

## LM1877 Dual Audio Power Amplifier

 Check for Samples: [LM1877](#)

### 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

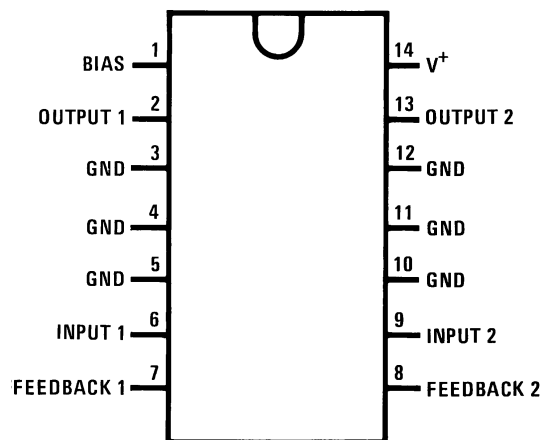
### DESCRIPTION

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. 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.

### APPLICATIONS

- Multi-Channel Audio Systems
- Stereo Phonographs
- Tape Recorders and Players
- AM-FM Radio Receivers
- Servo Amplifiers
- Intercom Systems
- Automotive Products

### Connection Diagram



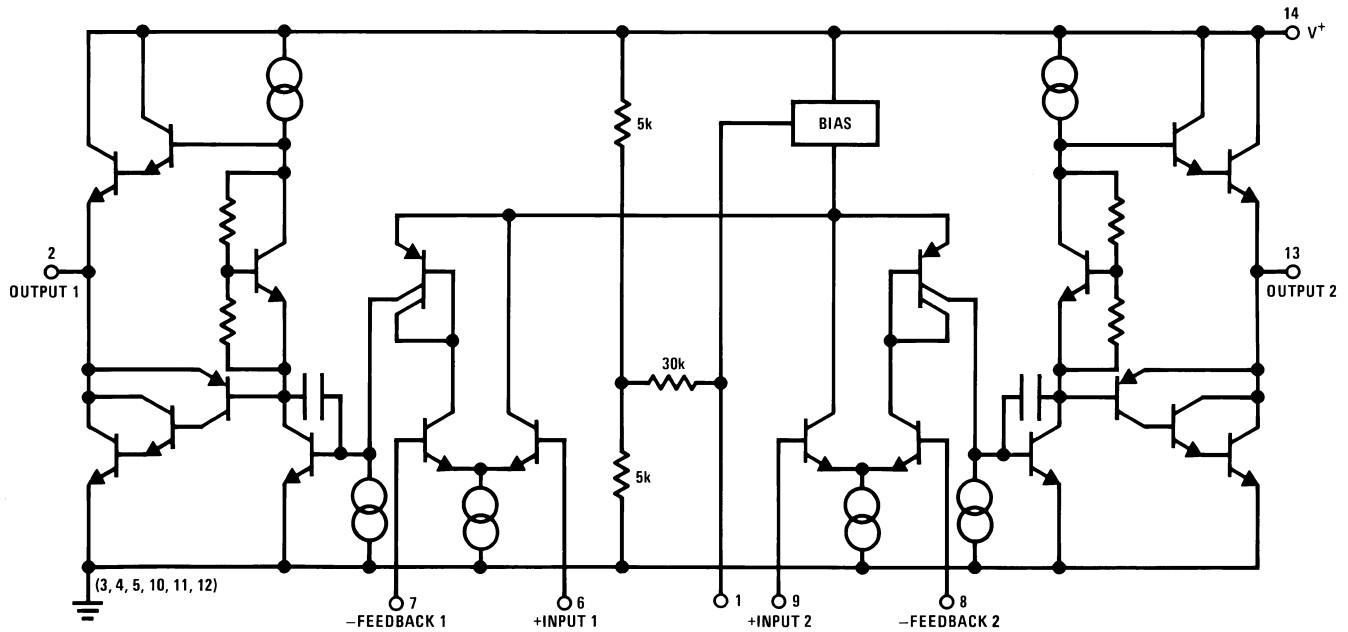
**Figure 1. 14-Pin SOIC or PDIP (Top View)**  
See NPA0014B or NFF0014A Package



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

All trademarks are the property of their respective owners.

