

## 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

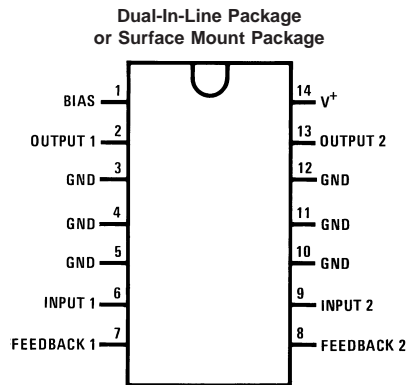
- 2W/channel
- -65 dB ripple rejection, output referred
- -65 dB channel separation, output referred

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

### Applications

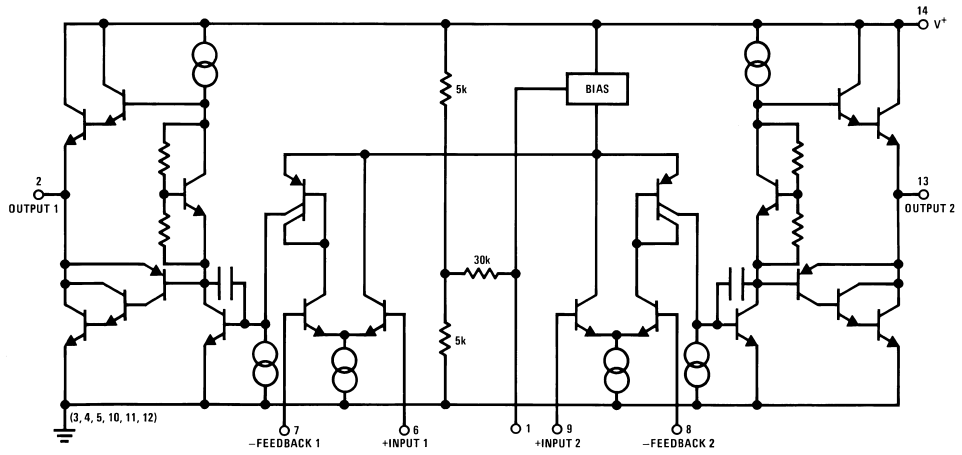
- Multi-channel audio systems
- Stereo phonographs
- Tape recorders and players
- AM-FM radio receivers
- Servo amplifiers
- Intercom systems
- Automotive products

### 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 Infared (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

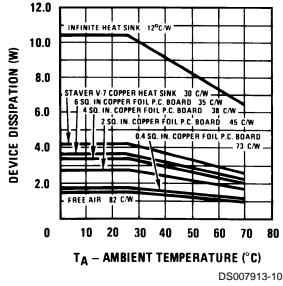
$V_S = 20V$ ,  $T_A = 25^\circ C$ , (Note 2)  $R_L = 8\Omega$ ,  $A_V = 50$  (34 dB) unless otherwise specified

Parameter	Conditions	Min	Typ	Max	Units
Total Supply Current	$P_O = 0W$		25	50	mA
Output Power LM1877	THD = 10%	2.0			
	$V_S = 20V$ , $R_L = 8\Omega$ $V_S = 12V$ , $R_L = 8\Omega$		1.3		
Total Harmonic Distortion LM1877	$f = 1\text{ kHz}$ , $V_S = 14V$				
	$P_O = 50\text{ mW/Channel}$		0.075		%
	$P_O = 500\text{ mW/Channel}$		0.045		%
	$P_O = 1\text{ W/Channel}$		0.055		%
Output Swing	$R_L = 8\Omega$		$V_S - 6$		Vp-p
Channel Separation	$C_F = 50\ \mu F$ , $C_{IN} = 0.1\ \mu F$ , $f = 1\text{ kHz}$ , Output Referred				
	$V_S = 20V$ , $V_O = 4\text{ Vrms}$	-50	-70		dB
	$V_S = 7V$ , $V_O = 0.5\text{ Vrms}$		-60		dB
PSRR Power Supply Rejection Ratio	$C_F = 50\ \mu F$ , $C_{IN} = 0.1\ \mu F$ , $f = 120\text{ Hz}$ , Output Referred				
	$V_S = 20V$ , $V_{RIPPLE} = 1\text{ Vrms}$	-50	-65		dB
	$V_S = 7V$ , $V_{RIPPLE} = 0.5\text{ Vrms}$		-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	$R_S = 0$ , $f = 100\text{ kHz}$ , $R_L = 8\Omega$		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

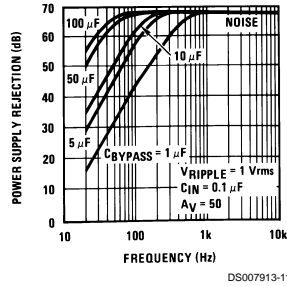
**Note 2:** For operation at ambient temperature greater than 25°C, the LM1877 must be derated based on a maximum 150°C junction temperature.

