

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

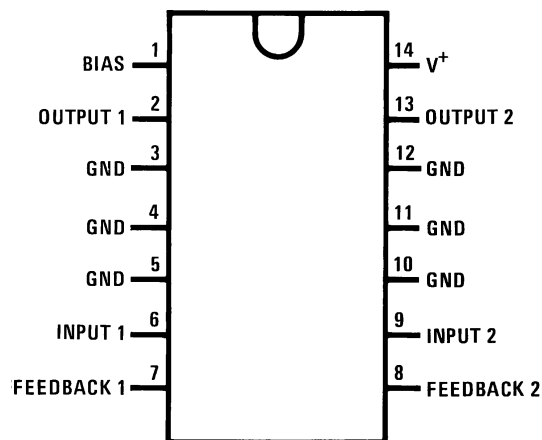


Figure 1. 14-Pin SOIC or PDIP (Top View)
See NPA0014B or NFF0014A Package



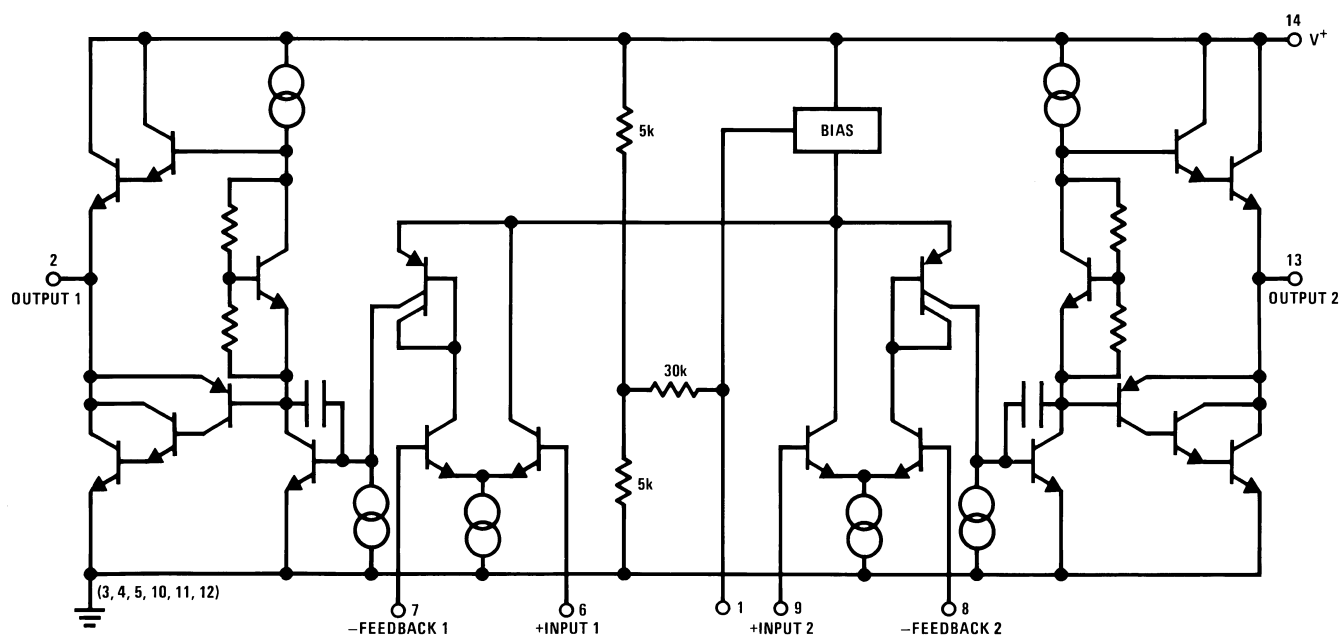
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Equivalent Schematic Diagram



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⁽¹⁾⁽²⁾

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	θ_{JC} (PDIP Package)	30°C/W
	θ_{JA} (PDIP Package)	79°C/W
	θ_{JC} (SOIC Package)	27°C/W
	θ_{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% $V_S = 20V$, $R_L = 8\Omega$ $V_S = 12V$, $R_L = 8\Omega$	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

- (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

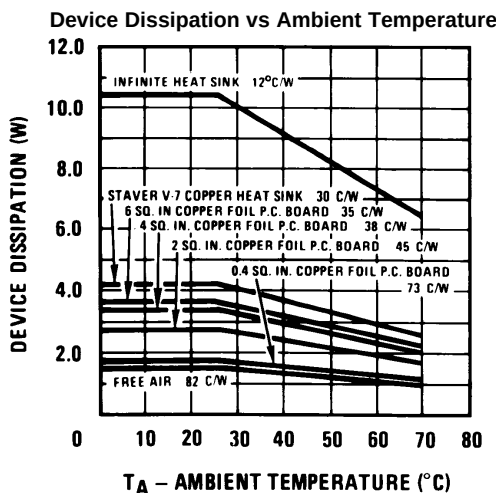


Figure 2.

