

## LM1877

### Dual Audio Power Amplifier

#### General Description

The LM1877 is a monolithic dual power amplifier designed to deliver 2W/channel continuous into 8Ω loads. The LM1877 is designed to operate with a low number of external components, and still provide flexibility for use in stereo phonographs, tape recorders and AM-FM stereo receivers, etc. Each power amplifier is biased from a common internal regulator to provide high power supply rejection, and output Q point centering. The LM1877 is internally compensated for all gains greater than 10.

#### Features

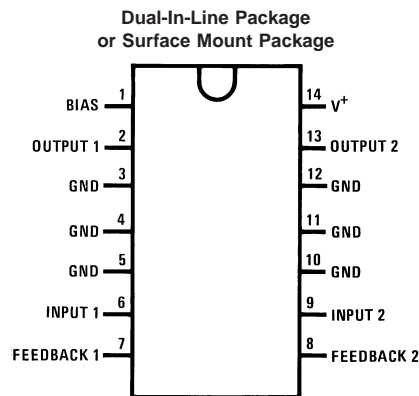
- 2W/channel
- -65 dB ripple rejection, output referred
- -65 dB channel separation, output referred

- Wide supply range, 6V–24V
- Very low cross-over distortion
- Low audio band noise
- AC short circuit protected
- Internal thermal shutdown

#### Applications

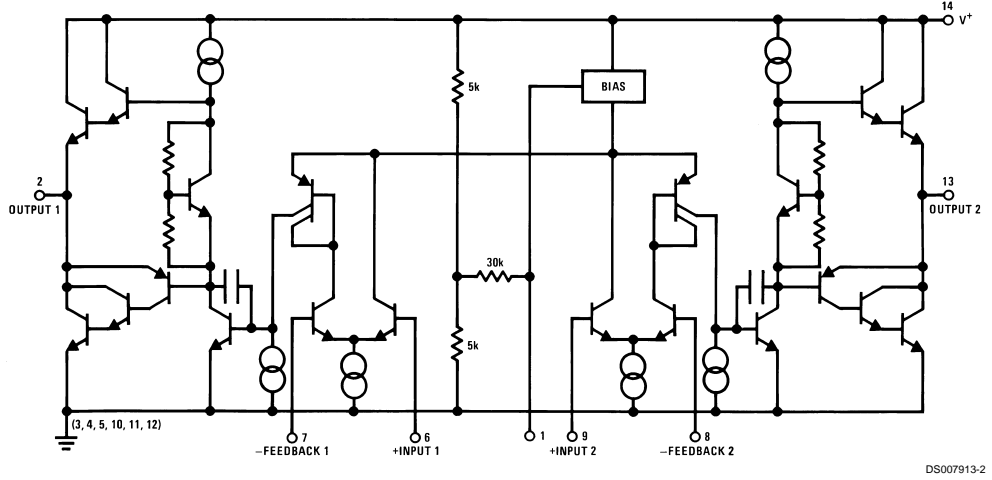
- Multi-channel audio systems
- Stereo phonographs
- Tape recorders and players
- AM-FM radio receivers
- Servo amplifiers
- Intercom systems
- Automotive products

#### Connection Diagram



**Top View**  
**Order Number LM1877M-9 or LM1877N-9**  
**See NS Package Number M14B or N14A**

# Equivalent Schematic Diagram



DS007913-2

## 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	26V
Input Voltage	±0.7V
Operating Temperature	0°C to +70°C
Storage Temperature	-65°C to +150°C
Junction Temperature	150°C
Lead Temperature	
N-Package Soldering (10 sec.)	260°C

M-Package Infrared (15 sec.)	220°C
M-Package Vapor Phase (60 sec.)	215°C
Thermal Resistance	
$\theta_{JC}$ (N-Package)	30°C/W
$\theta_{JA}$ (N-Package)	79°C/W
$\theta_{JC}$ (M-Package)	27°C/W
$\theta_{JA}$ (M-Package)	114°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