## Typical Performance Characteristics

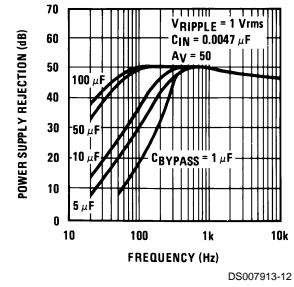
Device Dissipation vs Ambient Temperature



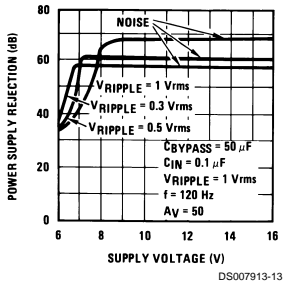
Power Supply Rejection Ratio (Referred to the Output) vs Frequency



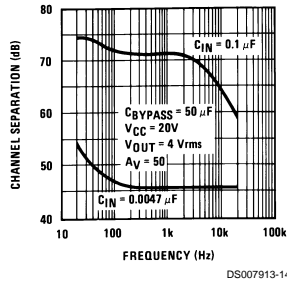
Power Supply Rejection Ratio (Referred to the Output) vs Frequency



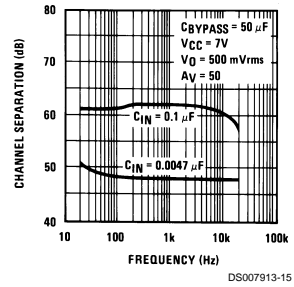
Power Supply Rejection Ratio (Referred to the Output) vs Supply Voltage



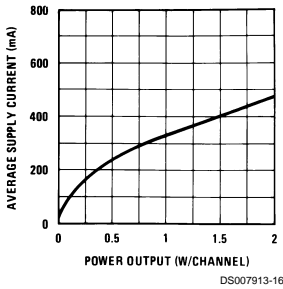
Channel Separation (Referred to the Output) vs Frequency



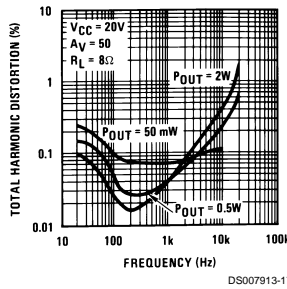
Channel Separation (Referred to the Output) vs Frequency



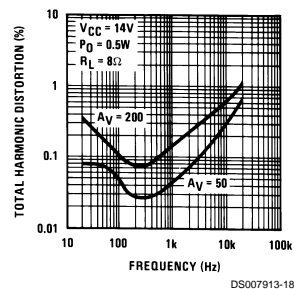
Average Supply Current vs  $P_{OUT}$



Total Harmonic Distortion vs Frequency

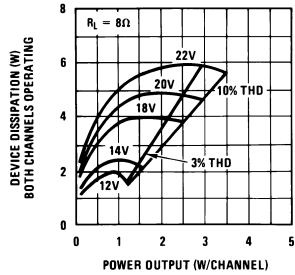


Total Harmonic Distortion vs Frequency



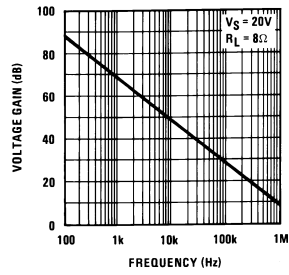
## Typical Performance Characteristics (Continued)

