

# LM2877

*LM2877 Dual 4W Audio Power Amplifier*



Literature Number: SNAS553A

## LM2877 Dual 4W Audio Power Amplifier

### General Description

The LM2877 is a monolithic dual power amplifier designed to deliver 4W/channel continuous into 8Ω loads. The LM2877 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 LM2877 is internally compensated for all gains greater than 10, and comes in an 11-lead single-in-line package.

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

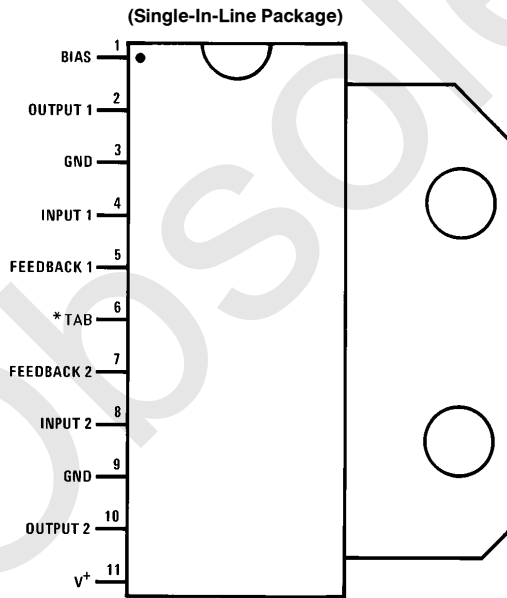
### Applications

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

### Features

- 4W/channel
- -68 dB ripple rejection, output referred
- -70 dB channel separation, output referred

### Connection Diagram



TL/H/7933-1

Top View

Order Number LM2877P  
See NS Package Number P11A

\*Pin 6 must be connected to GND.

## Absolute Maximum Ratings

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

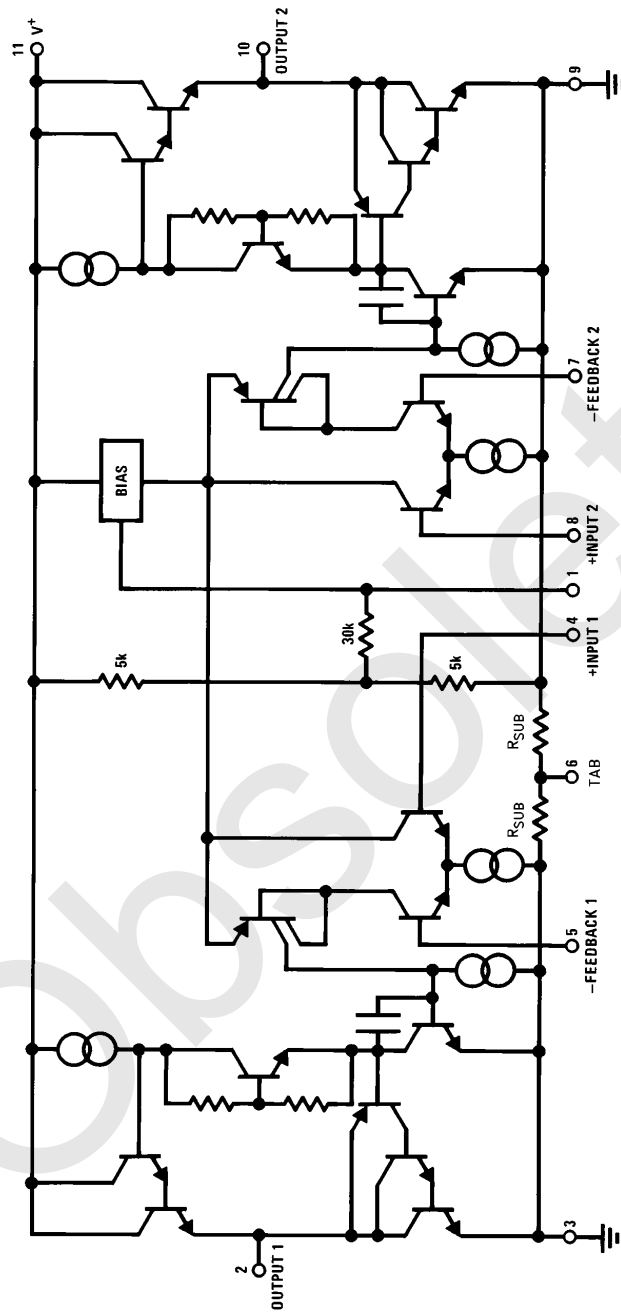
Storage Temperature	-65°C to +150°C
Junction Temperature	150°C
Lead Temperature (Soldering, 10 sec.)	260°C
Thermal Resistance	
$\theta_{JC}$	10°C/W
$\theta_{JA}$	55°C/W

