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February 1995

LM1877 Dual Audio Power Amplifier

LM1877

Dual Audio Power Amplifier

General Description

The LM1877 is a monolithic dual power amplifier designed to deliver 2W/channel continuous into 8 Ω 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

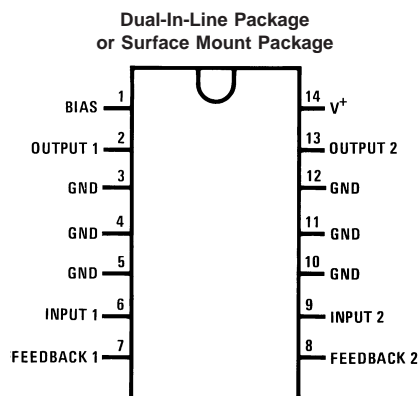
- 2W/channel
- -65 dB ripple rejection, output referred
- -65 dB channel separation, output referred

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

Applications

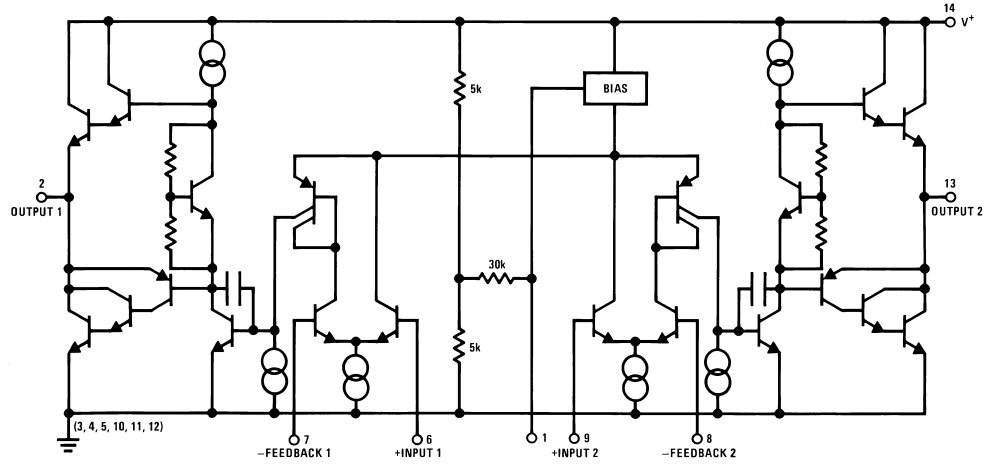
- Multi-channel audio systems
- Stereo phonographs
- Tape recorders and players
- AM-FM radio receivers
- Servo amplifiers
- Intercom systems
- Automotive products

Connection Diagram



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

Equivalent Schematic Diagram



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	$\pm 0.7V$
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	
θ_{JC} (N-Package)	30°C/W
θ_{JA} (N-Package)	79°C/W
θ_{JC} (M-Package)	27°C/W
θ_{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

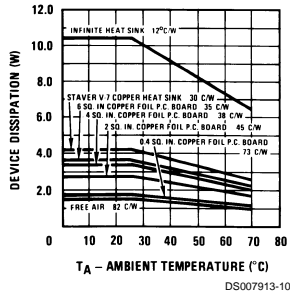
$V_S = 20V$, $T_A = 25^\circ C$, (Note 2) $R_L = 8\Omega$, $A_V = 50$ (34 dB) unless otherwise specified

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	$f = 1\text{ kHz}$, $V_S = 14V$				
	$P_O = 50\text{ mW/Channel}$		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	$C_F = 50\text{ }\mu F$, $C_{IN} = 0.1\text{ }\mu F$, $f = 1\text{ kHz}$, 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	$C_F = 50\text{ }\mu F$, $C_{IN} = 0.1\text{ }\mu F$, $f = 120\text{ Hz}$, 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				
	$R_S = 0$, $C_{IN} = 0.1\text{ }\mu F$, BW = 20 Hz–20 kHz, Output Noise Wideband		2.5		μV
	$R_S = 0$, $C_N = 0.1\text{ }\mu F$, $A_V = 200$		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 Ω
DC Output Level	$V_S = 20V$	9	10	11	V
Slew Rate			2.0		V/ μs
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.