### Equivalent Schematic Diagram



These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

### Absolute Maximum Ratings<sup>(1)(2)</sup>

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	PDIP Package Soldering (10 sec.)	260°C
	SOIC Package Infrared (15 sec.)	220°C
	SOIC Package Vapor Phase (60 sec.)	215°C
Thermal Resistance	$\theta_{JC}$ (PDIP Package)	30°C/W
	$\theta_{JA}$ (PDIP Package)	79°C/W
	$\theta_{JC}$ (SOIC Package)	27°C/W
	$\theta_{JA}$ (SOIC Package)	114°C/W

- (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 ensure specific performance limits.
- (2) If Military/Aerospace specified devices are required, please contact the Texas Instruments Sales Office/Distributors for availability and specifications.

## Electrical Characteristics

 $V_S = 20V$ ,  $T_A = 25^\circ C^{(1)}$ ,  $R_L = 8\Omega$ ,  $A_V = 50$  (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% $V_S = 20V$ , $R_L = 8\Omega$	2.0			W/Ch
	$V_S = 12V$ , $R_L = 8\Omega$		1.3		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

- (1) For operation at ambient temperature greater than  $25^\circ C$ , the LM1877 must be derated based on a maximum  $150^\circ C$  junction temperature.

### Typical Performance Characteristics

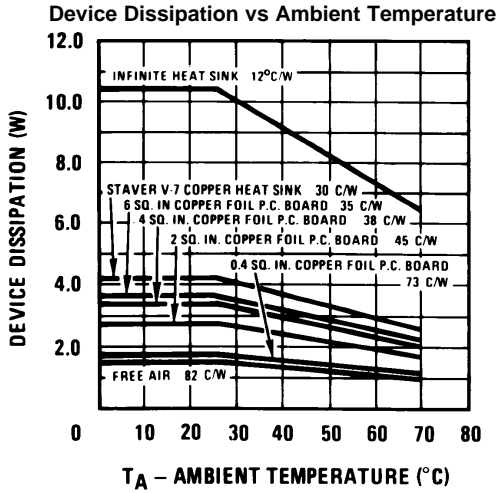


Figure 2.

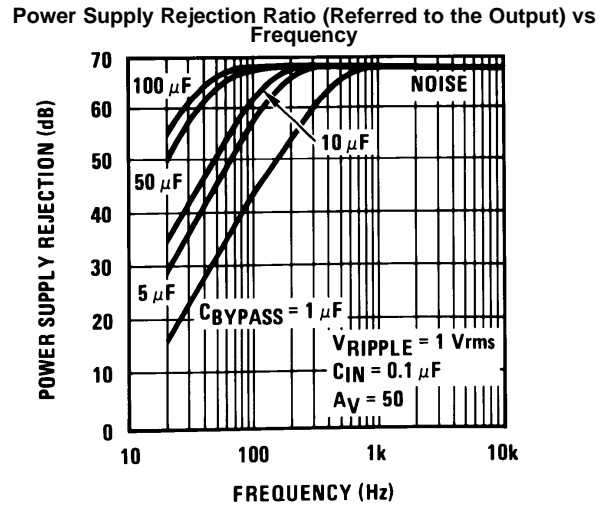


Figure 3.

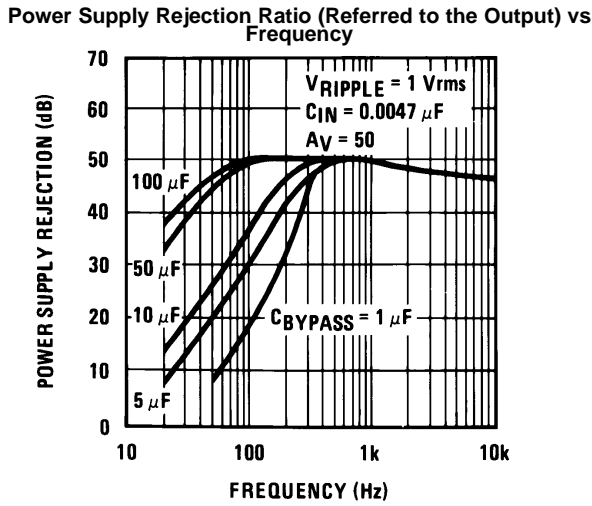


Figure 4.

