TEXAS INSTRUMENTS

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MIXED-SIGNAL & ANALOG

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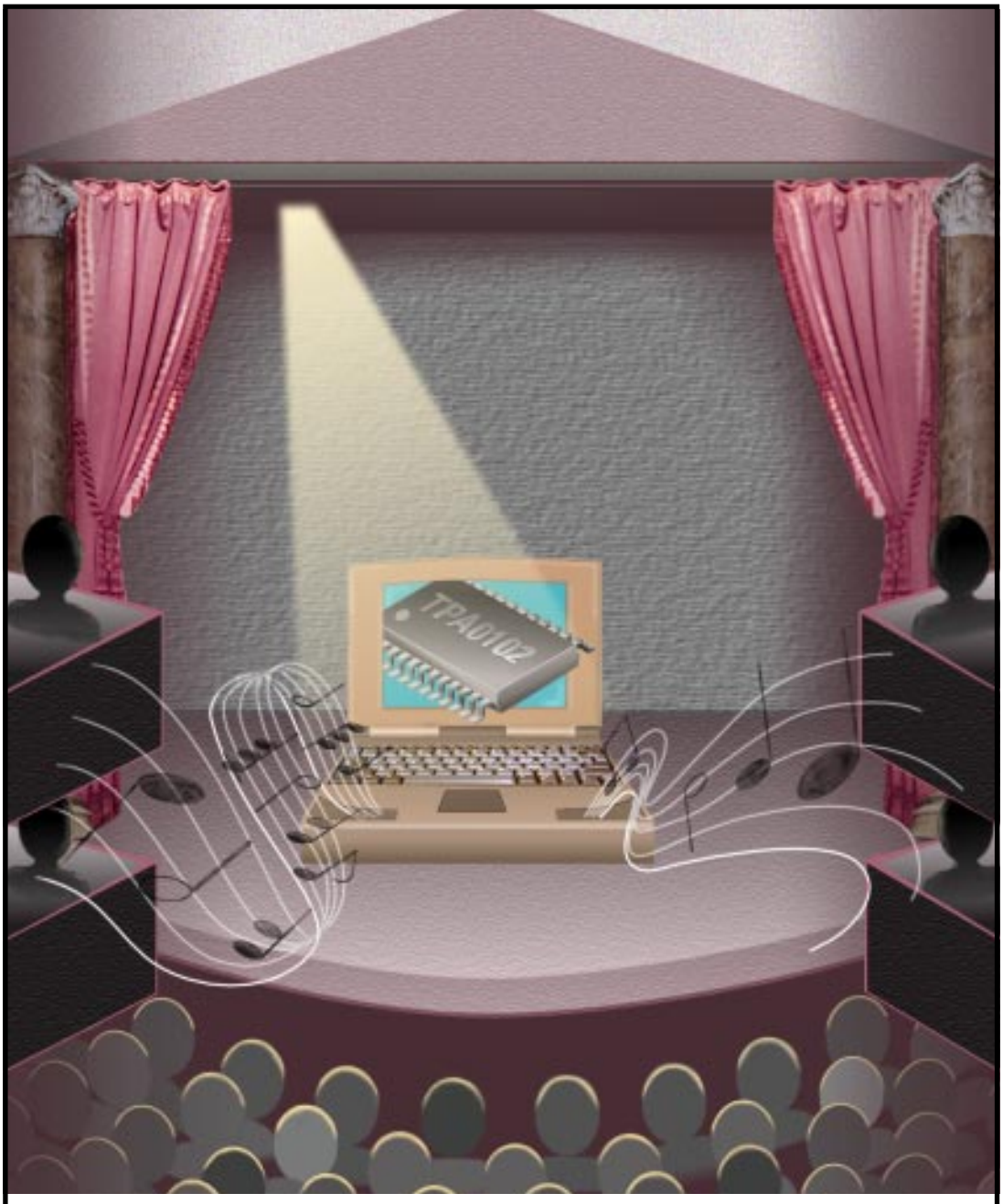
Inside