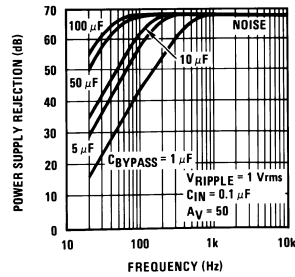
Typical Performance Characteristics

Device Dissipation vs Ambient Temperature



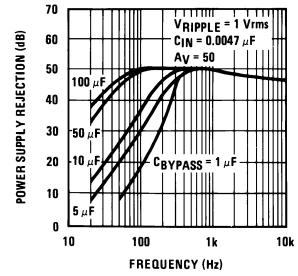
DS007913-10

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



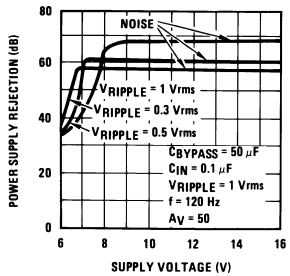
DS007913-11

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



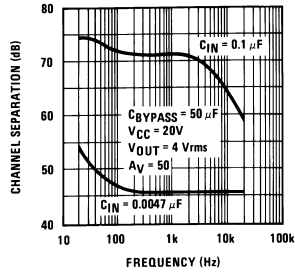
DS007913-12

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



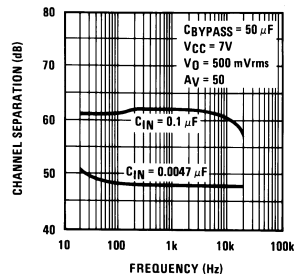
DS007913-13

Channel Separation (Referred to the Output) vs Frequency



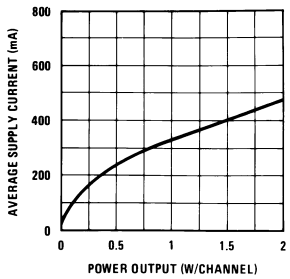
DS007913-14

Channel Separation (Referred to the Output) vs Frequency



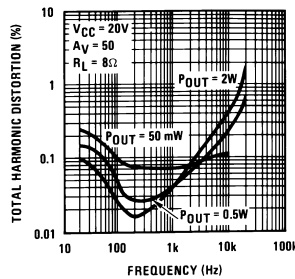
DS007913-15

Average Supply Current vs P_{OUT}



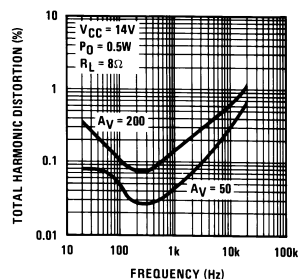
DS007913-16

Total Harmonic Distortion vs Frequency



DS007913-17

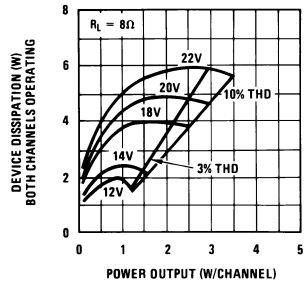
Total Harmonic Distortion vs Frequency



DS007913-18

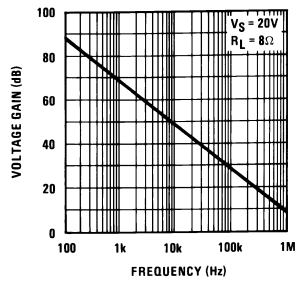
Typical Performance Characteristics (Continued)