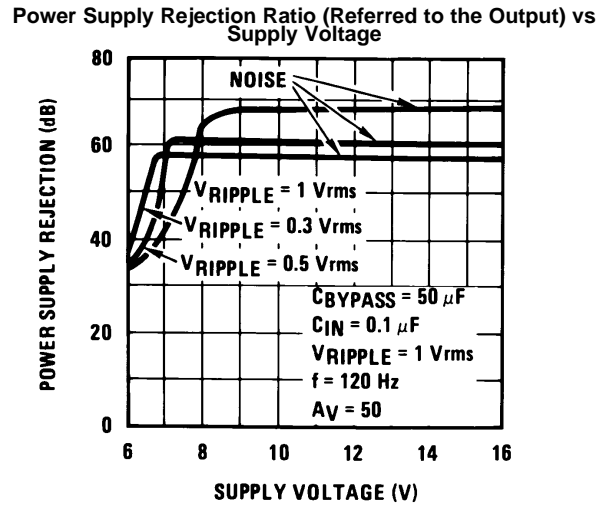


Figure 5.

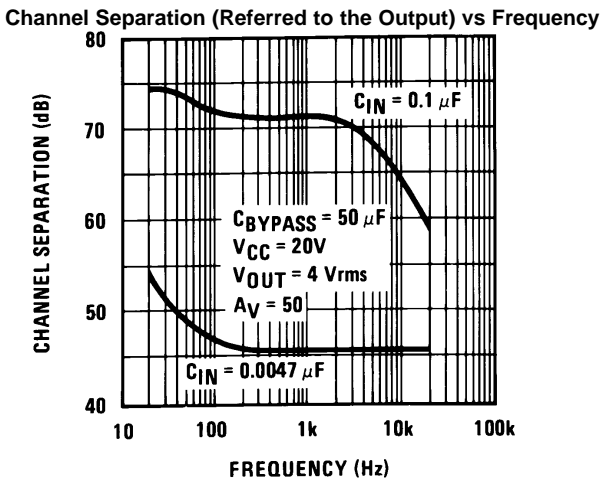


Figure 6.

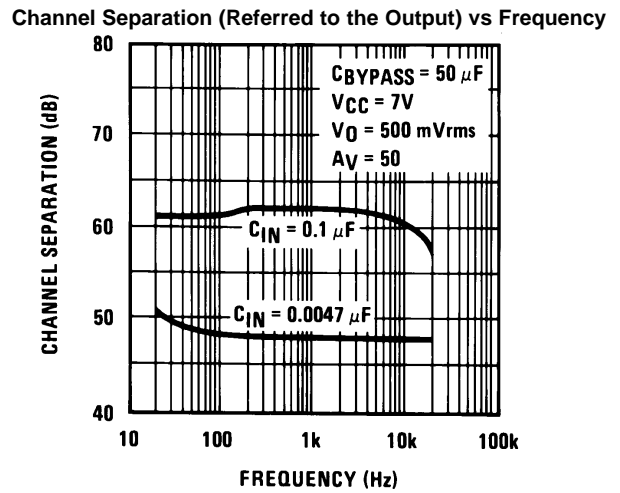


Figure 7.

Typical Performance Characteristics (continued)

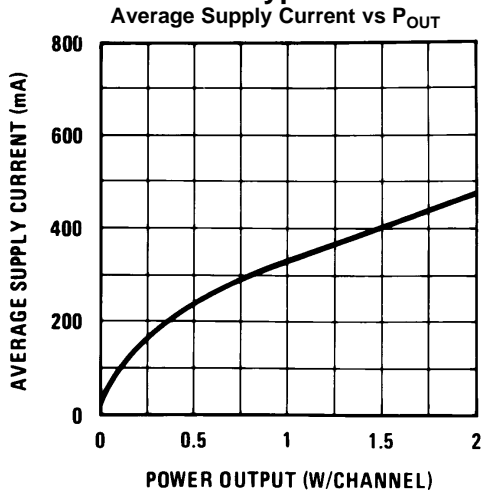


Figure 8.

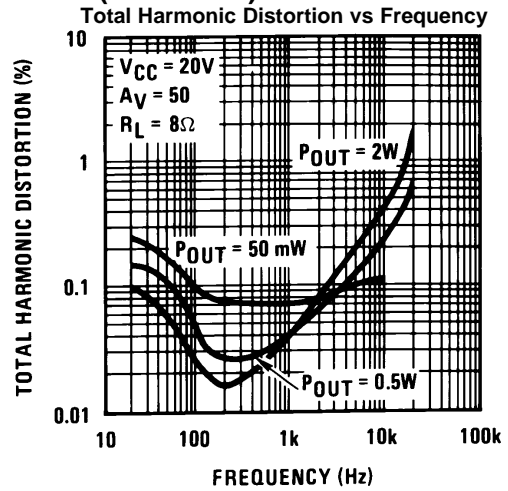


Figure 9.