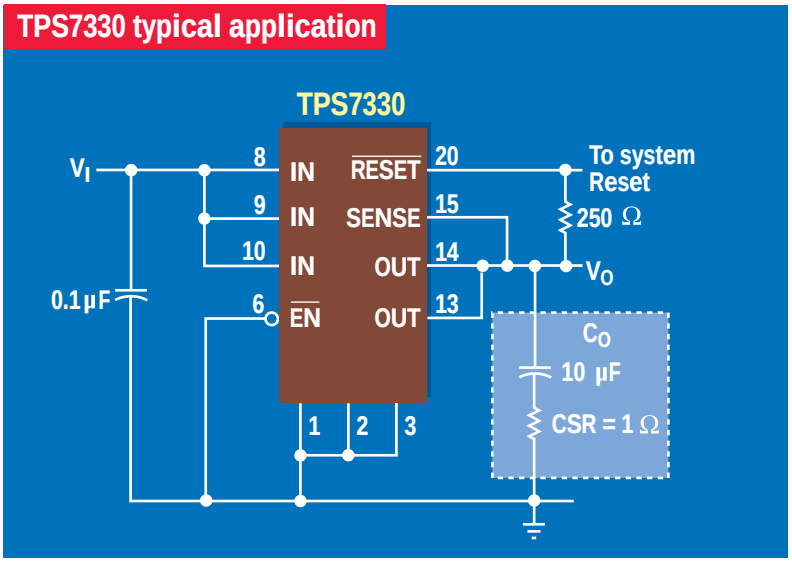
High performance stereo audio amplifier
Page 3

Simplify designs with integrated 3-V LDO and supply voltage supervisor

Product Features

- Integrated supply voltage supervisor and LDO regulator
- Low dropout voltage: (52 mV at 100 mA)
- Low quiescent current, 340 µA, independent of load
- Shutdown mode (0.5 µA typ)
- Wide load range: 0 to 500 mA
- Characterized for operation from –40°C to 125°C

TPS7330 typical application



The TPS7330 is an integrated voltage supervisor and low dropout regulator designed for 3.0 V systems. It is a simple solution for systems needing both longer battery life and a supply voltage supervisor. The TPS7330 is optimized for power sensitive applications such as cellular telephones, Personal Digital Assistants, digital cameras and other low power portable systems.

The device features extremely low dropout voltage and quiescent currents made possible by replacing the conventional bipolar PNP pass transistor with a PMOS element. The TPS7330 has a maximum dropout voltage of 52 mV at 100 mA load, quiescent current of only 340 µA, and remains constant over the full 500 mA load range, even in dropout. A micropower shutdown mode further reduces supply current to just 0.5 µA, offering additional flexibility for power distribution and load management. The micropower operation and very low dropout voltages significantly reduce system power consumption thereby extending battery life. Precision regulation is achieved with a maximum output voltage tolerance of 2% over full line, load and temperature conditions.

The TPS7330 is a new voltage option in TI's TPS73xx family. This family shares the same feature set as TI's TPS71xx ultra-low dropout regulators, with the addition of a precision supply voltage supervisor. An active-low $\overline{\text{RESET}}$ signal is automatically asserted during power up and power down, or any time the TPS7330 output drops below the threshold voltage. A preset 200 ms delay holds the $\overline{\text{RESET}}$ low to ensure that system voltage is stable before enabling sensitive circuits.

The TPS7330 is available in 20-pin Thin Shrink Small Outline Package and 8-pin SOIC and DIP packages.

- **Check Box 01** for the TPS73xx datasheet.
- **Check Box 02** for the TPS71xx datasheet.