Power Dissipation (W)
Both Channels Operating



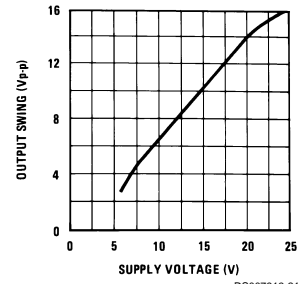
DS007913-19

Open Loop Gain vs
Frequency



DS007913-20

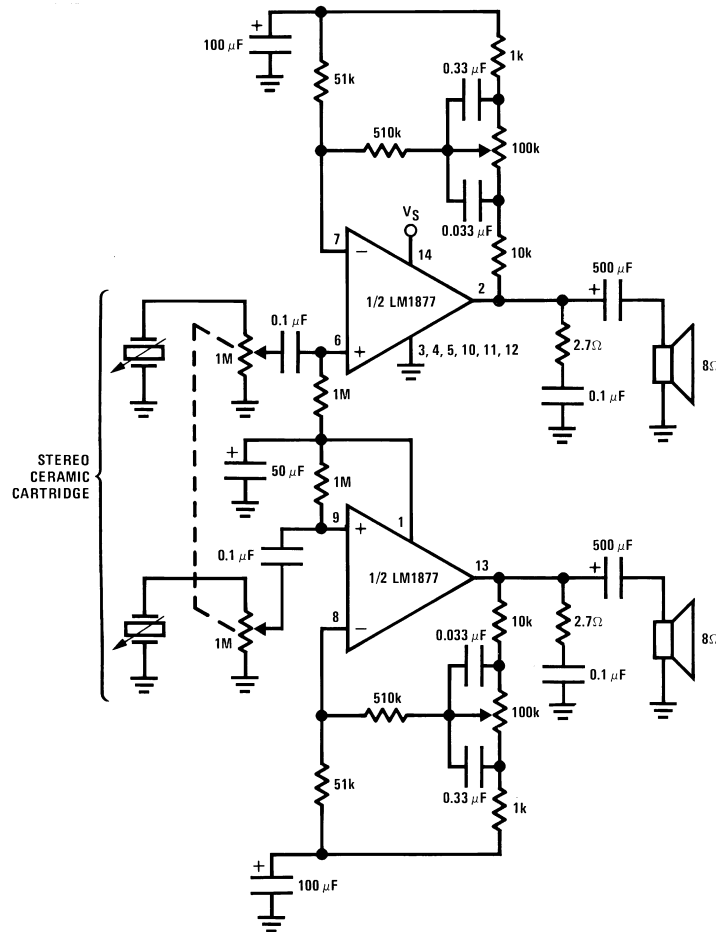
Output Swing vs Supply
Voltage



DS007913-21

Typical Applications

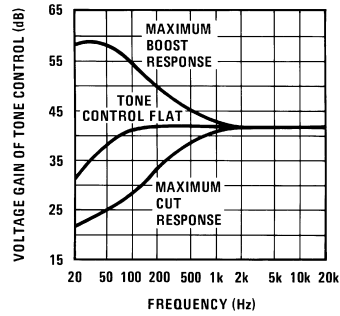
Stereo Phonograph Amplifier with Bass Tone Control



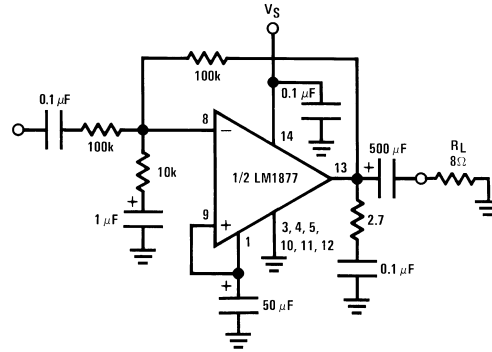
DS007913-4

Typical Applications (Continued)

