Audio

Order code	Manufacturer code	Description
82-0262	LM380N	LM380 2W AUDIO AMPLIFIER (RC)

Sales: 01206 751166
Sales@rapidelec.co.uk
Technical: 01206 835555
Tech@rapidelec.co.uk
Fax: 01206 751188
www.rapidonline.com

National Semiconductor

December 1994

LM380 Audio Power Amplifier

General Description

The LM380 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.

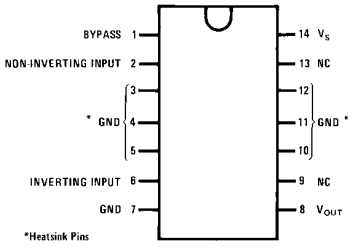
Uses include simple phonograph amplifiers, intercoms, line drivers, teaching machine outputs, alarms, ultrasonic drivers, TV sound systems, AM-FM radio, small servo drivers, power converters, etc.

A selected part for more power on higher supply voltages is available as the LM384. For more information see AN-69.

Features

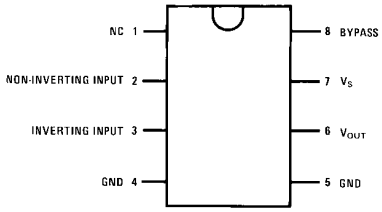
- Wide supply voltage range
- Low quiescent power drain
- Voltage gain fixed at 50
- High peak current capability
- Input referenced to GND
- High input impedance
- Low distortion
- Quiescent output voltage is at one-half of the supply voltage
- Standard dual-in-line package

Connection Diagrams (Dual-In-Line Packages, Top View)



TL/H/6977–1

Order Number LM380N
See NS Package Number N14A

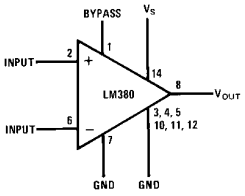


TL/H/6977–2

Order Number LM380N-8
See NS Package Number N08E

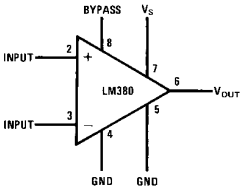
Block and Schematic Diagrams

LM380N

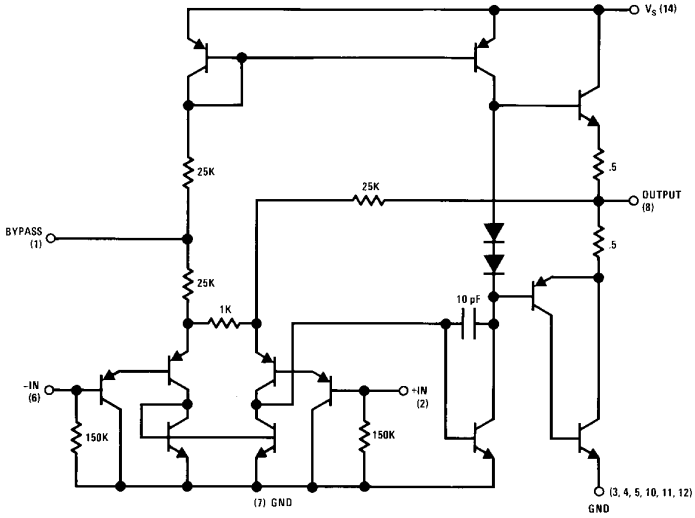


TL/H/6977–3

LM380N-8



TL/H/6977–4



TL/H/6977–5

RRD-B30M115/Printed in U. S. A.

Absolute Maximum Ratings

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

Supply Voltage	22V
Peak Current	1.3A
Package Dissipation 14-Pin DIP (Notes 6 and 7)	8.3W
Package Dissipation 8-Pin DIP (Notes 6 and 7)	1.67W
Input Voltage	±0.5V
Storage Temperature	−65°C to +150°C
Operating Temperature	0°C to +70°C
Junction Temperature	+150°C
Lead Temperature (Soldering, 10 sec.)	+260°C
ESD rating to be determined	
Thermal Resistance	
θ_{JC} (14-Pin DIP)	30°C/W
θ_{JC} (8-Pin DIP)	37°C/W
θ_{JA} (14-Pin DIP)	79°C/W
θ_{JA} (8-Pin DIP)	107°C/W

