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**

APPLICATIONS

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

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.

Connection Diagram

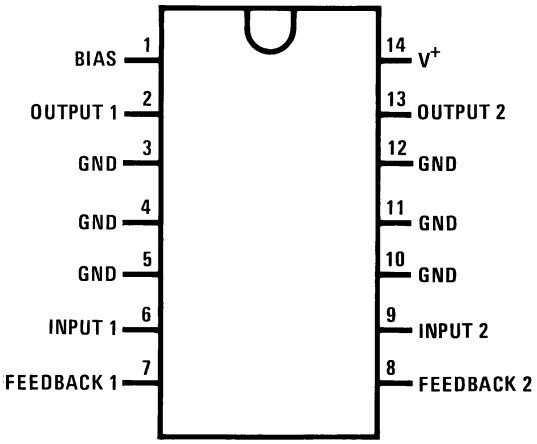
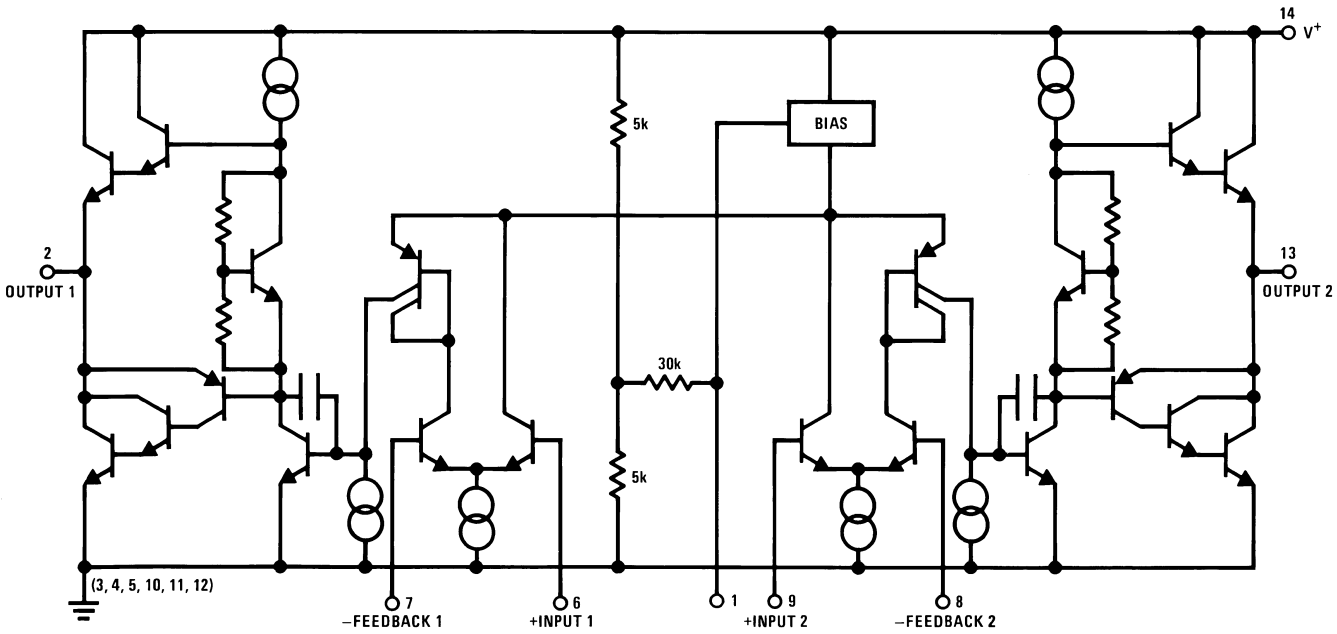


Figure 1. 14-Pin SOIC or PDIP (Top View)
See NPA0014B or NFF0014A Package

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°C[1] R_L = 8Ω, 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	THD = 10%				
LM1877	V_S = 20V, R_L = 8Ω	2.0			W/Ch
	V_S = 12V, R_L = 8Ω		1.3		W/Ch
Total Harmonic Distortion	f = 1 kHz, V_S = 14V				
LM1877	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 = 8Ω		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 = 8Ω		70		dB
Input Offset Voltage			15		mV
Input Bias Current			50		nA
Input Impedance	Open Loop		4		MΩ
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°C, the LM1877 must be derated based on a maximum 150°C junction temperature.

