National Semiconductor Corporation

LM2002/LM2002A 8 Watt Audio Power Amplifier

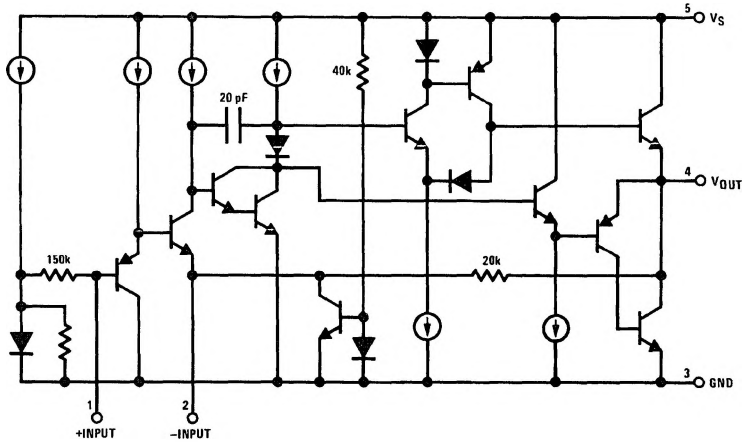
General Description

The LM2002 is a cost effective, high power amplifier suited for automotive applications. High current capability (3.5A) enables the device to drive low impedance loads with low distortion. The LM2002 is current limited and thermally protected. High voltage protection is available (LM2002A) which enables the amplifier to withstand 40V transients on its supply. The LM2002 comes in a 5-pin TO-220 package.

Features

- High peak current capability (3.5A)
- Large output voltage swing
- Externally programmable gain
- Wide supply voltage range (5V–20V)
- Few external parts required
- Low distortion
- High input impedance
- No turn-on transients
- High voltage protection available (LM2002A)
- Low noise
- AC short circuit protected
- Pin for pin compatible with TDA2002

Equivalent Schematic



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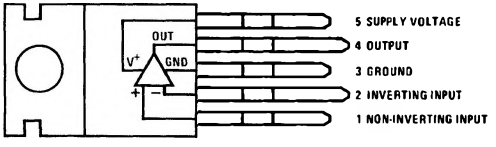
Connection Diagram

Plastic Package



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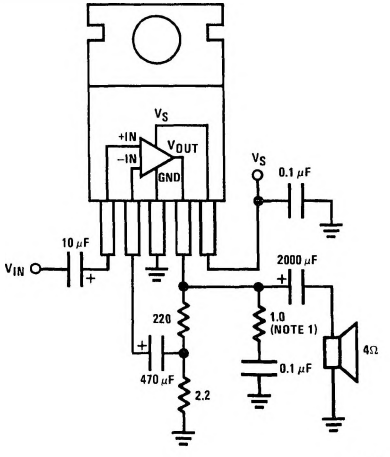
Order Number LM2002T or LM2002AT
See NS Package Number T05A

Typical Application



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Absolute Maximum Ratings

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

Peak Supply Voltage (50 ms)	
LM2002A (Note 2)	40V
LM2002	25V
Operating Supply Voltage	20V
Output Current	
Repetitive	3.5A
Non-repetitive	4.5A
Input Voltage	±0.5V
Power Dissipation (Note 3)	15W
Operating Temperature	0°C to +70°C
Storage Temperature	−60°C to +150°C
Lead Temperature (Soldering, 10 sec.)	260°C

Electrical Characteristics

V_S = 14.4V, T_{TAB} = 25°C, A_V = 100 (40 dB), R_L = 4Ω, unless otherwise specified

Parameter	Conditions	Min	Typ	Max	Units
DC Output Level		6.4	7.2	8	V
Quiescent Supply Current	Excludes Current in Feedback Resistors		45	80	mA
Supply Voltage Range		5		20	V
Input Resistance			150		kΩ
Bandwidth	Gain = 40 dB		100		kHz
Output Power	V_S = 13.2V, f = 1 kHz				
	R_L = 4Ω, THD = 10%		4.3		W
	R_L = 2Ω, THD = 10%		6.5		W
	V_S = 13.8V, f = 1 kHz				
	R_L = 4Ω, THD = 10%		4.8		W
	R_L = 2Ω, THD = 10%		7.4		W
	V_S = 14.4V, f = 1 kHz				
	R_L = 4Ω, THD = 10%	4.8	5.2		W
	R_L = 2Ω, THD = 10%	7	8		W
	R_L = 1.6Ω, THD = 10%		9		W
	V_S = 16V, f = 1 kHz				
	R_L = 4Ω, THD = 10%		6.5		W
	R_L = 2Ω, THD = 10%		10		W
	R_L = 1.6Ω, THD = 10%		10.5		W
THD	P_O = 2W, R_L = 4Ω, f = 1 kHz		0.1		%
	P_O = 4W, R_L = 2 Ω, f = 1 kHz		0.1		%
Ripple Rejection	R_S = 50Ω, f = 100 Hz	30	40		dB
	R_S = 50Ω, f = 1 kHz		44		dB
Input Noise Voltage	R_S = 0, 15 kHz Bandwidth		2		μV
Input Noise Current	R_S = 100 kΩ, 15 kHz Bandwidth		40		pA

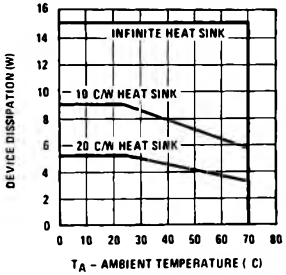
Note 1: A 1.0 resistor and 0.1 μF capacitor should be placed as close as possible to pins 3 and 4 for stability.