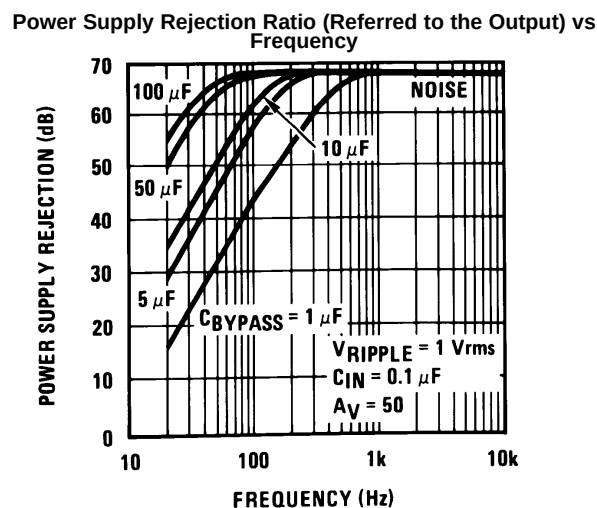


Figure 3.

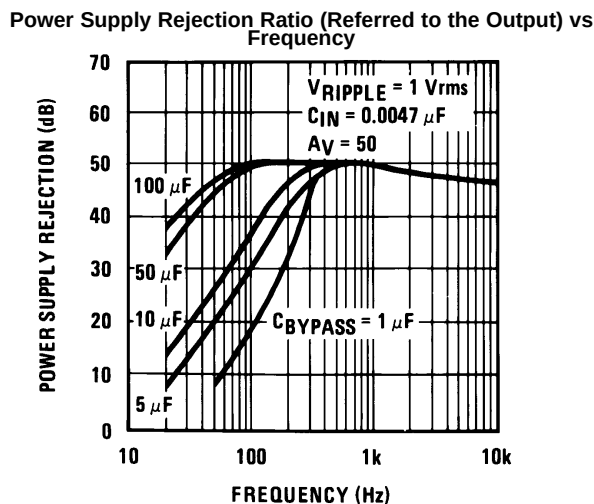


Figure 4.

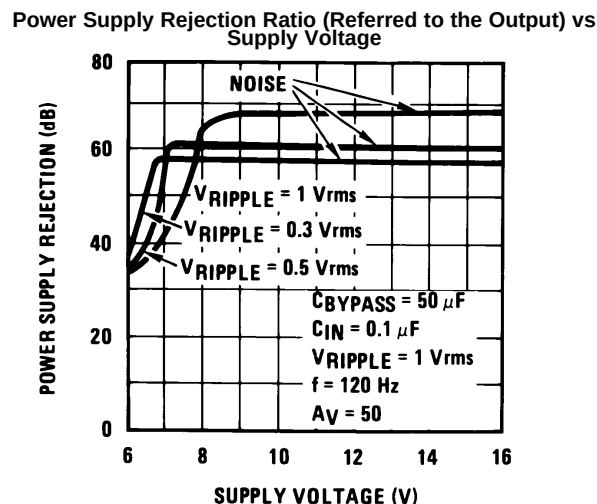


Figure 5.

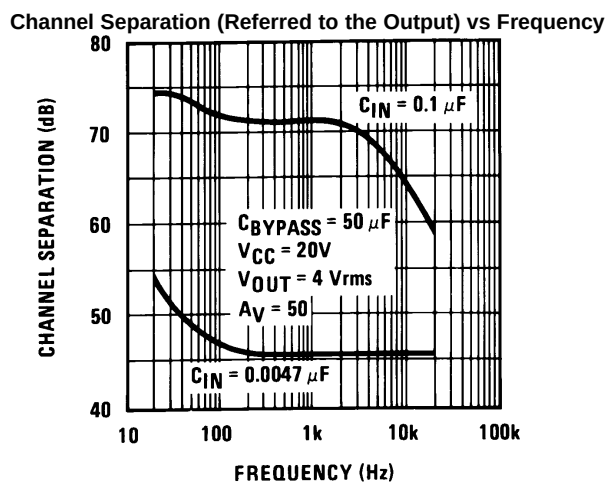


Figure 6.