Typical Performance Characteristics

Device Dissipation vs Ambient Temperature

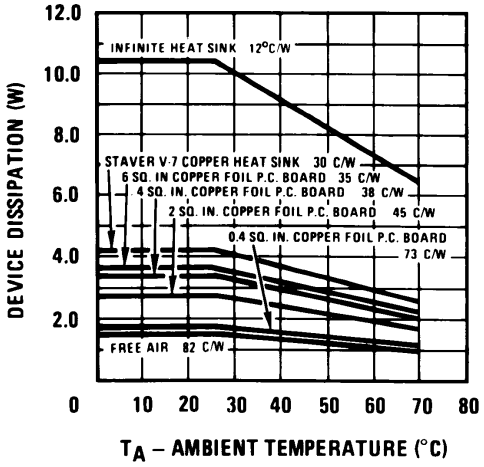


Figure 2.

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

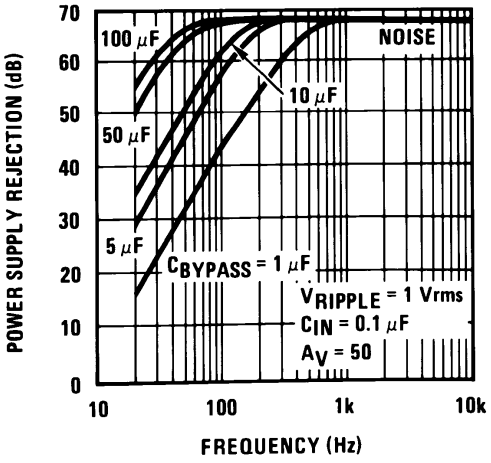


Figure 3.

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

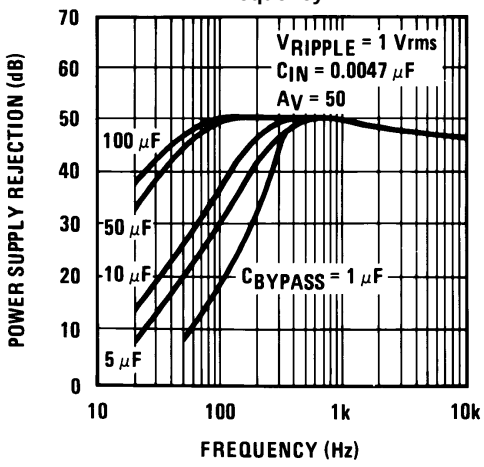


Figure 4.

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

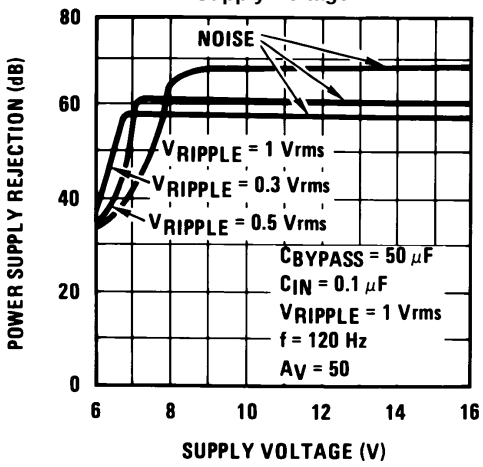


Figure 5.

Channel Separation (Referred to the Output) vs Frequency

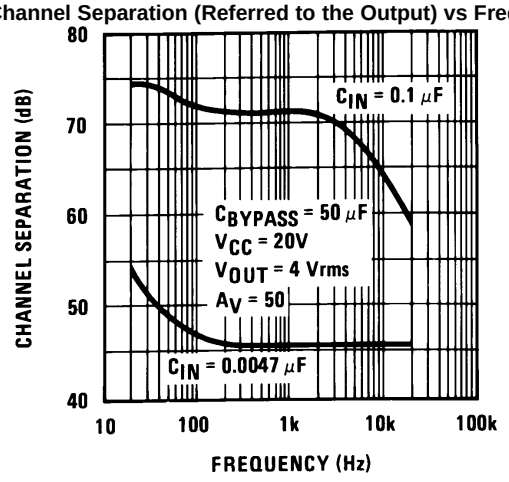


Figure 6.