Note 2: The LM2002 shuts down above 25V.

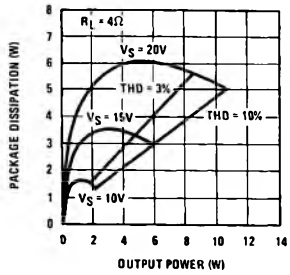
Note 3: For operating at elevated temperatures, the device must be derated based on a 150°C maximum junction temperature and a thermal resistance of 4°C/W junction to case.

Typical Performance Characteristics

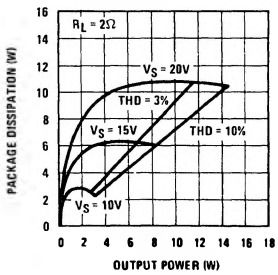
Device Dissipation vs Ambient Temperature



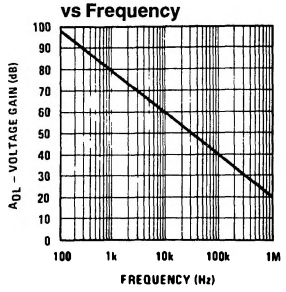
Power Dissipation vs Output Power



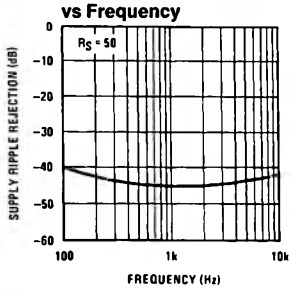
Power Dissipation vs Output Power



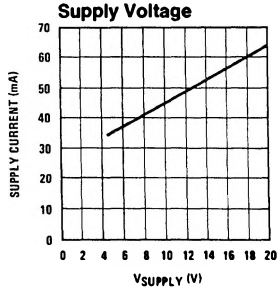
Open Loop Gain vs Frequency



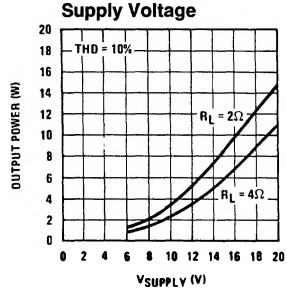
Supply Ripple Rejection vs Frequency



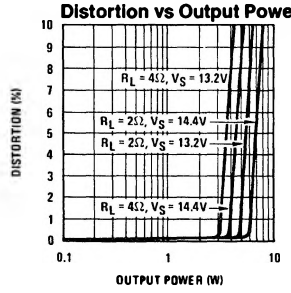
Supply Current vs Supply Voltage



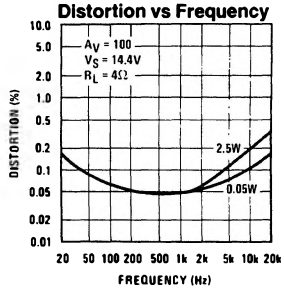
Output Power vs Supply Voltage



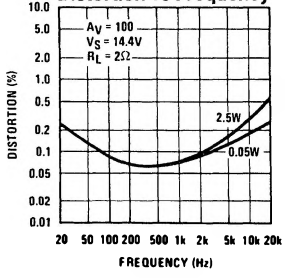
Distortion vs Output Power



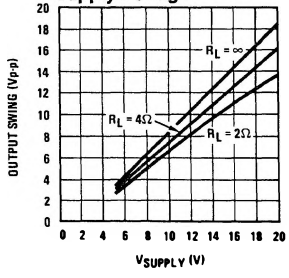
Distortion vs Frequency



Distortion vs Frequency



Output Swing vs Supply Voltage



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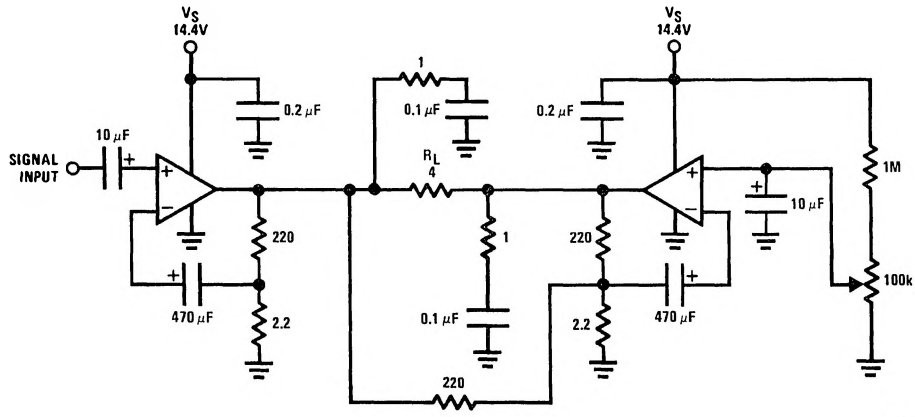
Typical Applications (Continued)

16W Bridge Amplifier



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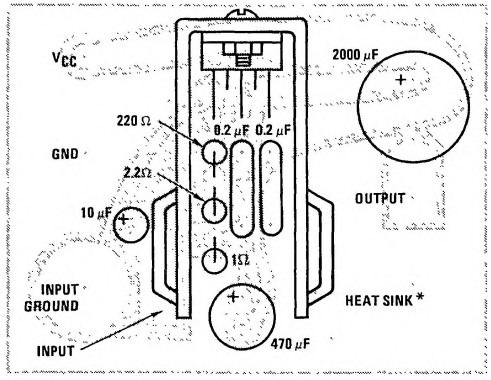
Component Layout

Single Amplifier
V_S = 20V
R_L = 4Ω



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