## Electrical Characteristics $V_S = 20V, T_{TAB} = 25^\circ C, R_L = 8\Omega, A_V = 50$ (34 dB) unless otherwise specified.

Parameter	Conditions	Min	Typ	Max	Units
Total Supply Current	$P_O = 0W$		25	50	mA
Operating Supply Voltage		6		24	V
Output Power/Channel	$f = 1 \text{ kHz, THD} = 10\%, T_{TAB} = 25^\circ C$ $V_S = 20V$ $V_S = 18V$ $V_S = 12V, R_L = 4\Omega$ $V_S = 12V, R_L = 8\Omega$	4.0	4.5 3.6 1.9 1.0		W W W W
Distortion, THD	$f = 1 \text{ kHz, } V_S = 20V$ $P_O = 50 \text{ mW/Channel}$ $P_O = 1W/Channel$ $P_O = 2W/Channel$ $f = 1 \text{ kHz, } V_S = 12V, R_L = 4\Omega$ $P_O = 50 \text{ mW/Channel}$ $P_O = 500 \text{ mW/Channel}$ $P_O = 1W/Channel$		0.1 0.07 0.07 0.25 0.20 0.15	1	% % % % % %
Output Swing	$R_L = 8\Omega$		$V_S - 4$		$V_{p-p}$
Channel Separation	$C_F = 50 \mu F, C_{IN} = 0.1 \mu F, f = 1 \text{ kHz,}$ Output Referred $V_S = 20V, V_O = 4 \text{ Vrms}$ $V_S = 7V, V_O = 0.5 \text{ Vrms}$	-50	-70 -60		dB dB
PSRR Power Supply	$C_F = 50 \mu F, C_{IN} = 0.1 \mu F, f = 120 \text{ Hz}$				
Rejection Ratio	Output Referred $V_S = 20V, V_{RIPPLE} = 1 \text{ Vrms}$ $V_S = 7V, V_{RIPPLE} = 0.5 \text{ Vrms}$	-50	-68 -40		dB dB
Noise	Equivalent Input Noise $R_S = 0, C_{IN} = 0.1 \mu F, BW = 20 \text{ Hz} - 20 \text{ kHz}$ Output Noise Wideband $R_S = 0, C_{IN} = 0.1 \mu F, A_V = 200$		2.5 0.80		$\mu V$ mV
Open Loop Gain	$R_S = 0, f = 1 \text{ kHz, } R_L = 8\Omega$		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

**Note 1:** For operation at ambient temperature greater than 25°C, the LM2877 must be derated based on a maximum 150°C junction temperature using a thermal resistance which depends upon device mounting techniques.

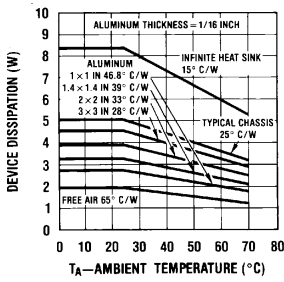
# Equivalent Schematic Diagram



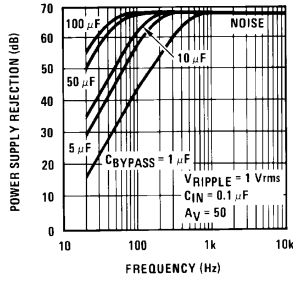
TL/H/7933-2

# Typical Performance Characteristics

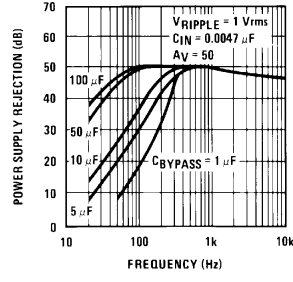
**Device Dissipation vs Ambient Temperature**