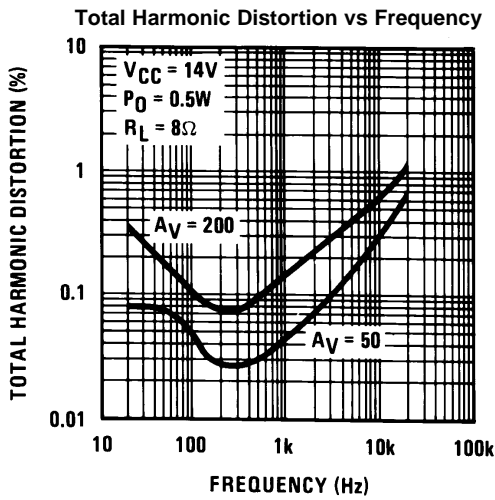


Figure 10.

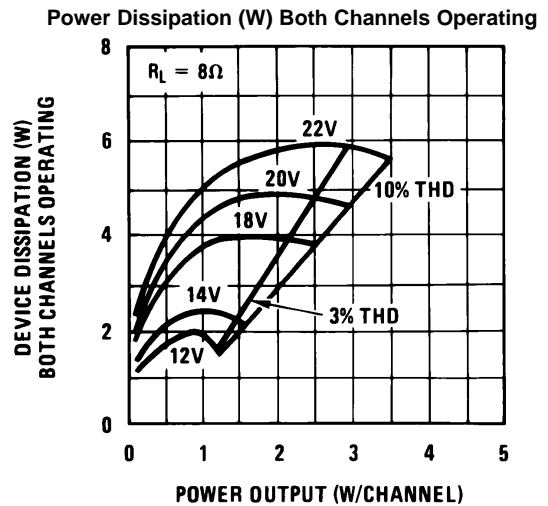


Figure 11.

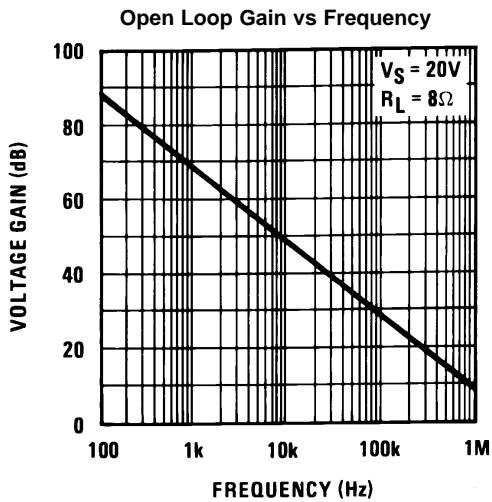


Figure 12.

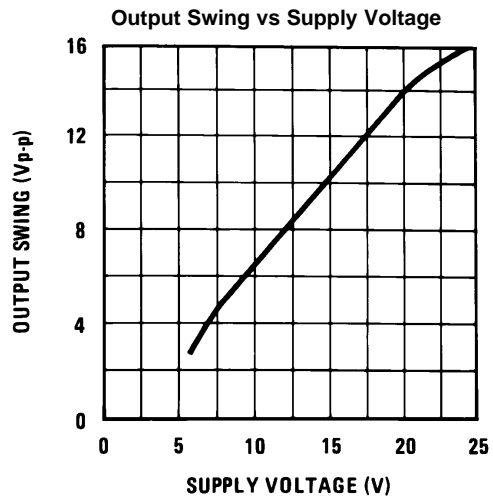


Figure 13.