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



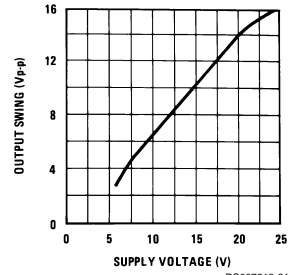
DS007913-19

**Open Loop Gain vs  
Frequency**



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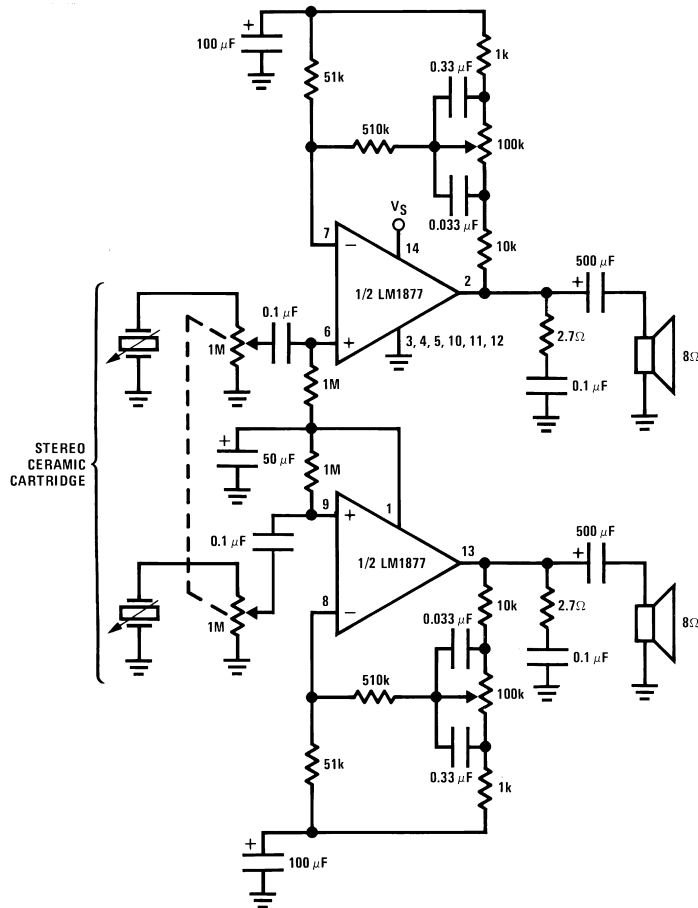
**Output Swing vs Supply  
Voltage**



DS007913-21

## Typical Applications

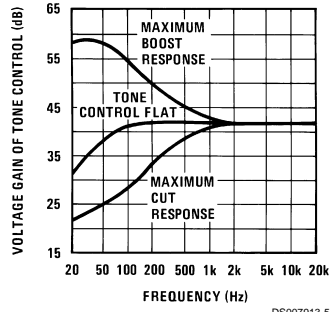
**Stereo Phonograph Amplifier with Bass Tone Control**



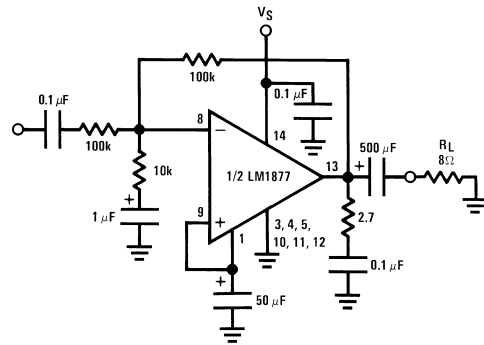
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## Typical Applications (Continued)