Electrical Characteristics (Note 1)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
$P_{OUT(RMS)}$	Output Power	$R_L = 8\Omega$, THD = 3% (Notes 3, 4)	2.5			W
A_V	Gain		40	50	60	V/V
V_{OUT}	Output Voltage Swing	$R_L = 8\Omega$		14		V_{p-p}
Z_{IN}	Input Resistance			150k		Ω
THD	Total Harmonic Distortion	(Notes 4, 5)		0.2		%
PSRR	Power Supply Rejection Ratio	(Note 2)		38		dB
V_S	Supply Voltage		10		22	V
BW	Bandwidth	$P_{OUT} = 2W$, $R_L = 8\Omega$		100k		Hz
I_Q	Quiescent Supply Current			7	25	mA
V_{OUTQ}	Quiescent Output Voltage		8	9.0	10	V
I_{BIAS}	Bias Current	Inputs Floating		100		nA
I_{SC}	Short Circuit Current			1.3		A

Note 1: $V_S = 18V$ and $T_A = 25°C$ unless otherwise specified.

Note 2: Rejection ratio referred to the output with $C_{BYPASS} = 5\ \mu F$.

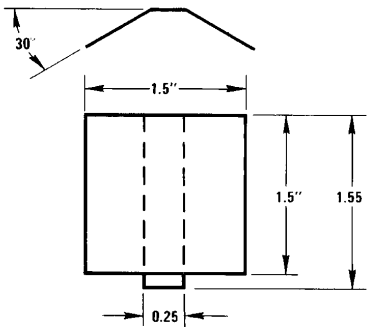
Note 3: With device Pins 3, 4, 5, 10, 11, 12 soldered into a $1/16''$ epoxy glass board with 2 ounce copper foil with a minimum surface of 6 square inches.

Note 4: $C_{BYPASS} = 0.47\ \mu fd$ on Pin 1.

Note 5: The maximum junction temperature of the LM380 is 150°C.

Note 6: The package is to be derated at 15°C/W junction to heat sink pins for 14-pin pkg; 75°C/W for 8-pin.

Heat Sink Dimensions

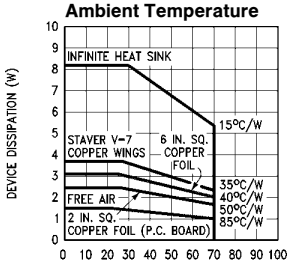


Staver Heat Sink #V-7
Staver Company
41 Saxon Ave.
P.O. Drawer H
Bayshore, NY 11706
Tel: (516) 666-8000
Copper Wings
2 Required
Soldered to
Pins 3, 4, 5,
10, 11, 12
Thickness 0.04
Inches

TL/H/6977–6

Typical Performance Characteristics

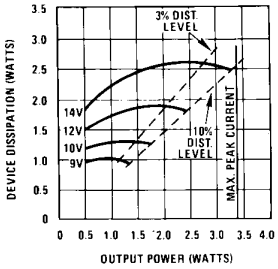
Maximum Device Dissipation vs Ambient Temperature



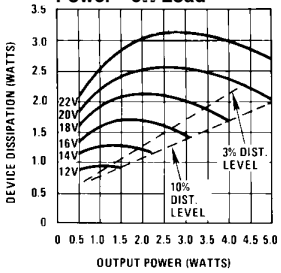
Note: 2 oz. copper foil, single-sided PC board.

TL/H/6977–12

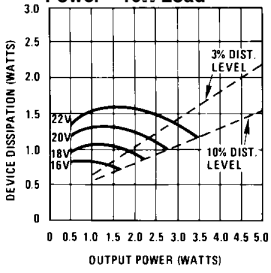
Device Dissipation vs Output Power—4Ω Load



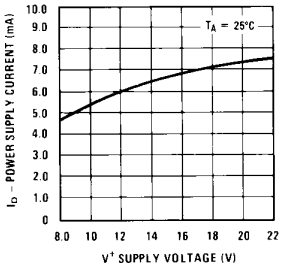
Device Dissipation vs Output Power—8Ω Load