Typical Applications

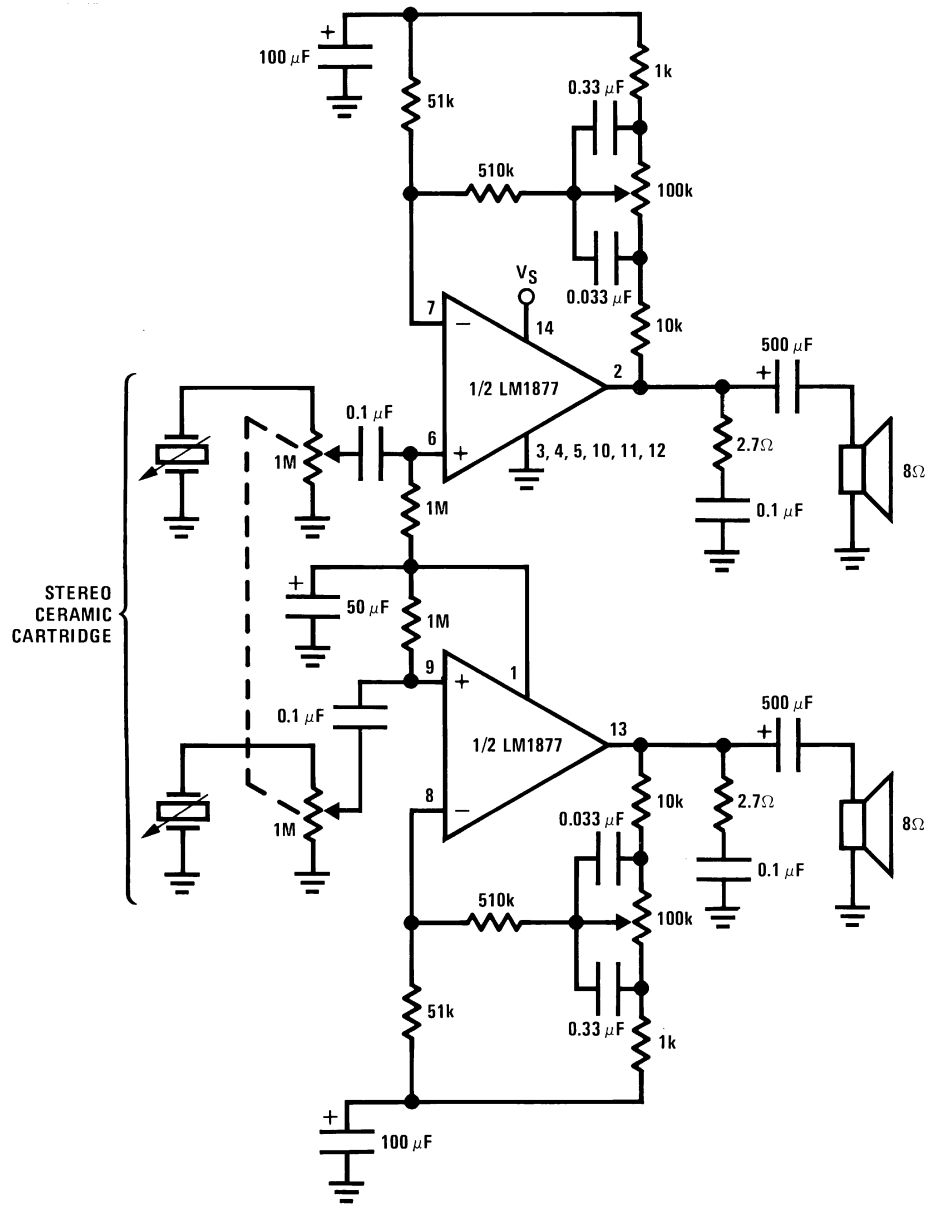


Figure 14. Stereo Phonograph Amplifier with Bass Tone Control

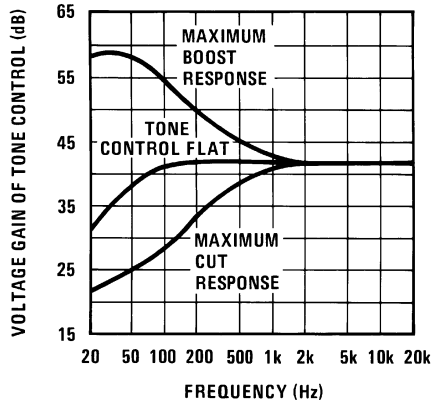


Figure 15. Frequency Response of Bass Tone Control

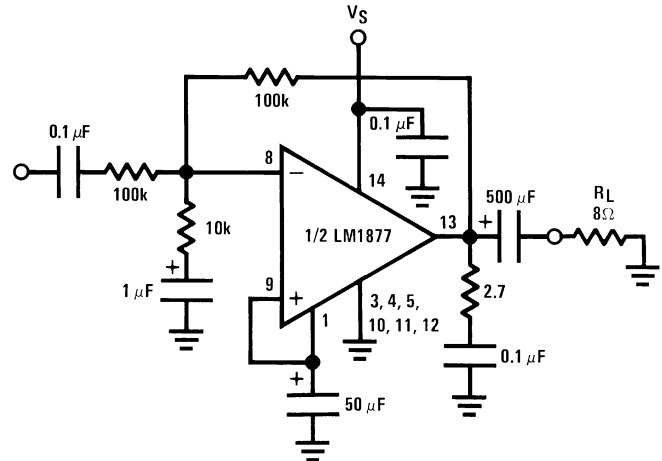


Figure 16. Inverting Unity Gain Amplifier

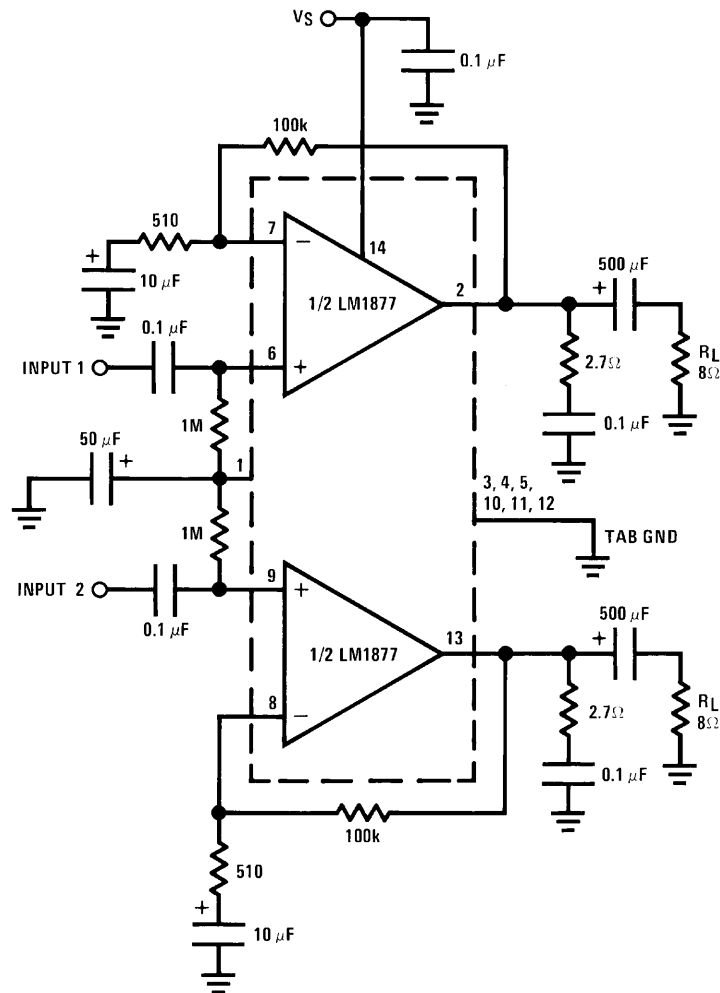


Figure 17. Stereo Amplifier with  $A_V = 200$

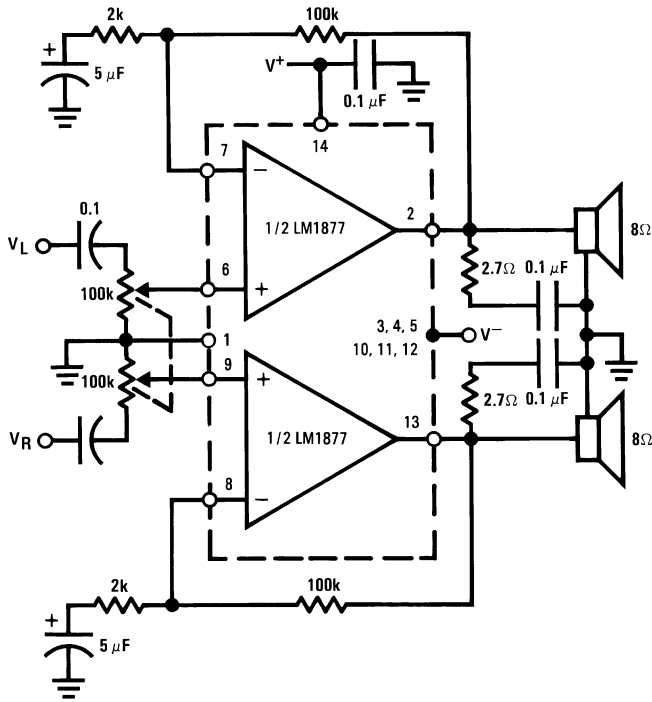


Figure 18. Non-Inverting Amplifier Using Split Supply

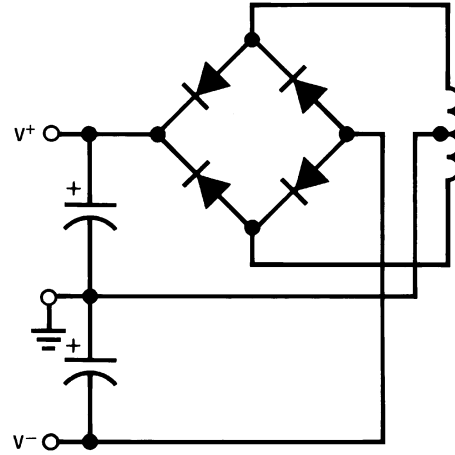


Figure 19. Typical Split Supply



---