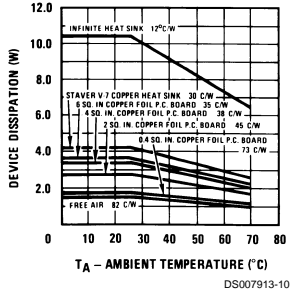
$V_S = 20V$ ,  $T_A = 25^\circ C$ , (Note 2)  $R_L = 8\Omega$ ,  $A_V = 50$  (34 dB) unless otherwise specified

Parameter	Conditions	Min	Typ	Max	Units
Total Supply Current	$P_O = 0W$		25	50	mA
Output Power LM1877	THD = 10% $V_S = 20V$ , $R_L = 8\Omega$ $V_S = 12V$ , $R_L = 8\Omega$	2.0	1.3		W/Ch W/Ch
Total Harmonic Distortion LM1877	$f = 1$ kHz, $V_S = 14V$				
	$P_O = 50$ mW/Channel		0.075		%
	$P_O = 500$ mW/Channel		0.045		%
	$P_O = 1$ W/Channel		0.055		%
Output Swing	$R_L = 8\Omega$		$V_S - 6$		Vp-p
Channel Separation	$C_F = 50$ $\mu F$ , $C_{IN} = 0.1$ $\mu F$ , $f = 1$ kHz, Output Referred				
	$V_S = 20V$ , $V_O = 4$ Vrms	-50	-70		dB
	$V_S = 7V$ , $V_O = 0.5$ Vrms		-60		dB
PSRR Power Supply Rejection Ratio	$C_F = 50$ $\mu F$ , $C_{IN} = 0.1$ $\mu F$ , $f = 120$ Hz, Output Referred				
	$V_S = 20V$ , $V_{RIPPLE} = 1$ Vrms	-50	-65		dB
	$V_S = 7V$ , $V_{RIPPLE} = 0.5$ Vrms		-40		dB
Noise	Equivalent Input Noise				
	$R_S = 0$ , $C_{IN} = 0.1$ $\mu F$ , BW = 20 Hz–20 kHz, Output Noise Wideband		2.5		$\mu V$
	$R_S = 0$ , $C_N = 0.1$ $\mu F$ , $A_V = 200$		0.80		mV
Open Loop Gain	$R_S = 0$ , $f = 100$ kHz, $R_L = 8\Omega$		70		dB
Input Offset Voltage			15		mV
Input Bias Current			50		nA
Input Impedance	Open Loop		4		M $\Omega$
DC Output Level	$V_S = 20V$	9	10	11	V
Slew Rate			2.0		V/ $\mu s$
Power Bandwidth			65		kHz
Current Limit			1.0		A

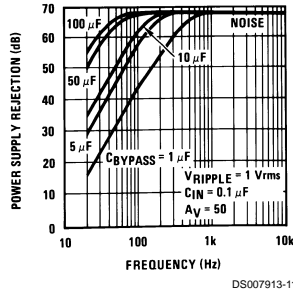
**Note 2:** For operation at ambient temperature greater than 25°C, the LM1877 must be derated based on a maximum 150°C junction temperature.

# Typical Performance Characteristics

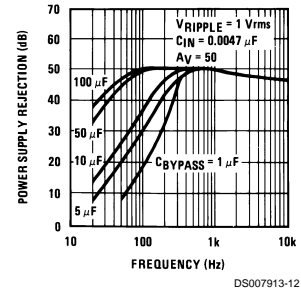
**Device Dissipation vs Ambient Temperature**



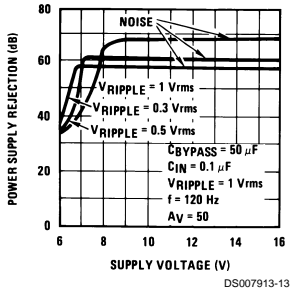
**Power Supply Rejection Ratio (Referred to the Output) vs Frequency**



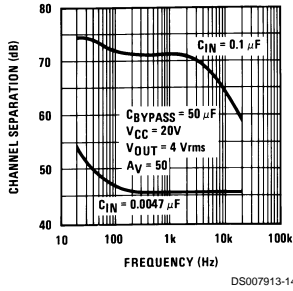
**Power Supply Rejection Ratio (Referred to the Output) vs Frequency**