Channel Separation (Referred to the Output) vs Frequency

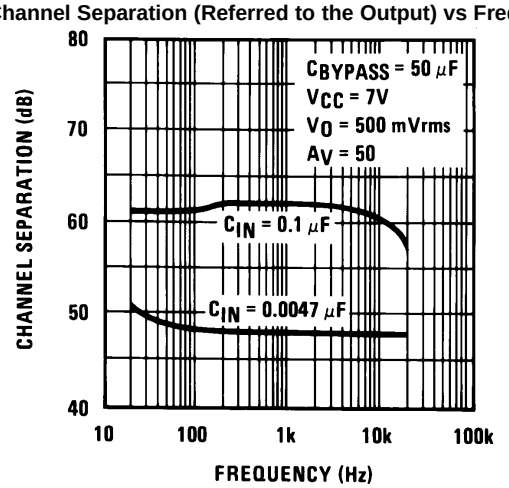


Figure 7.

Typical Performance Characteristics (continued)

Average Supply Current vs P_{OUT}

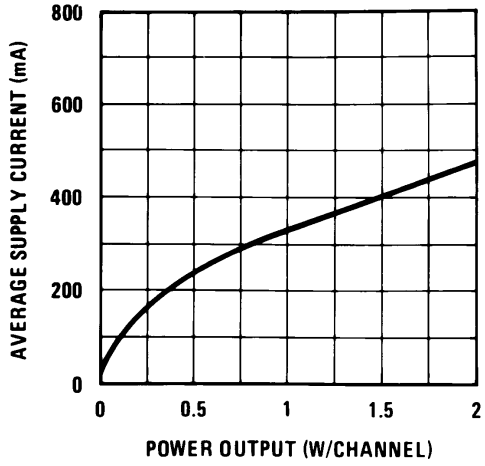


Figure 8.

Total Harmonic Distortion vs Frequency

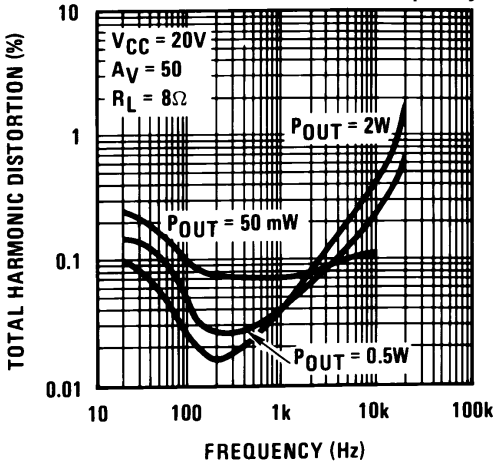


Figure 9.

Total Harmonic Distortion vs Frequency

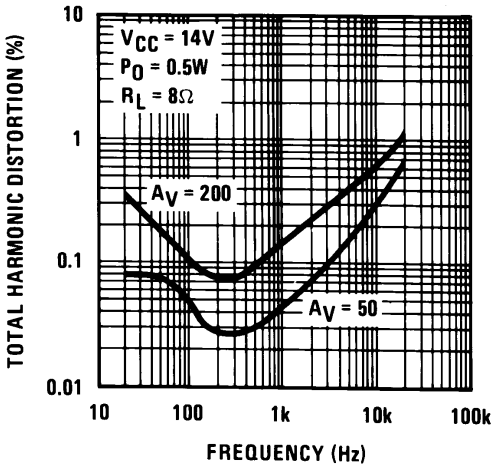


Figure 10.

Power Dissipation (W) Both Channels Operating

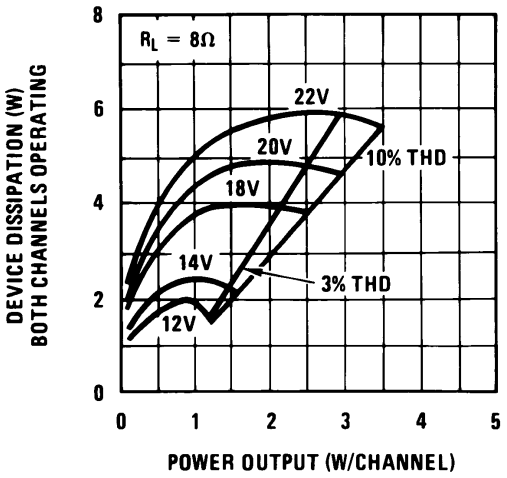


Figure 11.

