



DUAL-PORT, LOW-POWER DIFFERENTIAL xDSL LINE DRIVER AMPLIFIERS

FEATURES

- Trimmed Low-Power Consumption
 - 4.2-mA/amp Full Bias Mode ; 4.8 mA Max
 - 3.2-mA/amp Mid Bias Mode ; 3.7 mA Max
 - 2.15-mA/amp Low Bias Mode ; 2.5 mA Max
 - Shutdown Mode and I_{ADJ} Pin for Variable Bias
 - Stable Down to 1.6-mA/amplifier
- Low Noise
 - 2.9-nV/ $\sqrt{\text{Hz}}$ Voltage Noise
 - 5.7-pA/ $\sqrt{\text{Hz}}$ Inverting Current Noise
 - 0.8-pA/ $\sqrt{\text{Hz}}$ Noninverting Current Noise
- Low MTPR Distortion
 - –74 dB with ADSL and ADSL2
 - –71 dB with ADSL2+ and –70 dB with ADSL2++
- –83 dBc THD (1 MHz, 100- Ω Differential)
- High Output Current: >410 mA (25- Ω Load)
- Wide Output Swing: 44 Vpp (± 12 -V, 200- Ω Differential)
- Wide Bandwidth: 45 MHz (Gain = +5)
- Wide Power Supply Range: ± 2.25 V to ± 16.5 V

APPLICATIONS

- Ideal For Power Sensitive, High Density ADSL, ADSL2, ADSL2+, and ADSL2++ Systems

DESCRIPTION

The THS6184 is a dual-port, low-power current feedback differential line driver amplifier system ideal for xDSL systems. Its extremely low-power dissipation is ideal for ADSL, ADSL2, ADSL2+, and ADSL2++ systems that must achieve high densities in ADSL central office rack applications by combining two ports, or four amplifiers, into one package.

The unique architecture of the THS6184 allows the trimmed quiescent current to be much lower than existing line drivers while still achieving high linearity. Distortion at these low-power levels is good with –73 dBc THD at 1 MHz with the low bias mode of 4.3 mA/port. Fixed and variable multiple-bias settings of the amplifiers allows for enhanced power savings for line lengths where the full performance of the amplifier is not required.

The wide output swing of 44-Vpp differentially with ± 12 -V power supplies coupled with over 410-mA current drive allow for wide dynamic headroom, keeping distortion minimized. The THS6184 output stage incorporates extra catch-diodes to the power supply to minimize the external protection required in CO systems. With a low 2.9-nV/ $\sqrt{\text{Hz}}$ voltage noise coupled with a low 5.7-pA/ $\sqrt{\text{Hz}}$ inverting current noise, the THS6184 increases the sensitivity of the receive signals allowing for better margins and reach.

PRODUCT PREVIEW

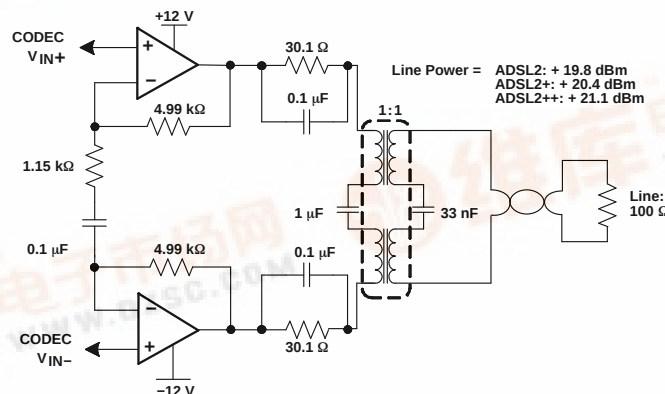


Figure 1. Typical Line Driver Circuit Using One Port of THS6184

THS6184

SLLS635–JANUARY 2005



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

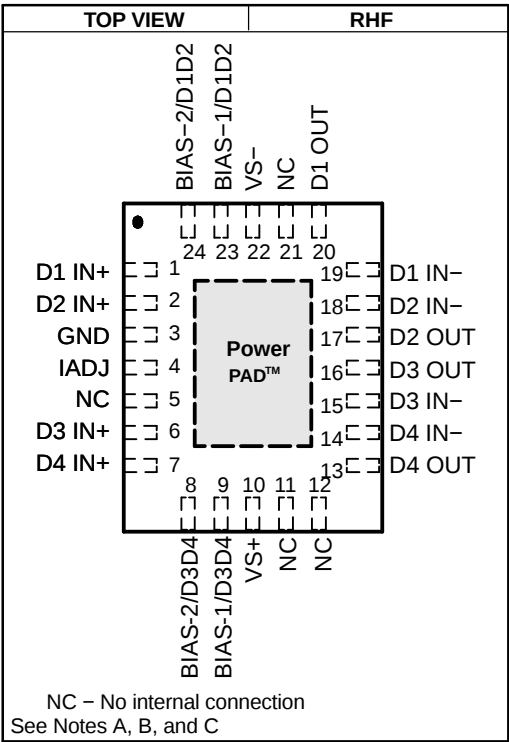
ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

PACKAGING/ORDERING INFORMATION⁽¹⁾

PACKAGED DEVICES ⁽²⁾	DEVICE MARKING	PACKAGE TYPE	TRANSPORT MEDIA, QUANTITY
THS6184RHFT	6184	Leadless MSOP	Tape and Reel, 250
THS6184RHFR			Tape and Reel, 3000

- (1) For the most current package and ordering information, see the Package Option Addendum at the end of this document, or see the TI website at www.ti.com.
- (2) The PowerPAD is electrically Isolated from all other pins.

PIN CONFIGURATION



- A. The THS6184 defaults to the FULL BIAS state if no signal is present on the BIAS pins.
- B. The PowerPAD is electrically isolated from all other pins and can be connected to any potential voltage range from V_{S-} to V_{S+} . Typically, the PowerPAD is connected to the GND plane as this plane tends to be physically the largest and able to dissipate the most amount of heat.
- C. The GND pin range is from V_{S-} to $(V_{S+} - 2.5 \text{ V})$.

Please contact Texas Instruments for full data sheet.

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
THS6184RHFR	ACTIVE	QFN	RHF	24	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR
THS6184RHFRG4	ACTIVE	QFN	RHF	24	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR
THS6184RHFT	ACTIVE	QFN	RHF	24	1000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR
THS6184RHFTG4	ACTIVE	QFN	RHF	24	1000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR

⁽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.

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.

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 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.

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.

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

Products

Amplifiers	amplifier.ti.com
Data Converters	dataconverter.ti.com
DSP	dsp.ti.com
Interface	interface.ti.com
Logic	logic.ti.com
Power Mgmt	power.ti.com
Microcontrollers	microcontroller.ti.com

Applications

Audio	www.ti.com/audio
Automotive	www.ti.com/automotive
Broadband	www.ti.com/broadband
Digital Control	www.ti.com/digitalcontrol
Military	www.ti.com/military
Optical Networking	www.ti.com/opticalnetwork
Security	www.ti.com/security
Telephony	www.ti.com/telephony
Video & Imaging	www.ti.com/video
Wireless	www.ti.com/wireless

Mailing Address: Texas Instruments
Post Office Box 655303 Dallas, Texas 75265