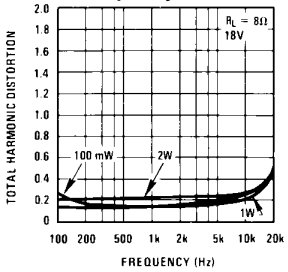
Device Dissipation vs Output Power—16Ω Load



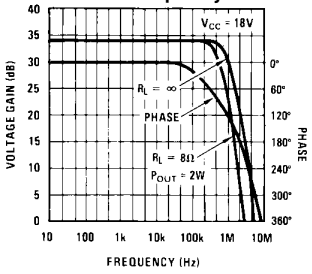
Power Supply Current vs Supply Voltage



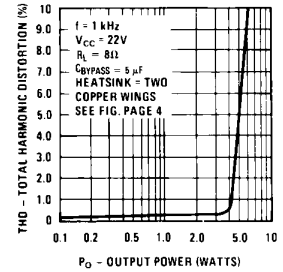
Total Harmonic Distortion vs Frequency



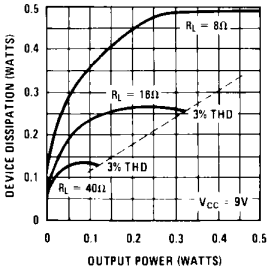
Output Voltage Gain and Phase vs Frequency



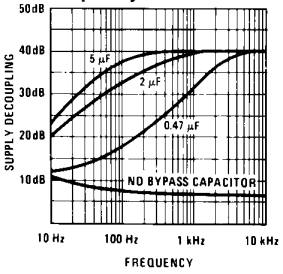
Total Harmonic Distortion vs Output Power