Open Loop Gain vs Frequency

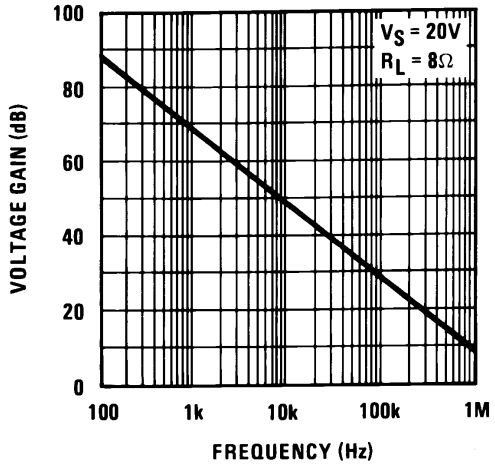


Figure 12.

Output Swing vs Supply Voltage

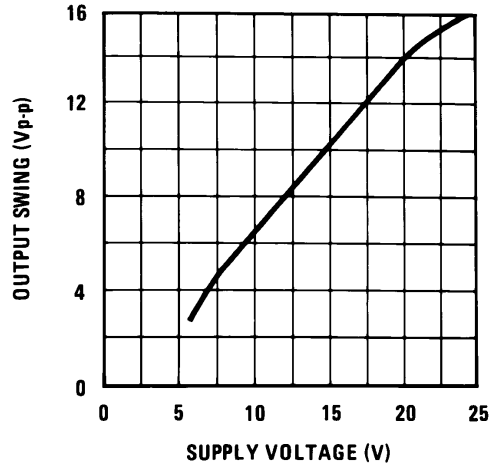


Figure 13.

