

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

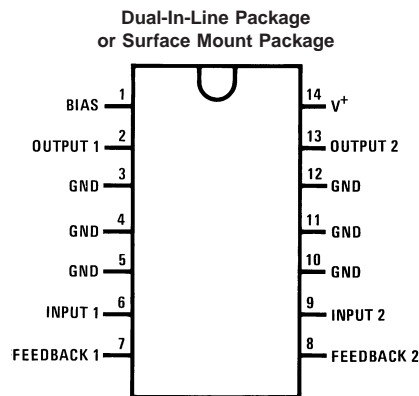
- 2W/channel
- -65 dB ripple rejection, output referred
- -65 dB channel separation, output referred

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

Applications

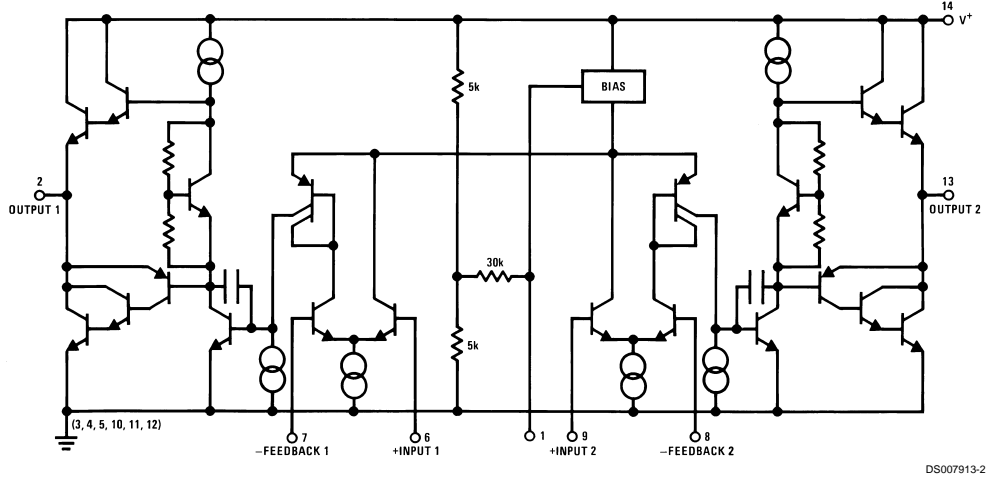
- Multi-channel audio systems
- Stereo phonographs
- Tape recorders and players
- AM-FM radio receivers
- Servo amplifiers
- Intercom systems
- Automotive products

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 | |
| 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

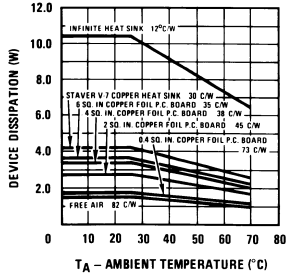
$V_S = 20V$, $T_A = 25^\circ C$, (Note 2) $R_L = 8\Omega$, $A_V = 50$ (34 dB) unless otherwise specified

| 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 | $f = 1$ 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 | $C_F = 50$ μF , $C_{IN} = 0.1$ μF , $f = 1$ 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 | $C_F = 50$ μF , $C_{IN} = 0.1$ μF , $f = 120$ 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 | | | | |
| | $R_S = 0$, $C_{IN} = 0.1$ μF , BW = 20 Hz–20 kHz, Output Noise Wideband | | 2.5 | | μV |
| | $R_S = 0$, $C_N = 0.1$ μF , $A_V 200$ | | 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 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.