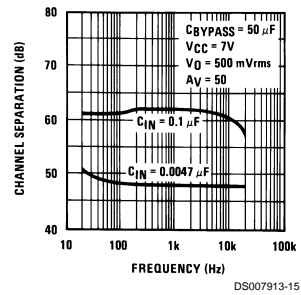
**Power Supply Rejection Ratio (Referred to the Output) vs Supply Voltage**



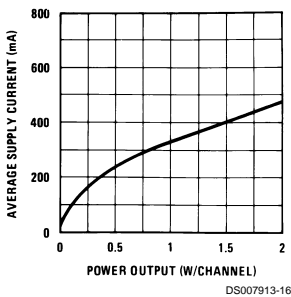
**Channel Separation (Referred to the Output) vs Frequency**



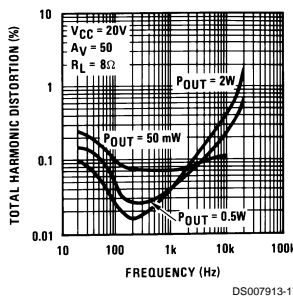
**Channel Separation (Referred to the Output) vs Frequency**



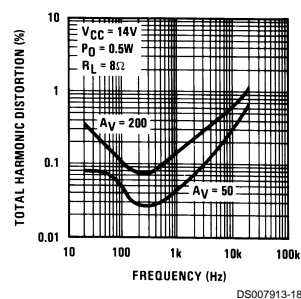
**Average Supply Current vs P<sub>OUT</sub>**



**Total Harmonic Distortion vs Frequency**

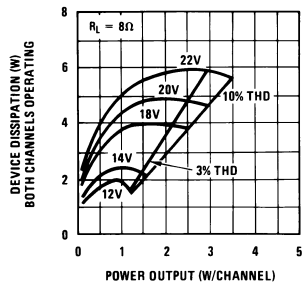


**Total Harmonic Distortion vs Frequency**



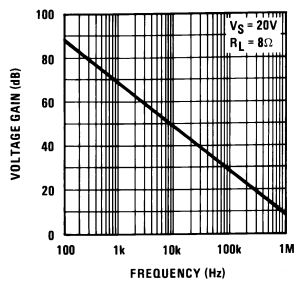
## Typical Performance Characteristics (Continued)

**Power Dissipation (W)  
Both Channels Operating**



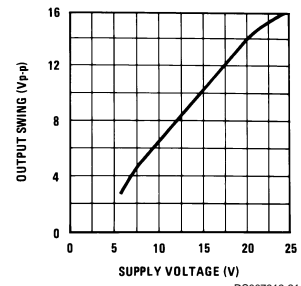
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**Open Loop Gain vs  
Frequency**



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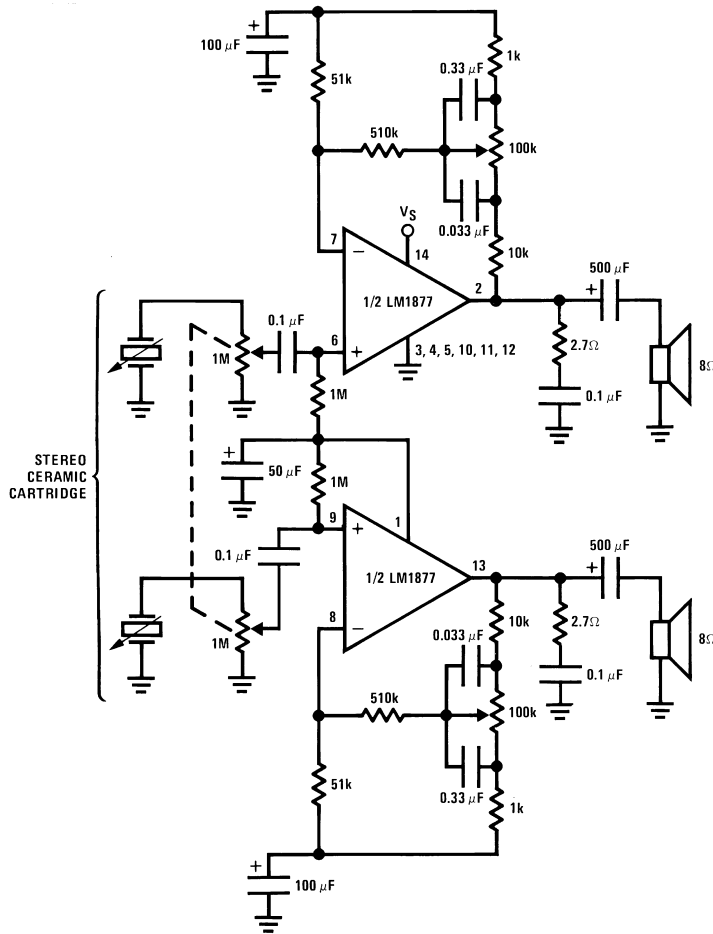
**Output Swing vs Supply  
Voltage**