Typical Applications

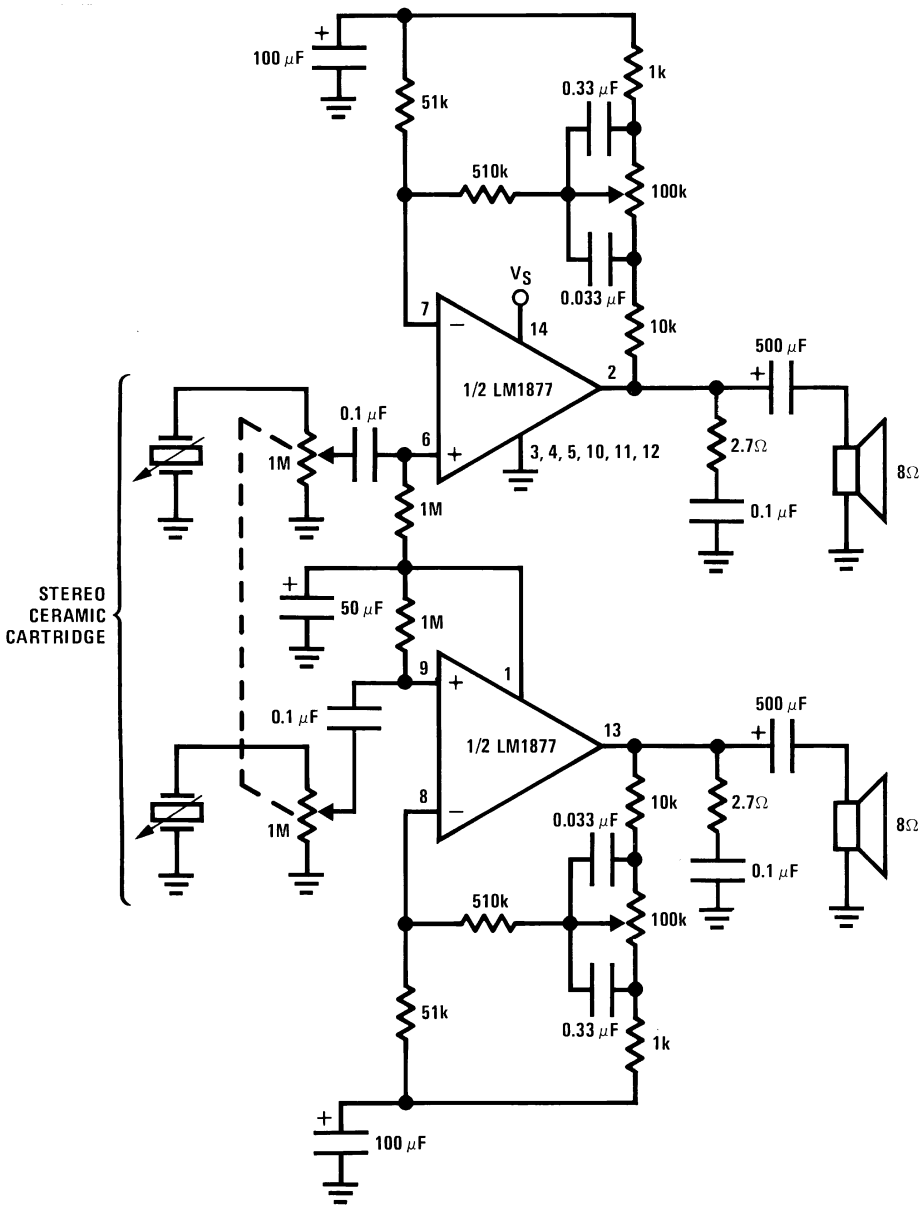


Figure 14. Stereo Phonograph Amplifier with Bass Tone Control

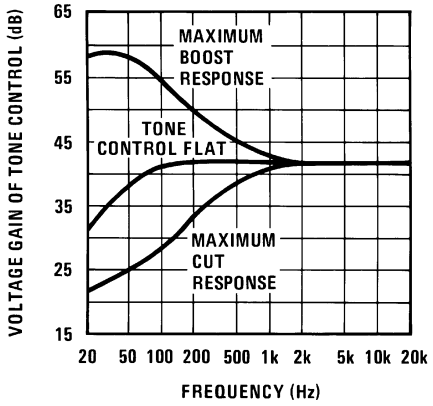


Figure 15. Frequency Response of Bass Tone Control

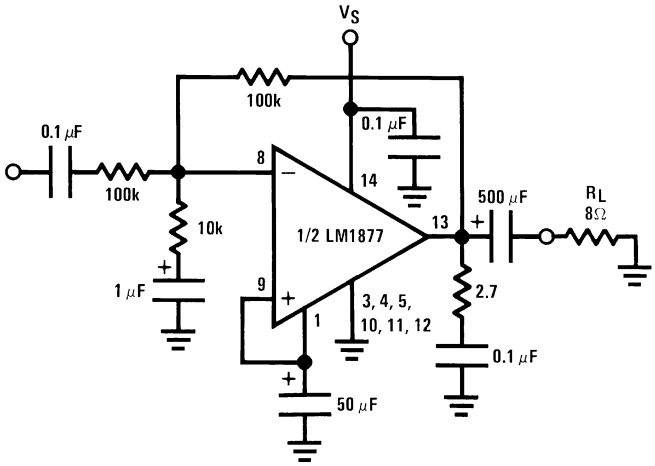


Figure 16. Inverting Unity Gain Amplifier

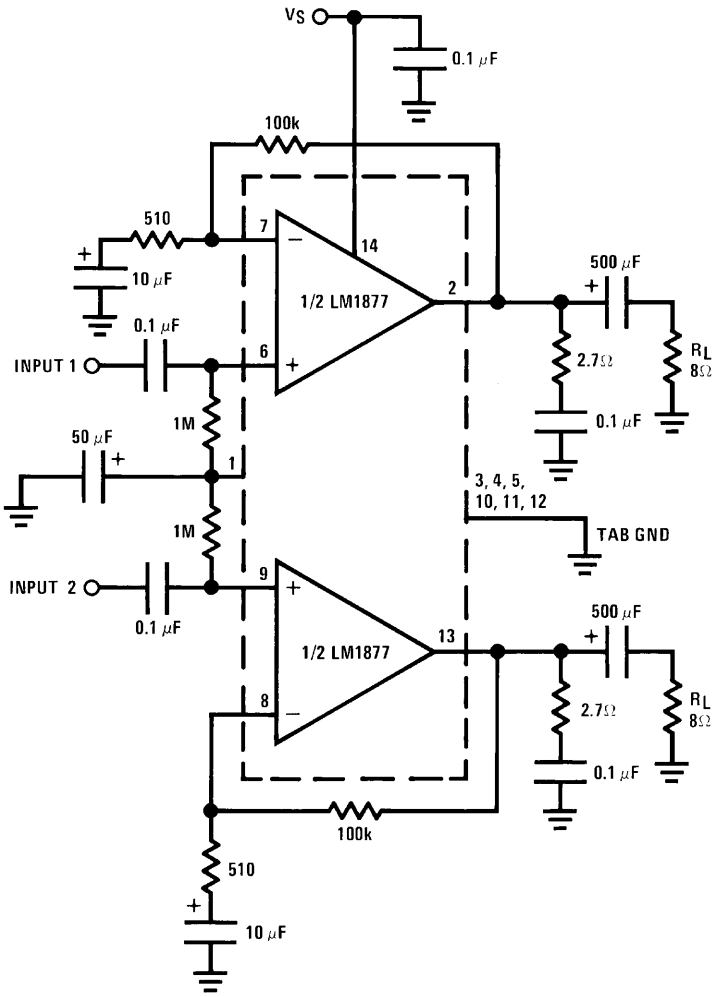


Figure 17. Stereo Amplifier with A_V = 200

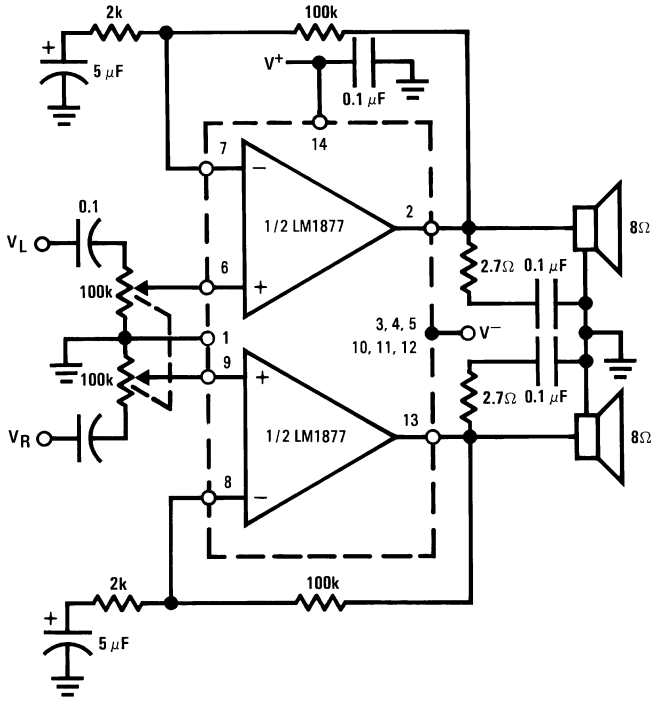


Figure 18. Non-Inverting Amplifier Using Split Supply

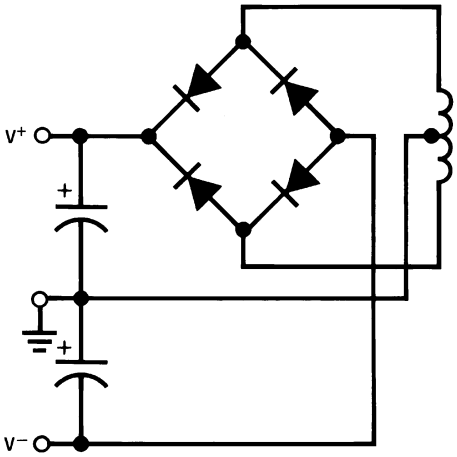


Figure 19. Typical Split Supply

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 finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
LM1877MX-9/NOPB	ACTIVE	SOIC	NPA	14	1000	RoHS & Green	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) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".
RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.
Green: TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

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

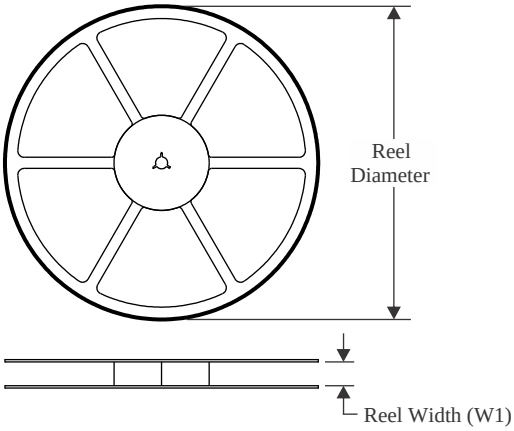
(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(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.