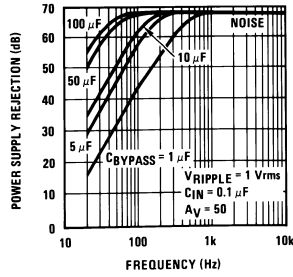
Typical Performance Characteristics

Device Dissipation vs Ambient Temperature



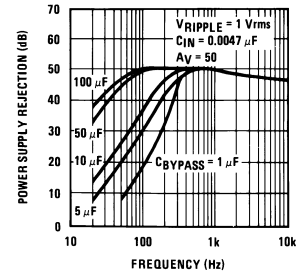
DS007913-10

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



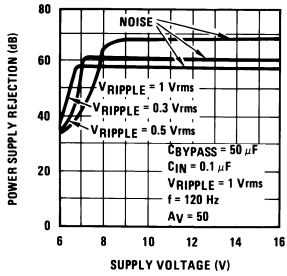
DS007913-11

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



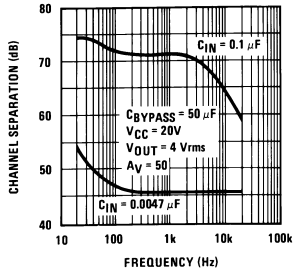
DS007913-12

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



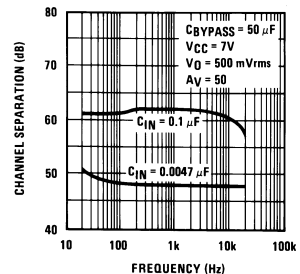
DS007913-13

Channel Separation (Referred to the Output) vs Frequency



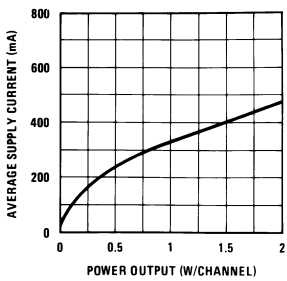
DS007913-14

Channel Separation (Referred to the Output) vs Frequency



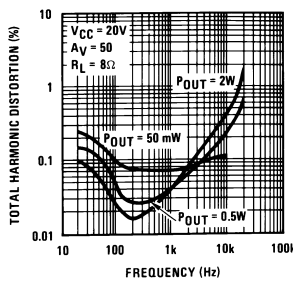
DS007913-15

Average Supply Current vs P_{OUT}



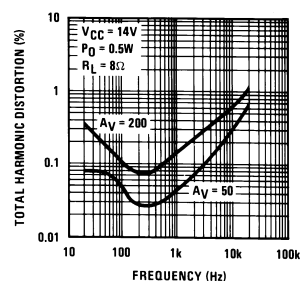
DS007913-16

Total Harmonic Distortion vs Frequency



DS007913-17

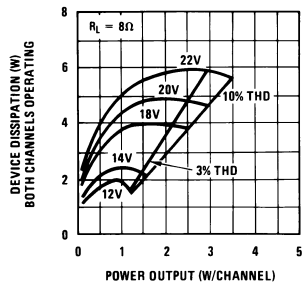
Total Harmonic Distortion vs Frequency



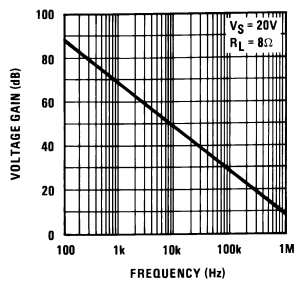
DS007913-18

Typical Performance Characteristics (Continued)

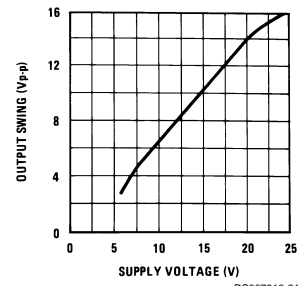
**Power Dissipation (W)
Both Channels Operating**