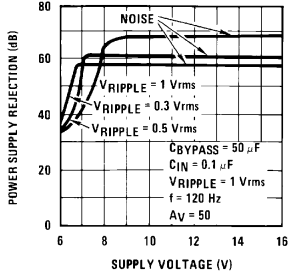
**Power Supply Rejection Ratio (Referred to the Output) vs Frequency**



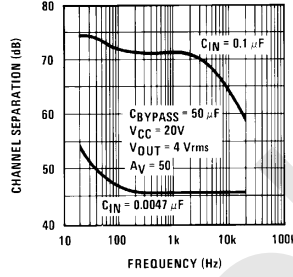
**Power Supply Rejection Ratio (Referred to the Output) vs Frequency**



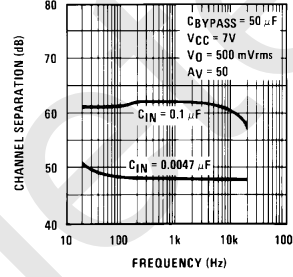
**Power Supply Rejection Ratio (Referred to the Output) vs Supply Voltage**



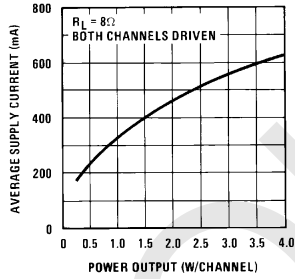
**Channel Separation (Referred to the Output) vs Frequency**



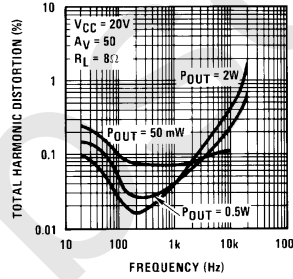
**Channel Separation (Referred to the Output) vs Frequency**



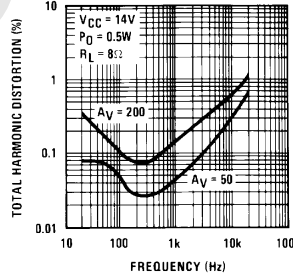
**Average Supply Current vs Power Output**



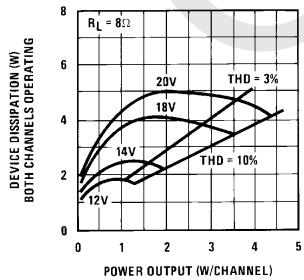
**Total Harmonic Distortion vs Frequency**



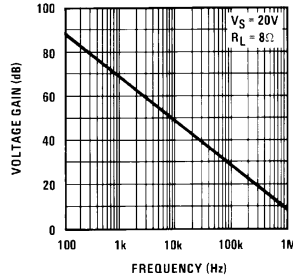
**Total Harmonic Distortion vs Frequency**