Device Dissipation vs Output Power



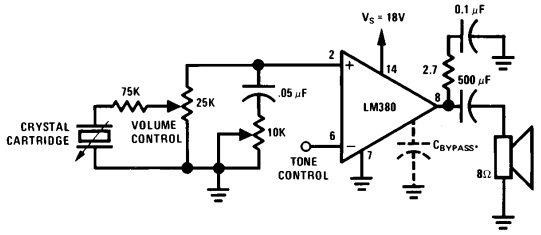
Supply Decoupling vs Frequency



TL/H/6977–7

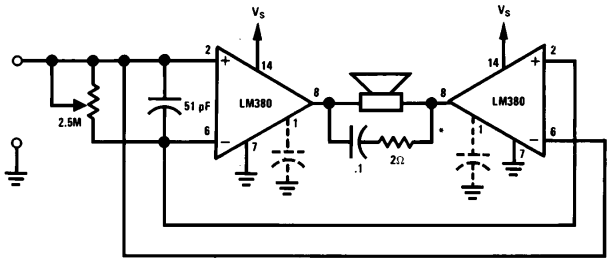
Typical Applications

Phono Amplifier



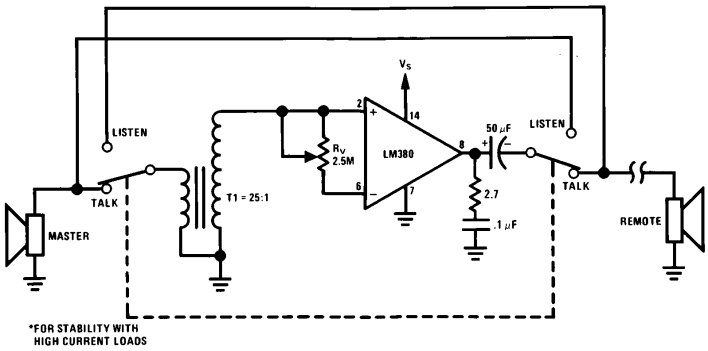
TL/H/6977–8

Bridge Amplifier



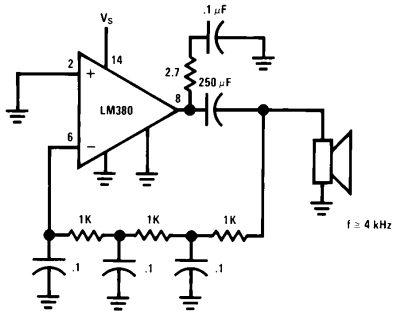
TL/H/6977–9

Intercom



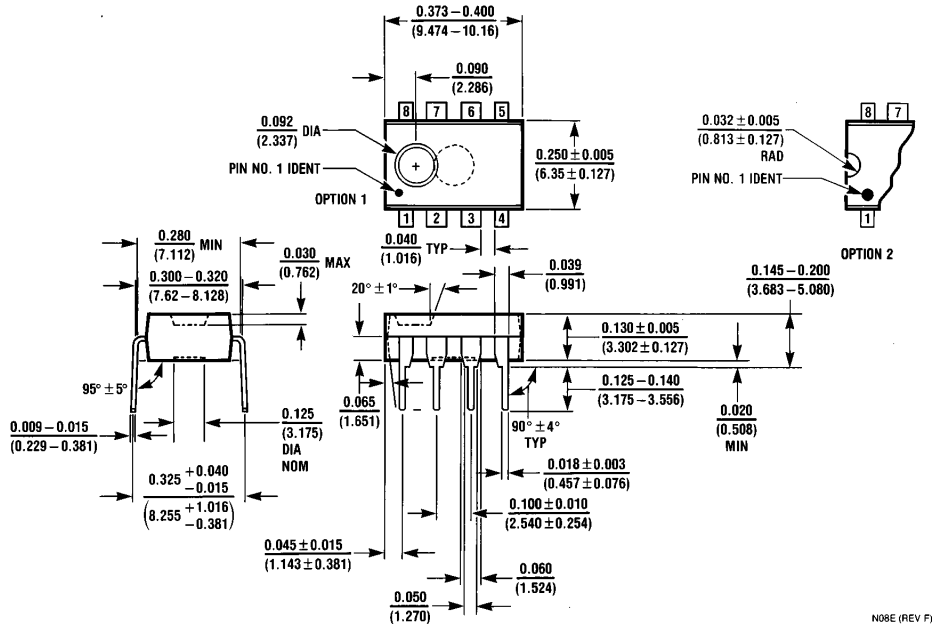
TL/H/6977–10

Phase Shift Oscillator



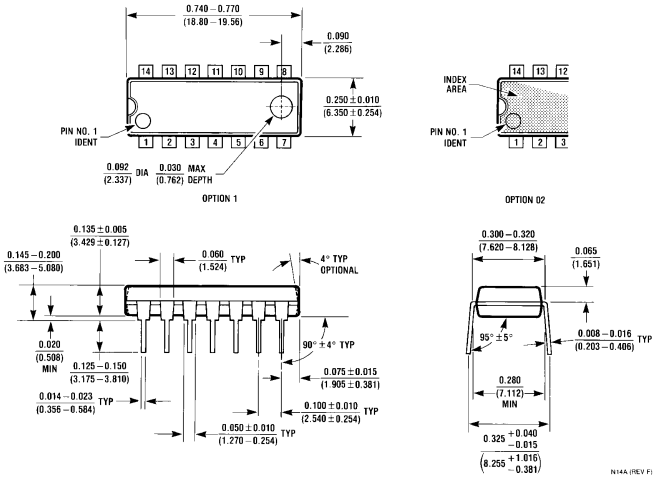
TL/H/6977–11

Physical Dimensions inches (millimeters)



Molded Dual-In-Line Package (N)
Order Number LM380N-8
NS Package Number N08E

Physical Dimensions inches (millimeters) (Continued)



Molded Dual-In-Line Package (N)
Order Number LM380N
NS Package Number N14A

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 OF NATIONAL SEMICONDUCTOR CORPORATION. As used herein:

1. 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.
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.

National Semiconductor Corporation
1111 West Bardin Road
Arlington, TX 76017
Tel: 1(800) 272-9959
Fax: 1(800) 737-7018

National Semiconductor Europe
Fax: (+49) 0-180-530 85 86
Email: cnjwge@tevm2.nsc.com
Deutsch Tel: (+49) 0-180-530 85 85
English Tel: (+49) 0-180-532 78 32
Français Tel: (+49) 0-180-532 93 58
Italiano Tel: (+49) 0-180-534 16 80

National Semiconductor Hong Kong Ltd.
13th Floor, Straight Block,
Ocean Centre, 5 Canton Rd.
Tsimshatsui, Kowloon
Hong Kong
Tel: (852) 2737-1600
Fax: (852) 2736-9960

National Semiconductor Japan Ltd.
Tel: 81-043-299-2309
Fax: 81-043-299-2408