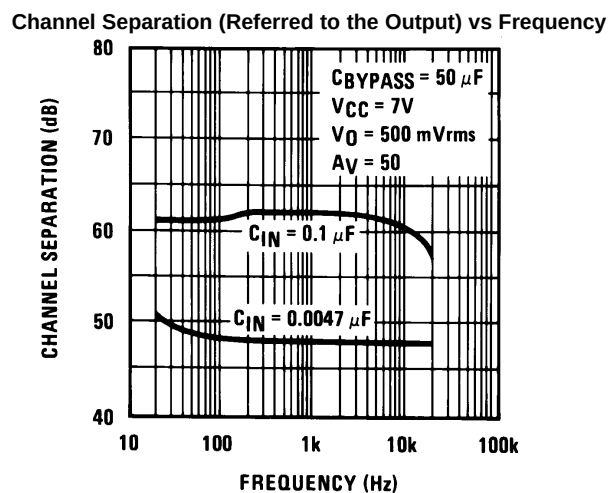


Figure 7.

Typical Performance Characteristics (continued)

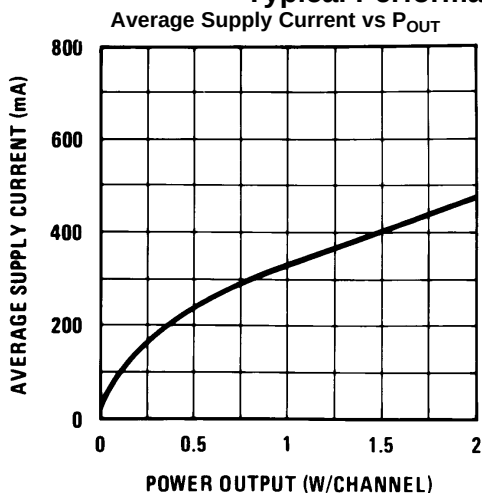


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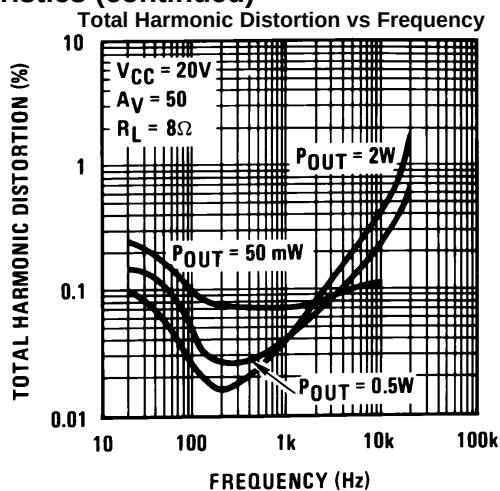


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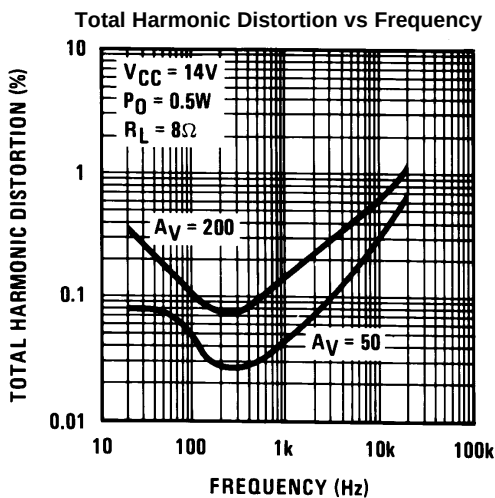


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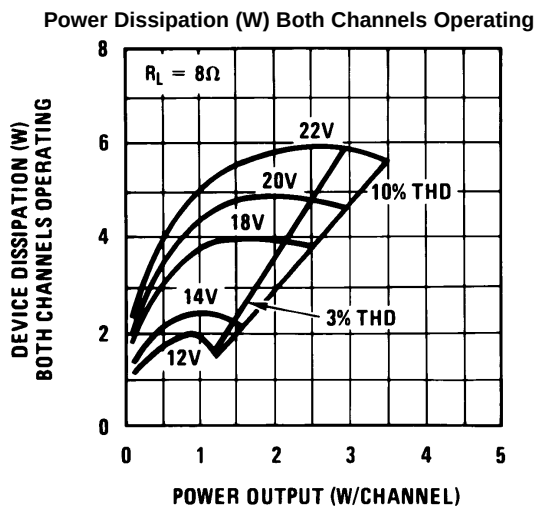


Figure 11.