**Open Loop Gain vs
Frequency**

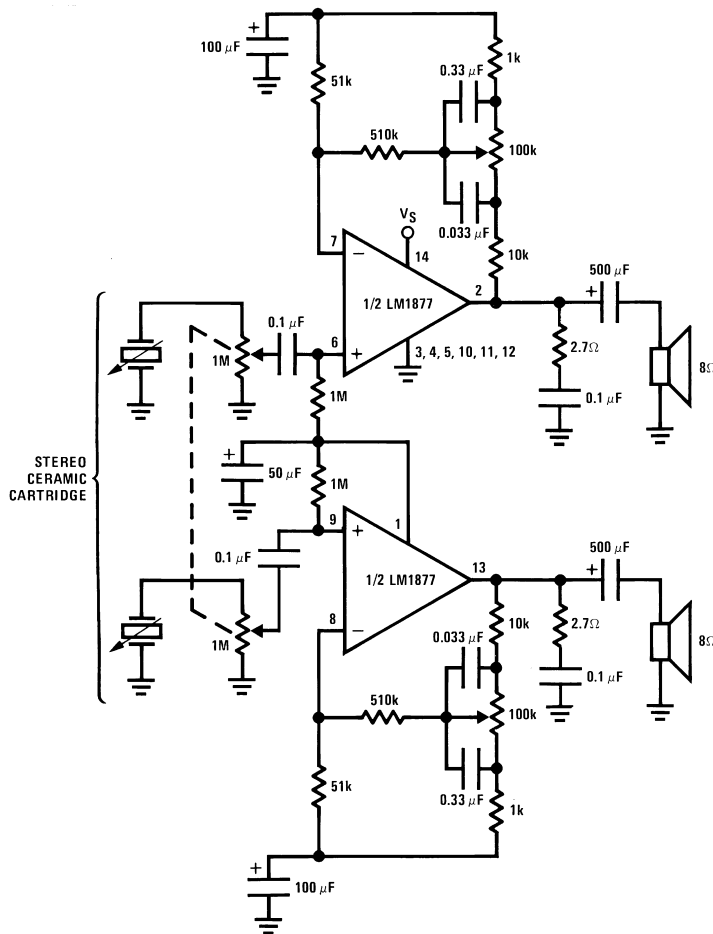


**Output Swing vs Supply
Voltage**



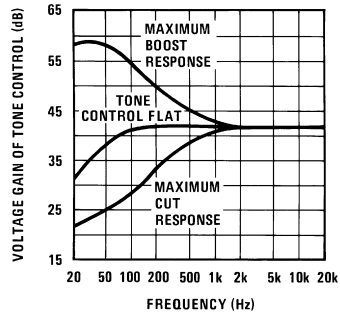
Typical Applications

Stereo Phonograph Amplifier with Bass Tone Control

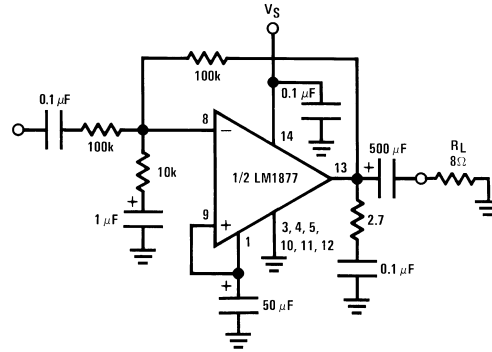


Typical Applications (Continued)