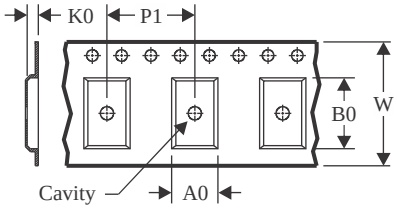
(6) Lead finish/Ball material - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

TAPE AND REEL INFORMATION

REEL DIMENSIONS

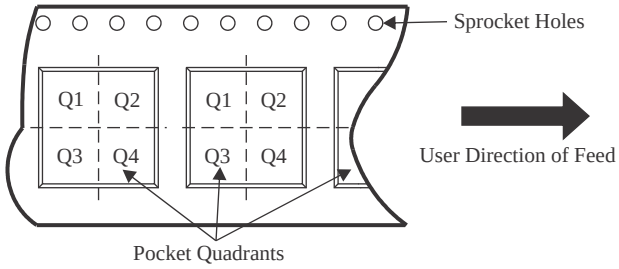


TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

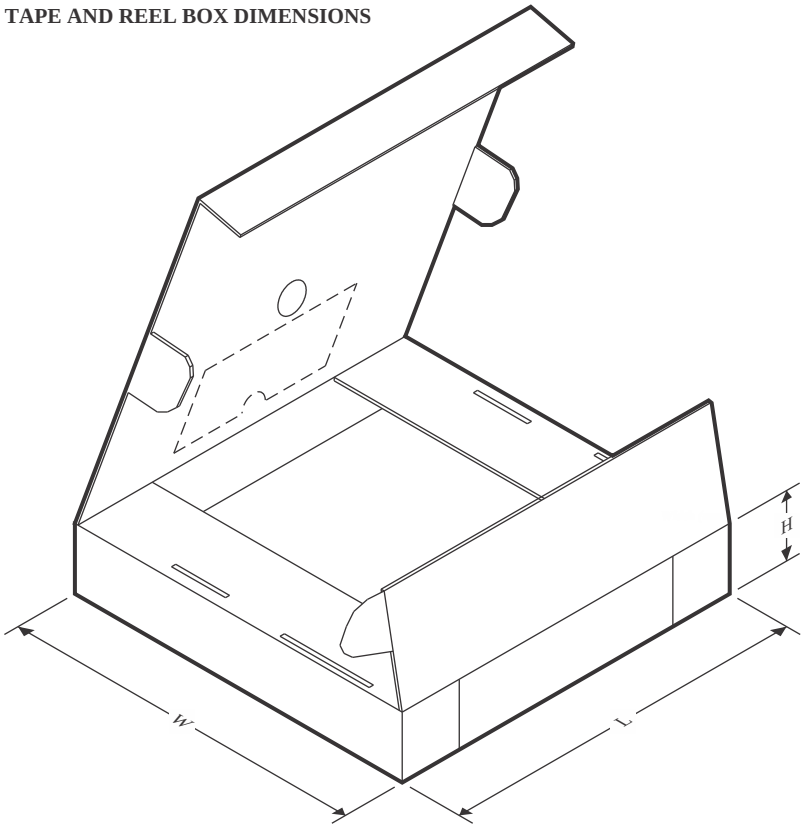
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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