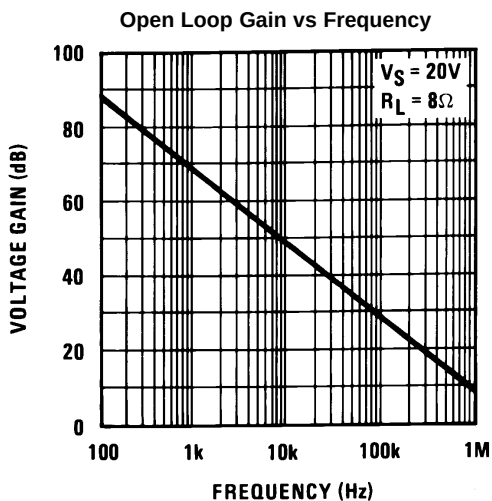


Figure 12.

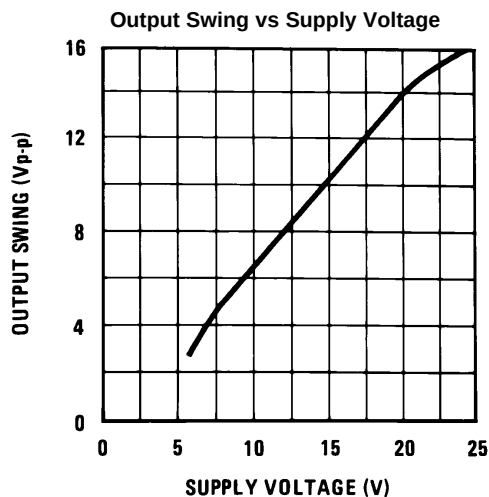


Figure 13.