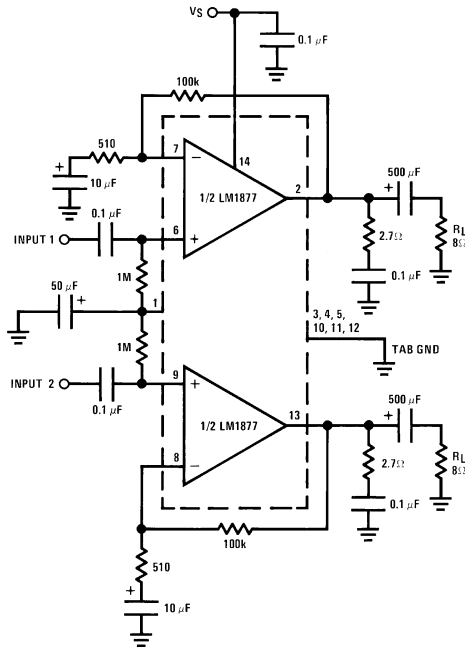
Frequency Response of Bass Tone Control



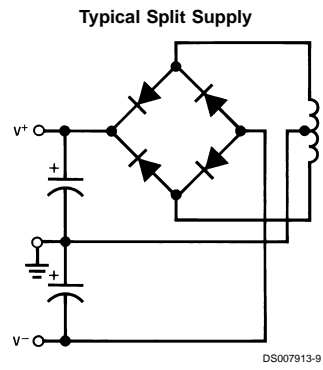
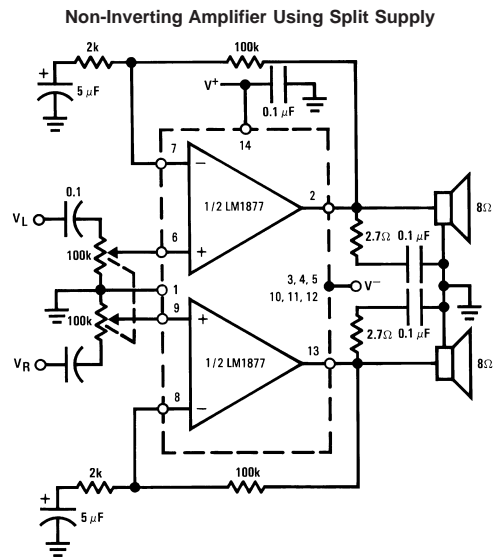
Inverting Unity Gain Amplifier



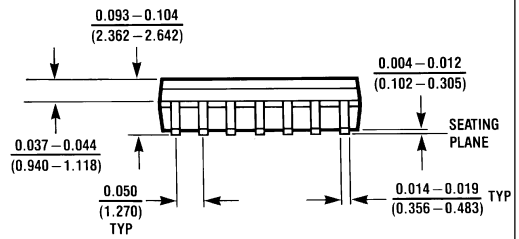
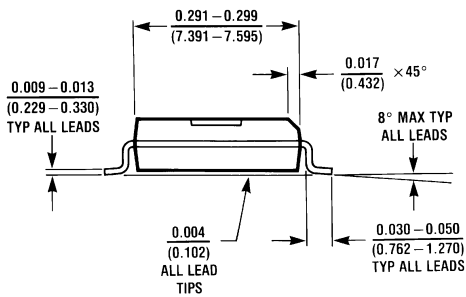
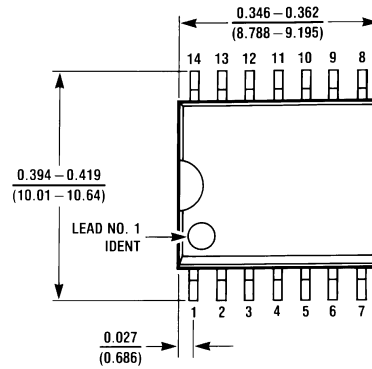
Stereo Amplifier with  $A_V = 200$



## Typical Applications (Continued)



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

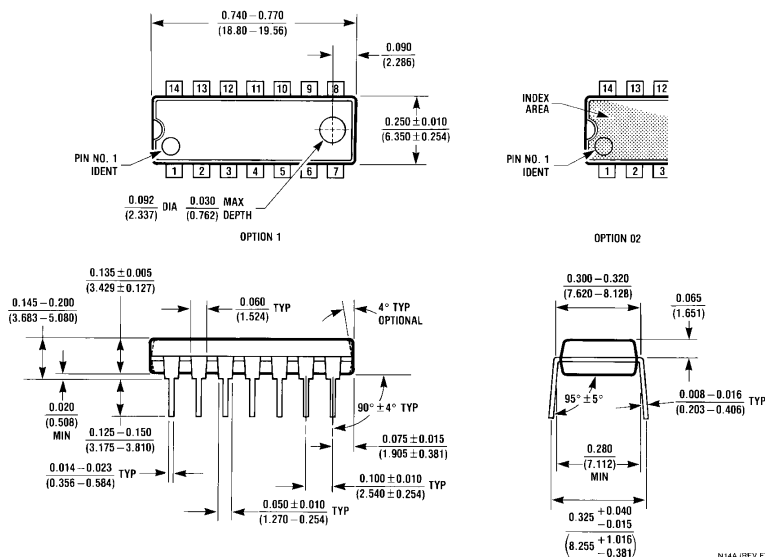


M14B (REV D)

**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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