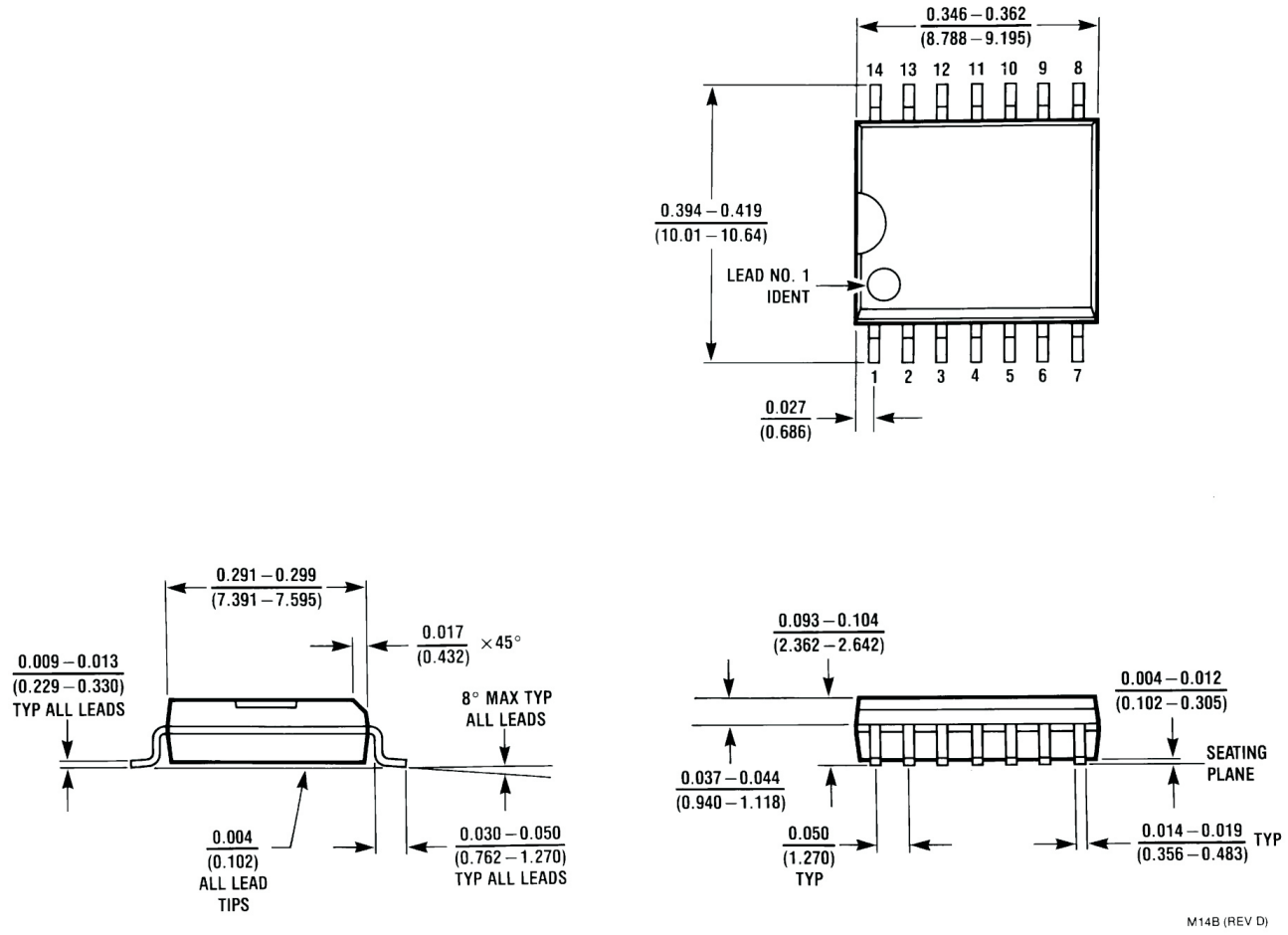
TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
LM1877MX-9/NOPB	SOIC	NPA	14	1000	356.0	356.0	36.0

NPA0014B


0.346 – 0.362
(8.788 – 9.195)
14 13 12 11 10 9 8
0.394 – 0.419
(10.01 – 10.64)
LEAD NO. 1
IDENT
1 2 3 4 5 6 7
0.027
(0.686)
0.291 – 0.299
(7.391 – 7.595)
0.017
(0.432)
×45°
0.009 – 0.013
(0.229 – 0.330)
TYP ALL LEADS
8° MAX TYP
ALL LEADS
0.004
(0.102)
ALL LEAD
TIPS
0.030 – 0.050
(0.762 – 1.270)
TYP ALL LEADS
0.093 – 0.104
(2.362 – 2.642)
0.004 – 0.012
(0.102 – 0.305)
SEATING
PLANE
0.037 – 0.044
(0.940 – 1.118)
0.050
(1.270)
TYP
0.014 – 0.019
(0.356 – 0.483)
TYP
M14B (REV D)

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