Typical Applications

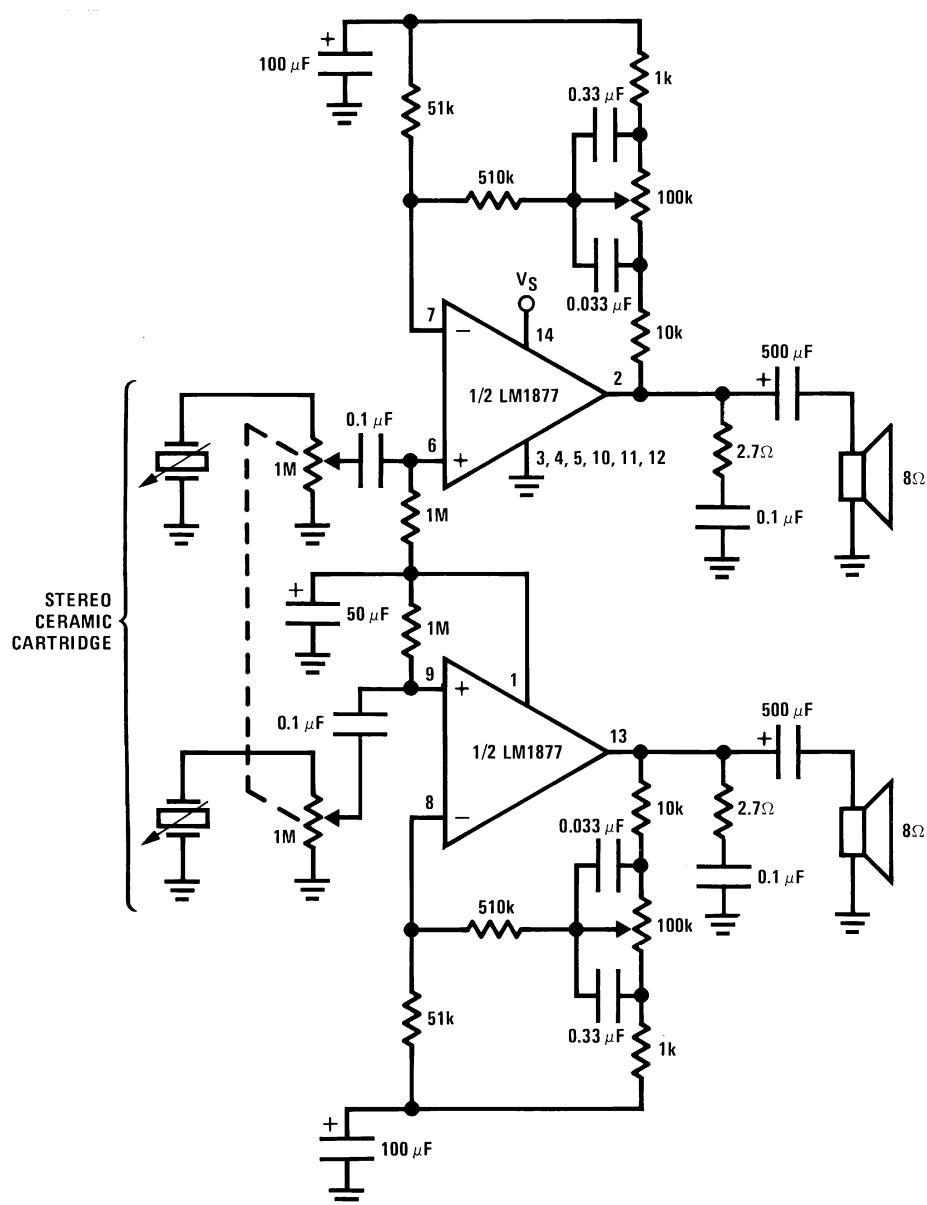


Figure 14. Stereo Phonograph Amplifier with Bass Tone Control

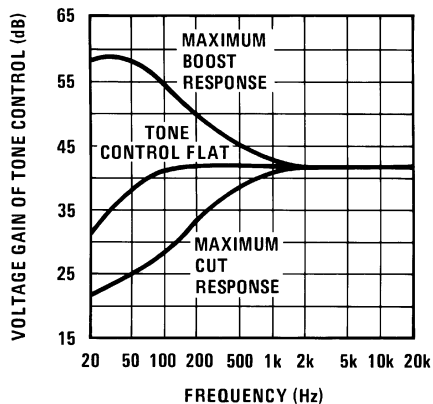


Figure 15. Frequency Response of Bass Tone Control

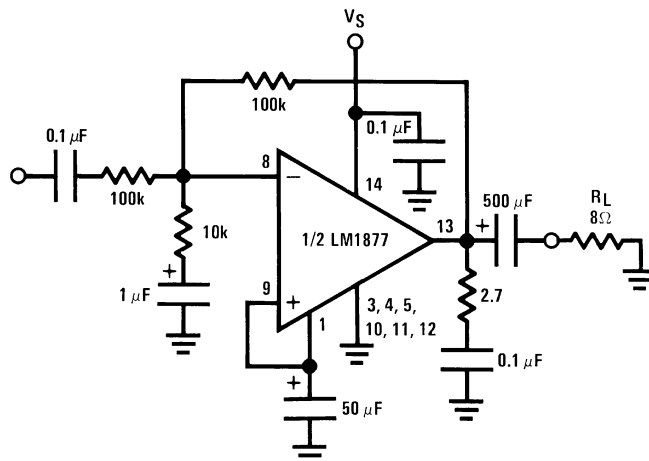


Figure 16. Inverting Unity Gain Amplifier

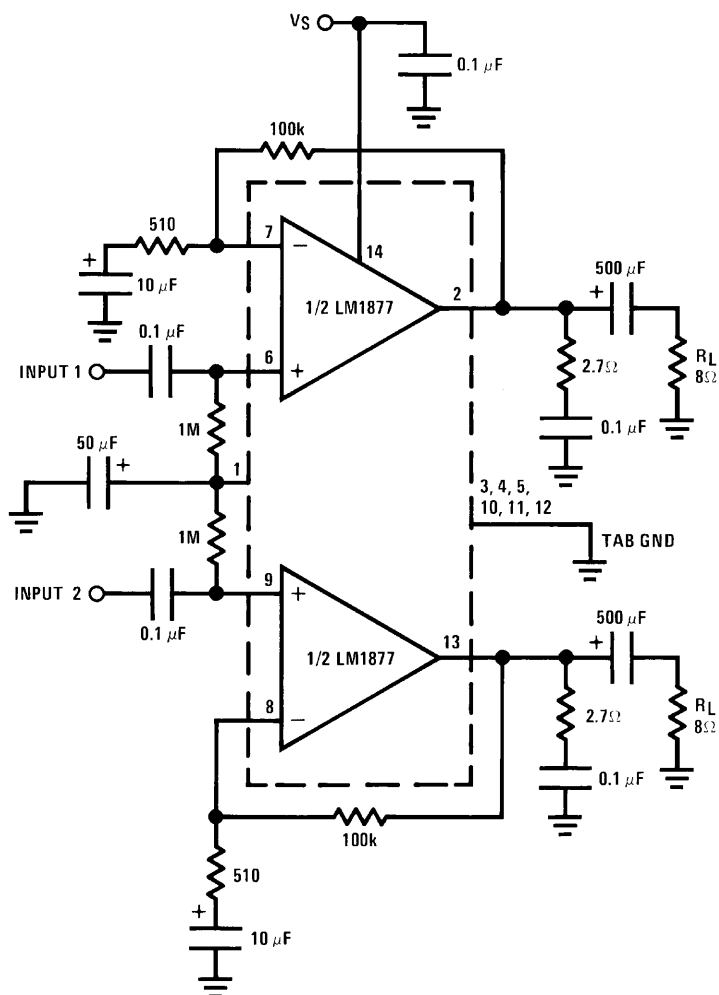


Figure 17. Stereo Amplifier with $A_V = 200$

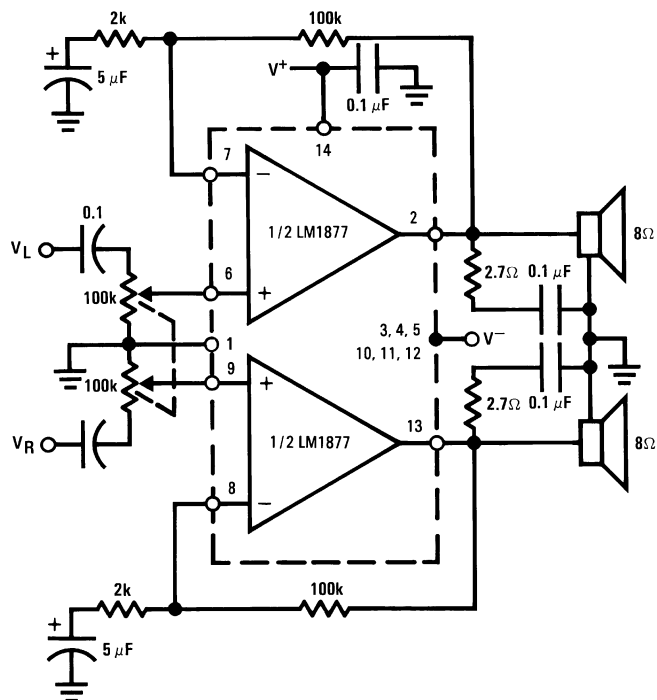


Figure 18. Non-Inverting Amplifier Using Split Supply

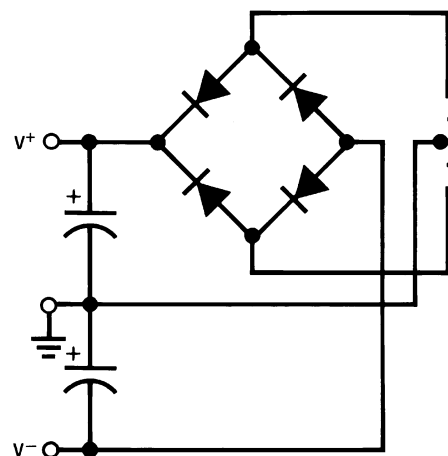


Figure 19. Typical Split Supply

REVISION HISTORY

Changes from Revision A (April 2013) to Revision B	Page
• Changed layout of National Data Sheet to TI format	7

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
LM1877M-9/NOPB	OBSOLETE	SOIC	NPA	14		TBD	Call TI	Call TI	0 to 70	LM1877M -9	
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	Samples

(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.