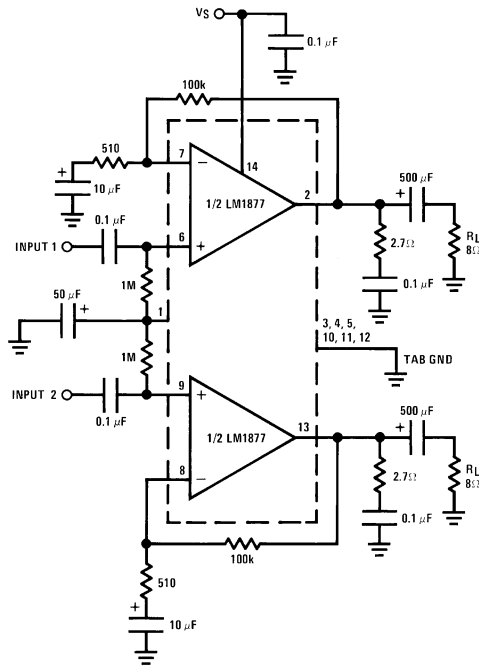
Frequency Response of Bass Tone Control



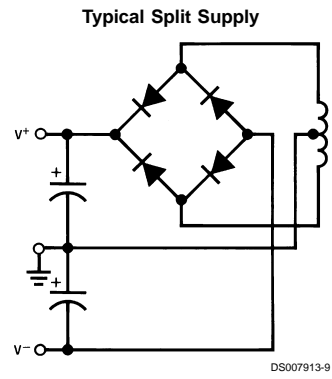
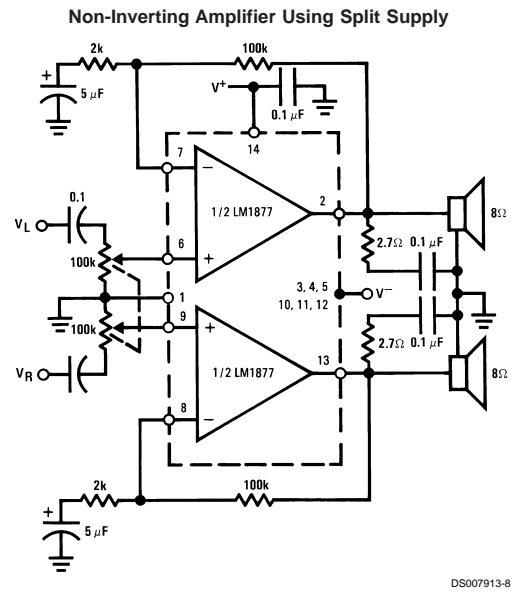
Inverting Unity Gain Amplifier