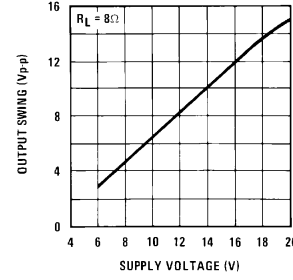
**Power Dissipation vs Power Output**



**Open Loop Gain vs Frequency**

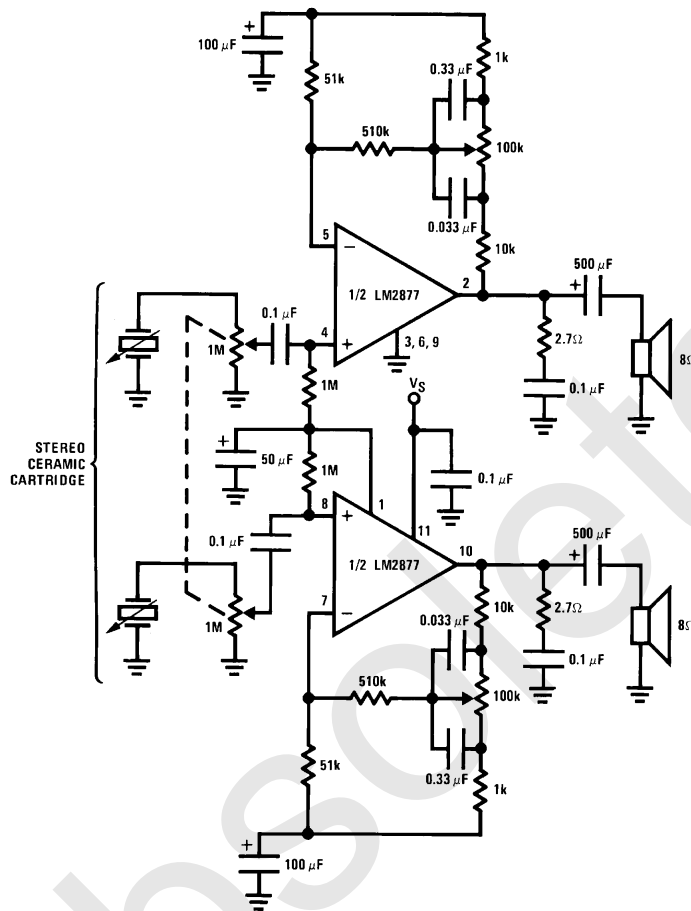


**Output Swing vs Supply Voltage**

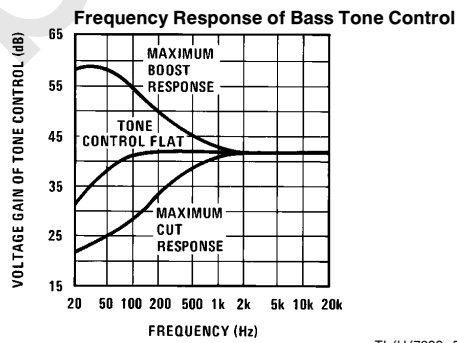


## Typical Applications

Stereo Phonograph Amplifier with Bass Tone Control



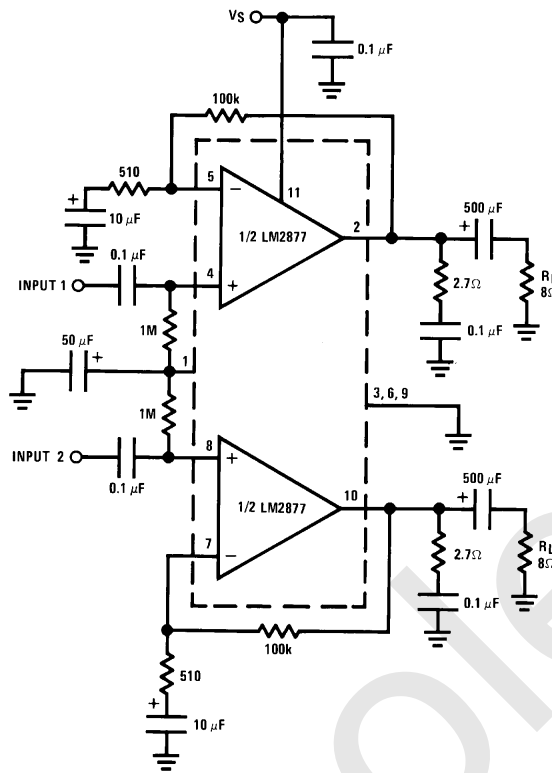
TL/H/7933-4



TL/H/7933-5

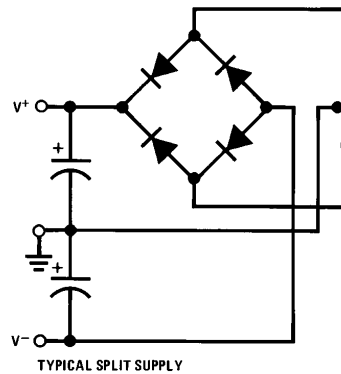
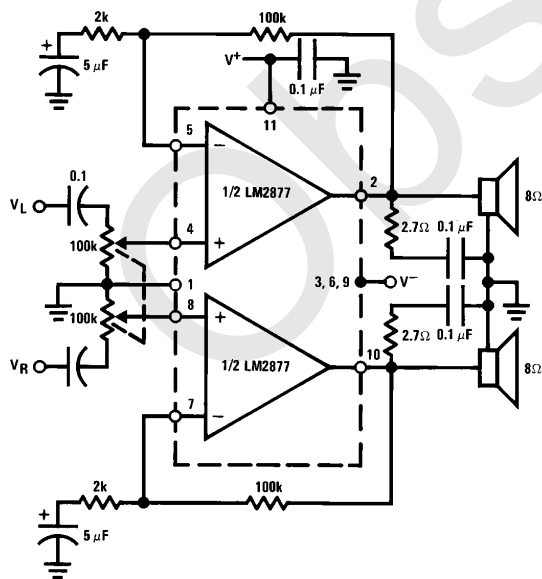
## Typical Applications (Continued)

