.com

National Semiconductor Europe Customer Support Center Fax: +49 (0) 180-530 85 86

Email: europe.support@nsc.com
Deutsch Tel: +49 (0) 69 9508 6208
English Tel: +44 (0) 870 24 0 2171
Français Tel: +33 (0) 1 41 91 8790

National Semiconductor Asia Pacific Customer Support Center Email: ap.support@nsc.com National Semiconductor Japan Customer Support Center Fax: 81-3-5639-7507 Email: jpn.feedback@nsc.com Tel: 81-3-5639-7560