**REVISION HISTORY**

<b>Changes from Revision A (April 2013) to Revision B</b>	<b>Page</b>
• Changed layout of National Data Sheet to TI format .....	<a href="#">7</a>

---

**PACKAGING INFORMATION**

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)	Op Temp (°C)	Top-Side Markings (4)	Samples
LM1877M-9	ACTIVE	SOIC	NPA	14	50	TBD	Call TI	Call TI	0 to 70	LM1877M -9	<a href="#">Samples</a>
LM1877M-9/NOPB	ACTIVE	SOIC	NPA	14	50	Green (RoHS & no Sb/Br)	CU SN	Level-3-260C-168 HR	0 to 70	LM1877M -9	<a href="#">Samples</a>
LM1877MX-9/NOPB	ACTIVE	SOIC	NPA	14	1000	Green (RoHS & no Sb/Br)	CU SN	Level-3-260C-168 HR	0 to 70	LM1877M -9	<a href="#">Samples</a>

(1) The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBsolete:** TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(3) MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) Multiple Top-Side Markings will be inside parentheses. Only one Top-Side Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Top-Side Marking for that device.

**Important Information and Disclaimer:** The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

## TAPE AND REEL INFORMATION



### QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
LM1877MX-9/NOPB	SOIC	NPA	14	1000	330.0	16.4	10.9	9.5	3.2	12.0	16.0	Q1