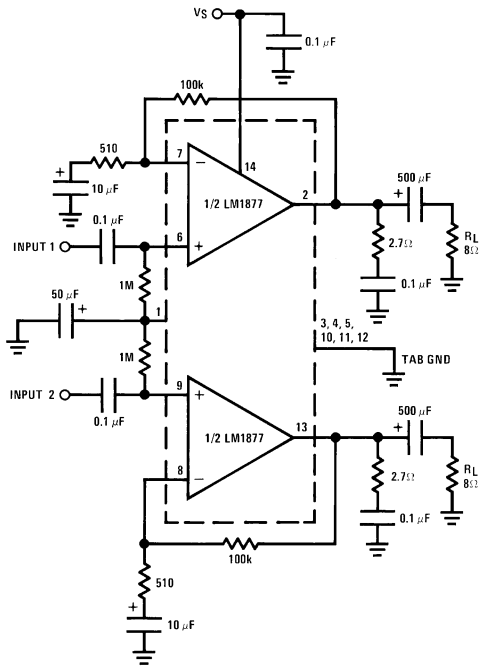
Frequency Response of Bass Tone Control



Inverting Unity Gain Amplifier

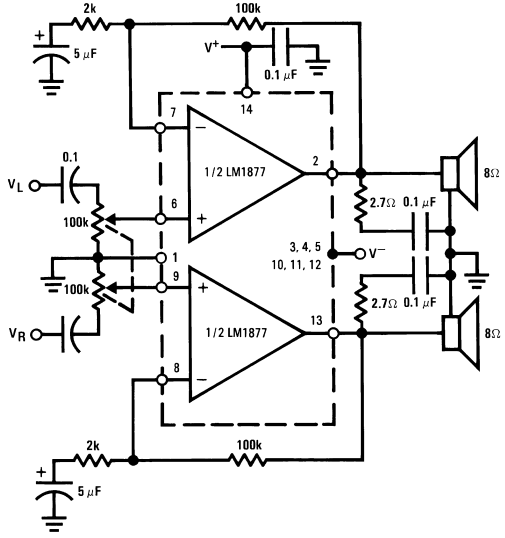


Stereo Amplifier with $A_v = 200$

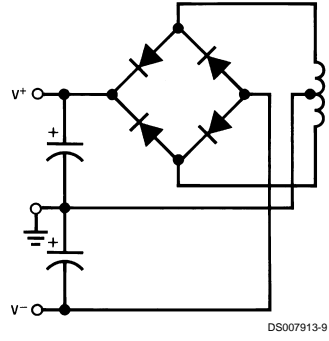


Typical Applications (Continued)

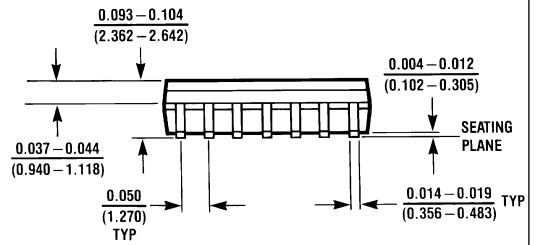
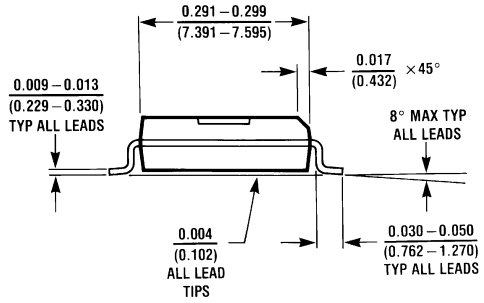
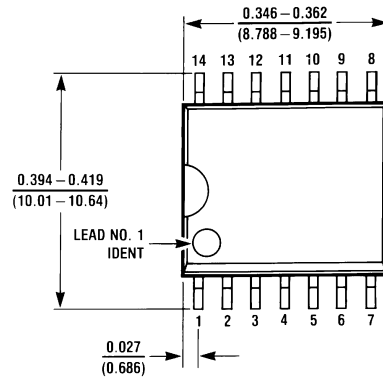
Non-Inverting Amplifier Using Split Supply



Typical Split Supply



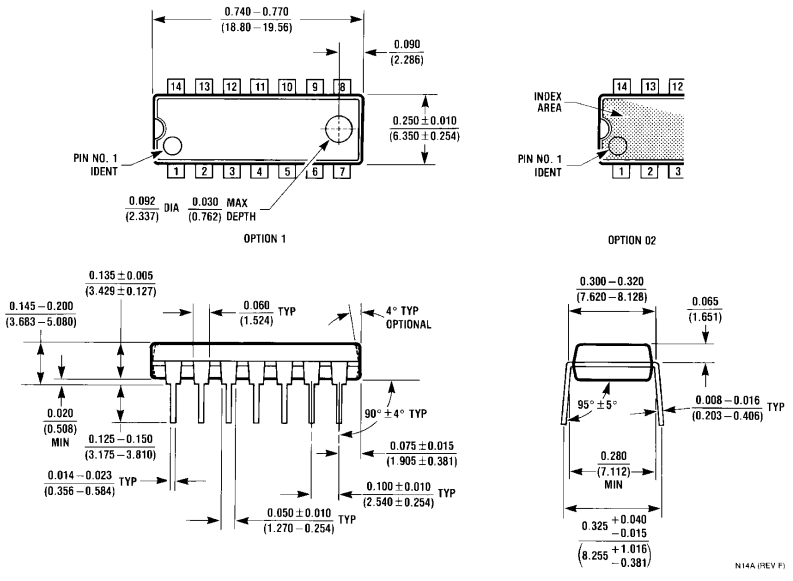
Physical Dimensions inches (millimeters) unless otherwise noted



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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