### Stereo Amplifier with $A_v = 200$



TL/H/7933-6

### Non-Inverting Amplifier Using Split Supply

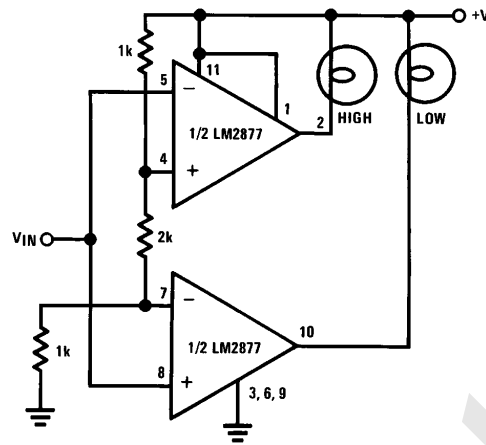


TYPICAL SPLIT SUPPLY

TL/H/7933-7

## Typical Applications (Continued)

Window Comparator Driving High, Low Lamps



TL/H/7933-8

Truth Table

$V_{IN}$	High	Low
$< \frac{1}{4} V^+$	Off	On
$\frac{1}{4} V^+ \text{ to } \frac{3}{4} V^+$	Off	Off
$> \frac{3}{4} V^+$	On	Off

## Application Hints

The LM2877 is an improved LM377 in typical audio applications. In the LM2877, the internal voltage regulator for the input stage is generated from the voltage on pin 1. Normally, the input common-mode range is within  $\pm 0.7V$  of this pin 1 voltage. Nevertheless, the common-mode range can be increased by externally forcing the voltage on pin 1. One way to do this is to short pin 1 to the positive supply, pin 11.

The only special care required with the LM2877 is to limit the maximum input differential voltage to  $\pm 7V$ . If this differential voltage is exceeded, the input characteristics may change.

Figure 1 shows a power op amp application with  $A_V = 1$ . The 100k and 10k resistors set a noise gain of 10 and are dictated by amplifier stability. The 10k resistor is bootstrapped by the feedback so the input resistance is dominated by the 1 M $\Omega$  resistor.

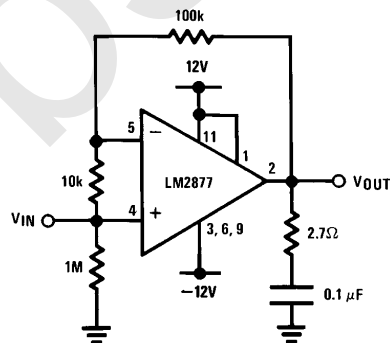
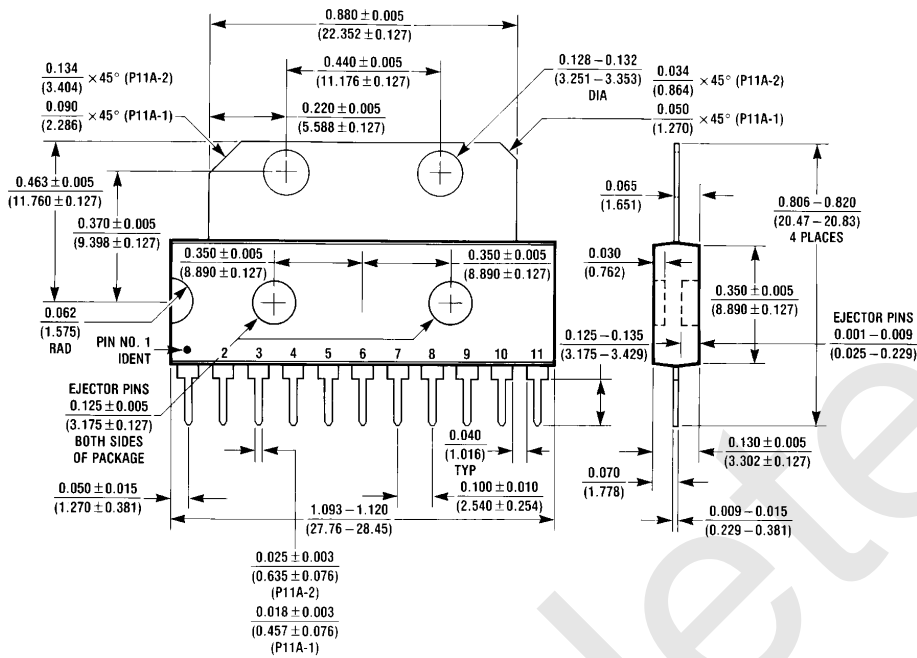