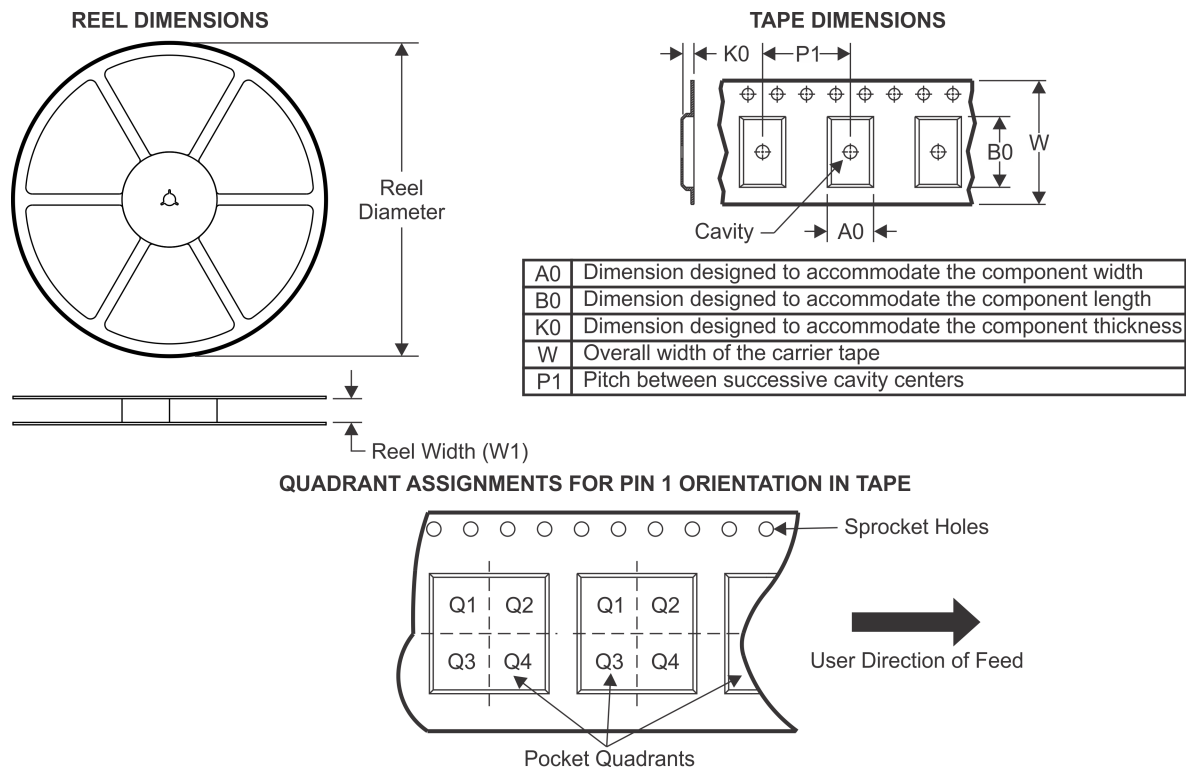
(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device 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 Device Marking for that device.

(6) Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

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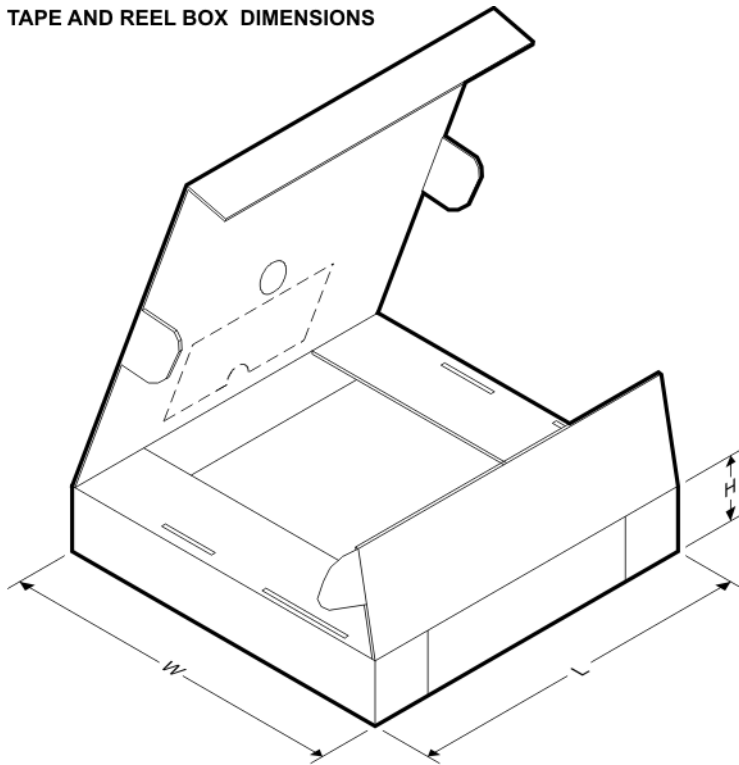
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TAPE AND REEL INFORMATION