DS007913-21

## Typical Applications

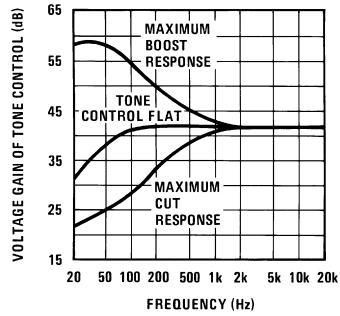
**Stereo Phonograph Amplifier with Bass Tone Control**



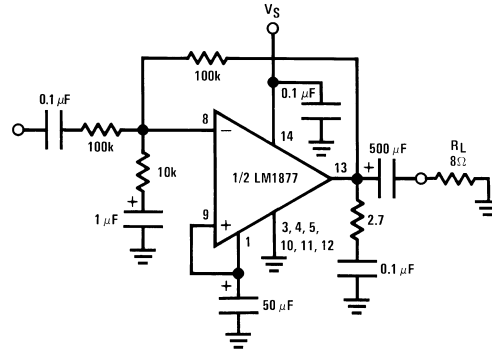
DS007913-4

## Typical Applications (Continued)

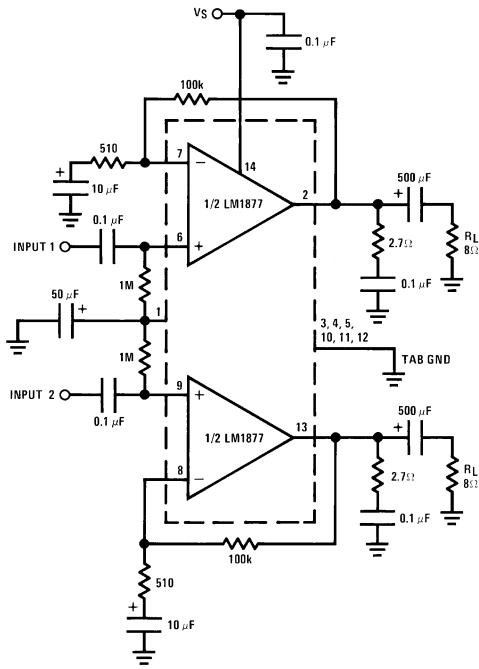
Frequency Response of Bass Tone Control



Inverting Unity Gain Amplifier

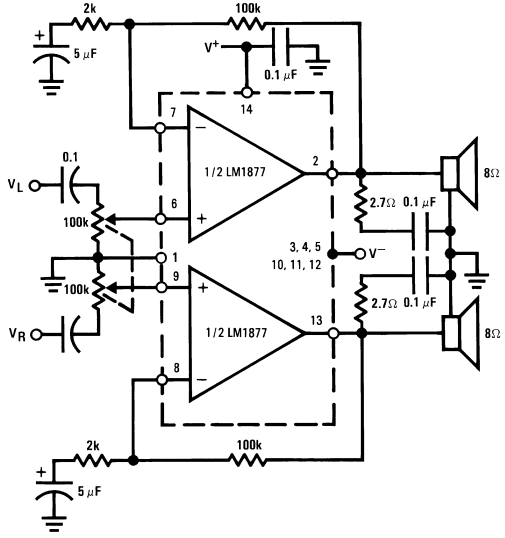


Stereo Amplifier with  $A_v = 200$

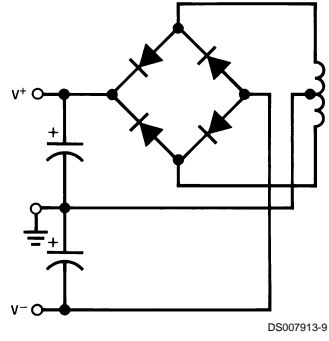


## Typical Applications (Continued)

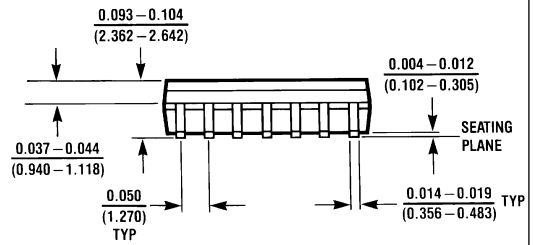
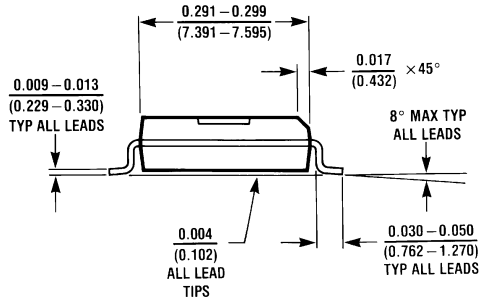