FIGURE 1

TL/H/7933-9



**Physical Dimensions** inches (millimeters)



Order Number LM2877P  
See NS Package Number P11A

**LIFE SUPPORT POLICY**

NATIONAL'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF NATIONAL SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform, when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

 <p><b>National Semiconductor Corporation</b> 2900 Semiconductor Drive P.O. Box 58090 Santa Clara, CA 95052-8090 Tel: (1800) 272-9959 TWX: (910) 339-9240</p>	<p><b>National Semiconductor GmbH</b> Livry-Gargan-Str. 10 D-82256 Fürstenfeldbruck Germany Tel: (81-41) 35-0 Telex: 527849 Fax: (81-41) 35-1</p>	<p><b>National Semiconductor Japan Ltd.</b> Sumitomo Chemical Engineering Center Bldg. 7F 1-7-1, Nakase, Mihama-Ku Chiba-City, Ciba Prefecture 261 Tel: (043) 299-2300 Fax: (043) 299-2500</p>	<p><b>National Semiconductor Hong Kong Ltd.</b> 13th Floor, Straight Block, Ocean Centre, 5 Canton Rd. Tsimshatsui, Kowloon Hong Kong Tel: (852) 2737-1600 Fax: (852) 2736-9960</p>	<p><b>National Semicondutores Do Brazil Ltda.</b> Rue Deputado Lacorda Franco 120-3A Sao Paulo-SP Brazil 05418-000 Tel: (55-11) 212-5066 Telex: 391-1131931 NSBR BR Fax: (55-11) 212-1181</p>	<p><b>National Semiconductor (Australia) Pty. Ltd.</b> Building 16 Business Park Drive Monash Business Park Nottingham, Melbourne Victoria 3168 Australia Tel: (3) 558-9999 Fax: (3) 558-9998</p>
--	---	--	---	---	---

National does not assume any responsibility for use of any circuitry described, no circuit patent licenses are implied and National reserves the right at any time without notice to change said circuitry and specifications.

## IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

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

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

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI 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 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. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

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

TI products are not authorized for use in safety-critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, unless officers of the parties have executed an agreement specifically governing such use. Buyers represent that they have all necessary expertise in the safety and regulatory ramifications of their applications, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of TI products in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by TI. Further, Buyers must fully indemnify TI and its representatives against any damages arising out of the use of TI products in such safety-critical applications.

TI products are neither designed nor intended for use in military/aerospace applications or environments unless the TI products are specifically designated by TI as military-grade or "enhanced plastic." Only products designated by TI as military-grade meet military specifications. Buyers acknowledge and agree that any such use of TI products which TI has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI products are neither designed nor intended for use in automotive applications or environments unless the specific TI products are designated by TI as compliant with ISO/TS 16949 requirements. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, TI will not be responsible for any failure to meet such requirements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

### 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 Mobile 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

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>
Transportation and Automotive	<a href="http://www.ti.com/automotive">www.ti.com/automotive</a>
Video and Imaging	<a href="http://www.ti.com/video">www.ti.com/video</a>

TI E2E Community Home Page

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

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265  
Copyright © 2011, Texas Instruments Incorporated