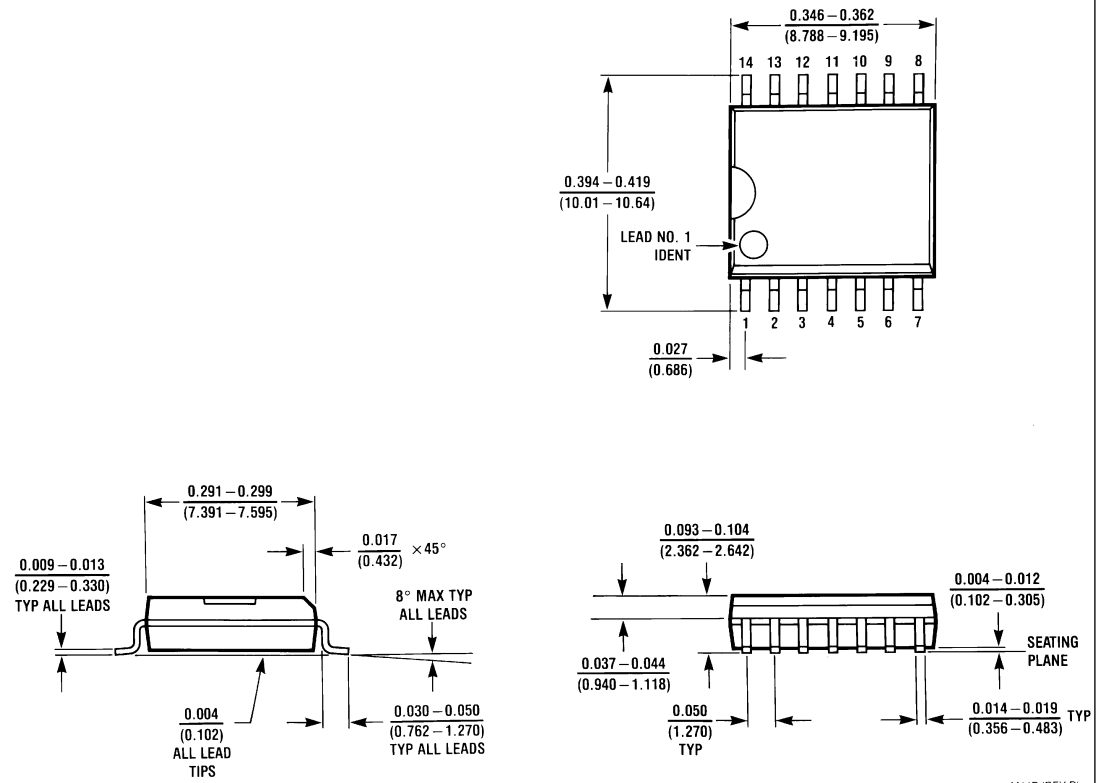
Stereo Amplifier with $A_v = 200$



Typical Applications (Continued)



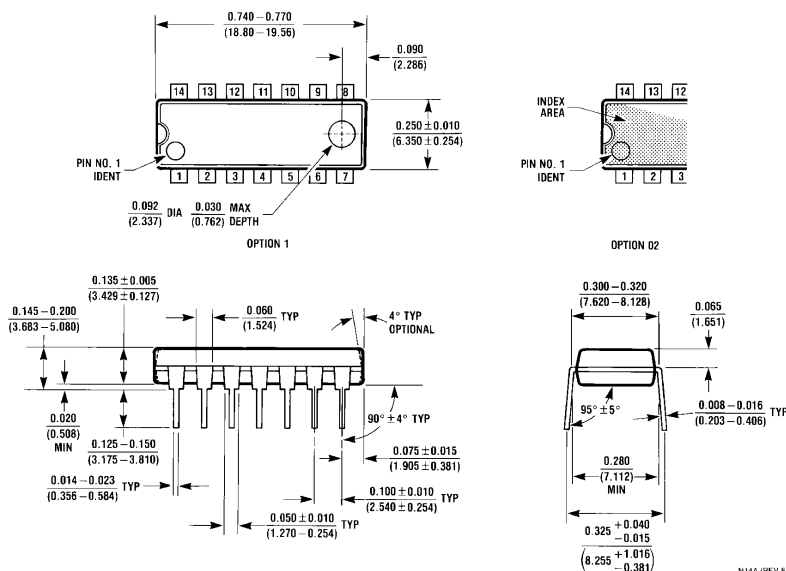
Physical Dimensions inches (millimeters) unless otherwise noted



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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National Semiconductor Corporation
Americas
Tel: 1-800-272-9959
Fax: 1-800-737-7018
Email: support@nsc.com

www.national.com

National Semiconductor Europe
Fax: +49 (0) 1 80-530 85 86
Email: europe.support@nsc.com
Deutsch Tel: +49 (0) 1 80-530 85 85
English Tel: +49 (0) 1 80-532 78 32
Français Tel: +49 (0) 1 80-532 93 58
Italiano Tel: +49 (0) 1 80-534 16 80

National Semiconductor Asia Pacific Customer Response Group
Tel: 65-2544466
Fax: 65-2504466
Email: sea.support@nsc.com

National Semiconductor Japan Ltd.
Tel: 81-3-5639-7560
Fax: 81-3-5639-7507