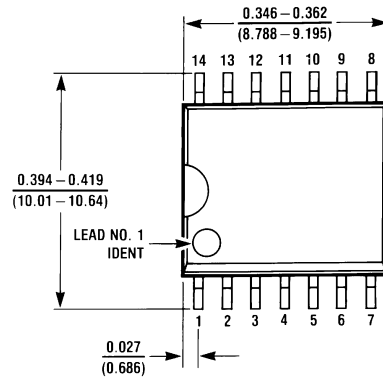
### Non-Inverting Amplifier Using Split Supply



### Typical Split Supply



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

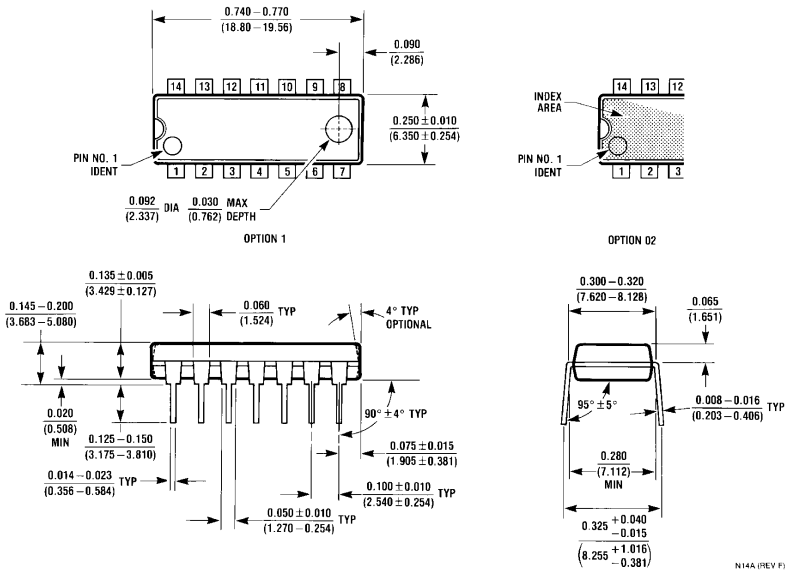


M14B (REV D)

**Molded SOIC Package (M)**  
**Order Number LM1877M-9**  
**NS Package Number M14B**



**Physical Dimensions** inches (millimeters) unless otherwise noted (Continued)




**Molded Dual-In-Line Package (N)**  
**Order Number LM1877N-9**  
**NS Package Number N14A**

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