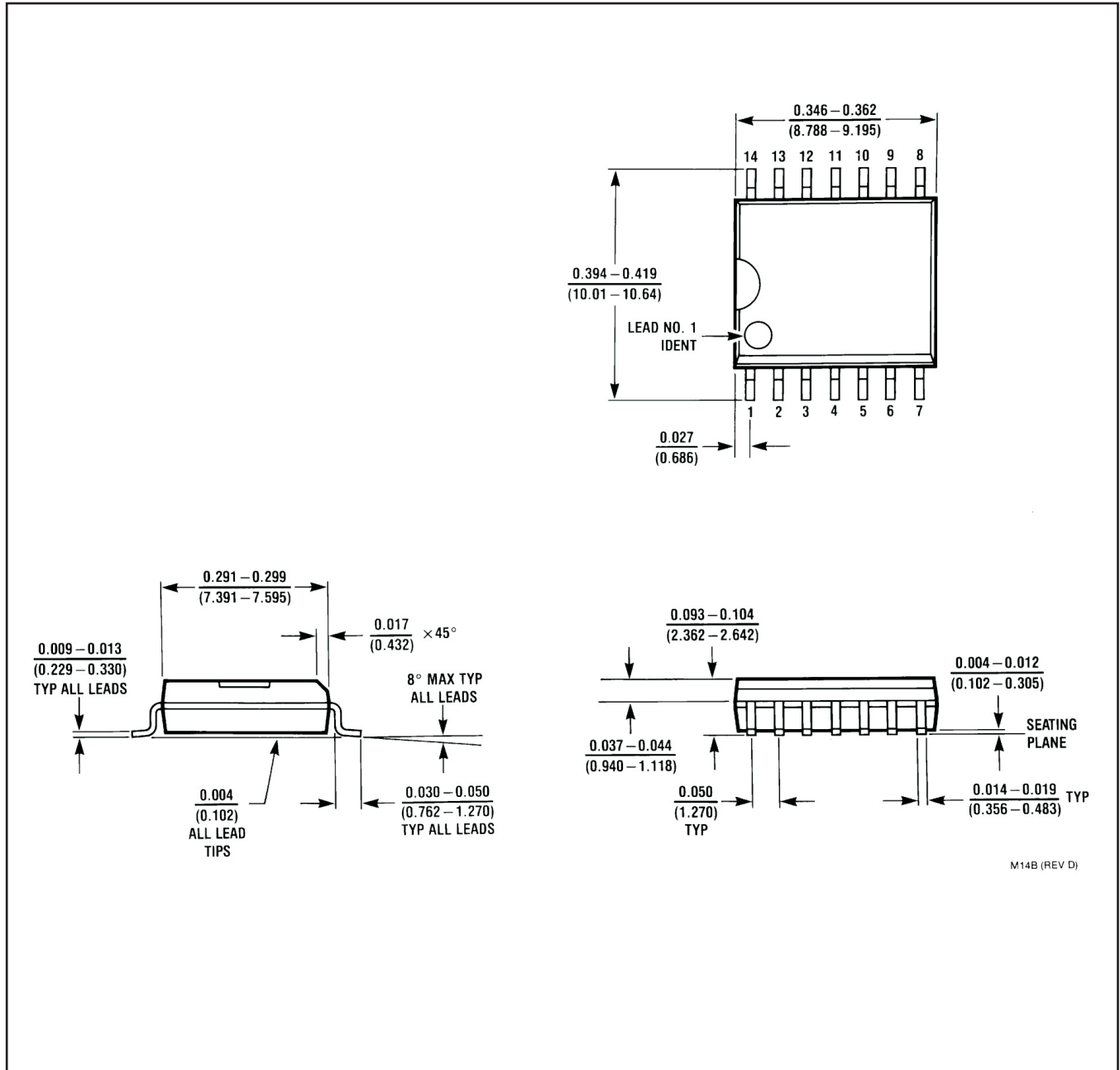
**TAPE AND REEL BOX DIMENSIONS**



\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
LM1877MX-9/NOPB	SOIC	NPA	14	1000	367.0	367.0	38.0

NPA0014B



## IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products (also referred to herein as "components") are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI's terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

TI assumes no liability for applications assistance or the design of Buyers' products. Buyers are responsible for their products and applications using TI components. To minimize the risks associated with Buyers' products and applications, Buyers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of significant portions of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI components or services with statements different from or beyond the parameters stated by TI for that component or service voids all express and any implied warranties for the associated TI component or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI's goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or "enhanced plastic" are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have **not** been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

### Products

Audio	<a href="http://www.ti.com/audio">www.ti.com/audio</a>
Amplifiers	<a href="http://amplifier.ti.com">amplifier.ti.com</a>
Data Converters	<a href="http://dataconverter.ti.com">dataconverter.ti.com</a>
DLP® Products	<a href="http://www.dlp.com">www.dlp.com</a>
DSP	<a href="http://dsp.ti.com">dsp.ti.com</a>
Clocks and Timers	<a href="http://www.ti.com/clocks">www.ti.com/clocks</a>
Interface	<a href="http://interface.ti.com">interface.ti.com</a>
Logic	<a href="http://logic.ti.com">logic.ti.com</a>
Power Mgmt	<a href="http://power.ti.com">power.ti.com</a>
Microcontrollers	<a href="http://microcontroller.ti.com">microcontroller.ti.com</a>
RFID	<a href="http://www.ti-rfid.com">www.ti-rfid.com</a>
OMAP Applications Processors	<a href="http://www.ti.com/omap">www.ti.com/omap</a>
Wireless Connectivity	<a href="http://www.ti.com/wirelessconnectivity">www.ti.com/wirelessconnectivity</a>

### Applications

Automotive and Transportation	<a href="http://www.ti.com/automotive">www.ti.com/automotive</a>
Communications and Telecom	<a href="http://www.ti.com/communications">www.ti.com/communications</a>
Computers and Peripherals	<a href="http://www.ti.com/computers">www.ti.com/computers</a>
Consumer Electronics	<a href="http://www.ti.com/consumer-apps">www.ti.com/consumer-apps</a>
Energy and Lighting	<a href="http://www.ti.com/energy">www.ti.com/energy</a>
Industrial	<a href="http://www.ti.com/industrial">www.ti.com/industrial</a>
Medical	<a href="http://www.ti.com/medical">www.ti.com/medical</a>
Security	<a href="http://www.ti.com/security">www.ti.com/security</a>
Space, Avionics and Defense	<a href="http://www.ti.com/space-avionics-defense">www.ti.com/space-avionics-defense</a>
Video and Imaging	<a href="http://www.ti.com/video">www.ti.com/video</a>

### TI E2E Community

[e2e.ti.com](http://e2e.ti.com)