*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

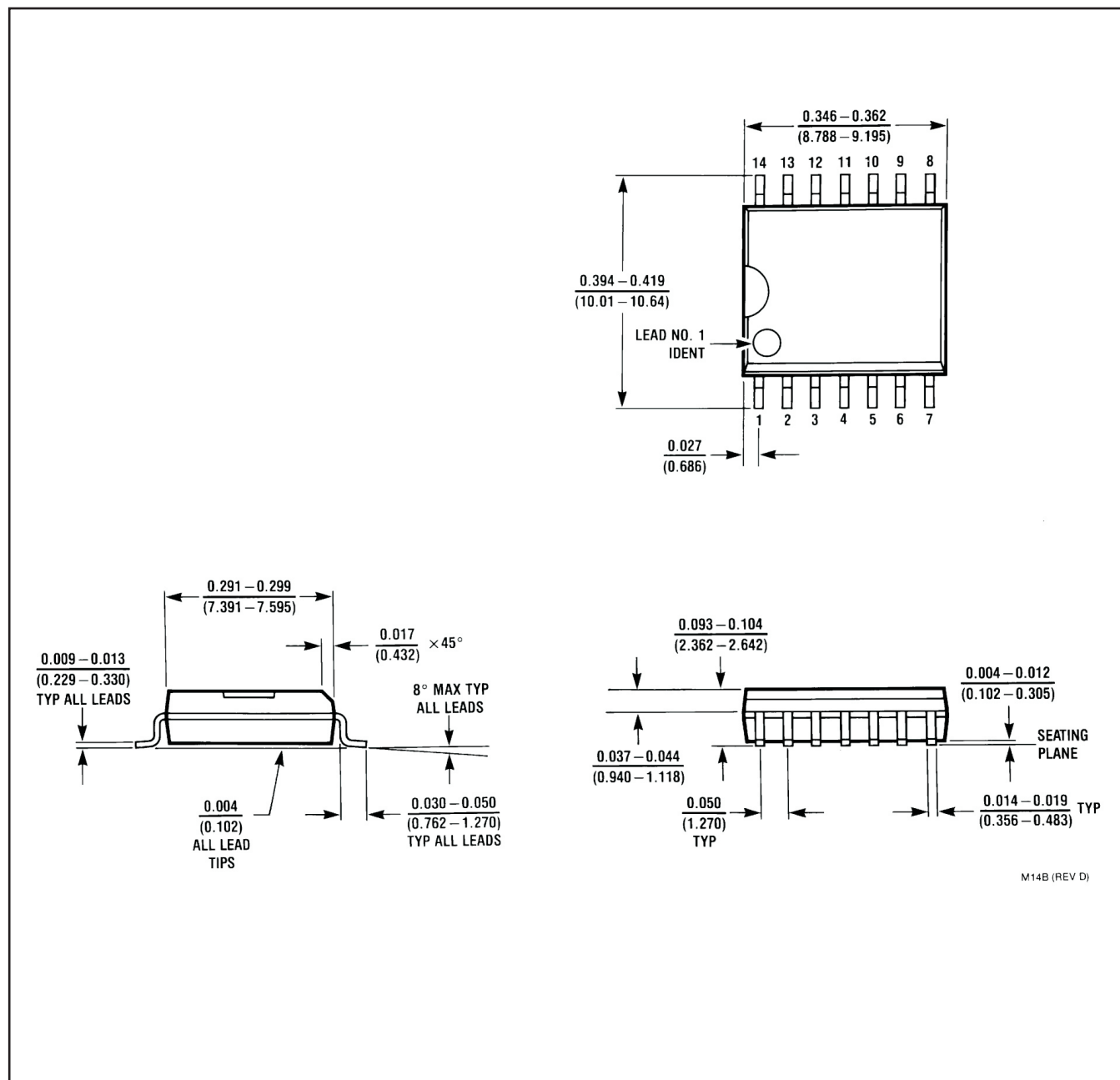
TAPE AND REEL BOX DIMENSIONS



*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



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