Suggested resale price

Quoted per device in quantities of 1,000

TPS7330QD/P: $1.58

TPS7330QPWLE: $1.68

TPS73xx device family options

Device	Output Voltage (V) Min	Typ	Max	Negative-Going $\overline{\text{RESET}}$ Threshold (V) Min	Typ	Max
TPS7301	Adjustable 1.2 V to 9.75 V					
TPS7330	2.94	3.0	3.06	2.58	2.64	2.7
TPS7333	3.23	3.3	3.37	2.868	2.934	3.0
TPS7348	4.75	4.85	4.95	4.5	4.6	4.7
TPS7350	4.9	5.0	5.1	4.55	4.65	4.75

Lowest distortion 1.5 W stereo audio amplifier

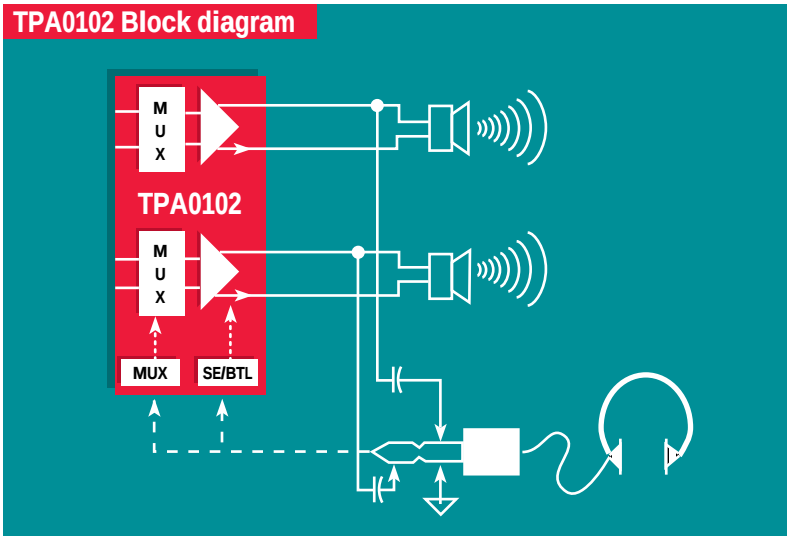
The TPA0102 is a complete stereo audio solution in a single package. The device offers two BTL (bridged-tied load) channels that can deliver 1.5 W of continuous average power per channel into 4-Ω loads from a 5-V supply. This is achieved with less than 0.05% THD+N, making it the lowest distortion single chip solution in the industry for low voltage systems. For applications where speakers are driven as BTL and the line outputs (often headphones) are required to be SE, the TPA0102 automatically switches into SE mode delivering up to 500 mV of output power for channel when the SE/BTL input is activated. The TPA0102 provides high power supply rejection (75 dB) for increased fidelity. It is characterized at 3.3 V and 5 V operation and offers shutdown for power-sensitive applications.

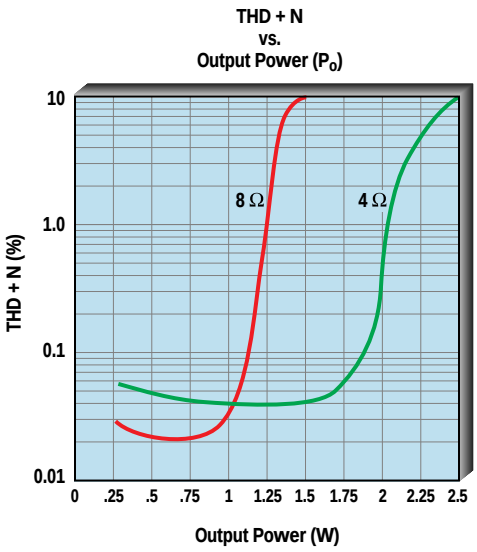
The TPA0102 also has an integrated MUX on board to allow two sets of stereo inputs to the amplifier. This is especially valuable when both speakers and headphones are being driven since they may require different signal conditioning to provide the best possible sound to the user.

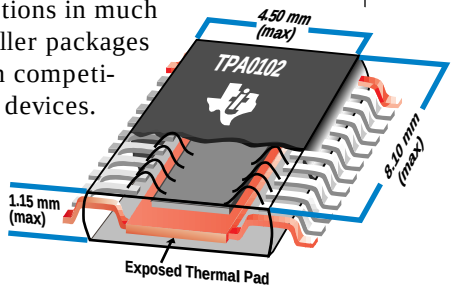
This functionality provides a very efficient upgrade path from the TPA4860, TPA4861, and TPA302 amplifiers where three separate ICs are required for stereo speaker and headphone drive. All of these functions are integrated in an ultra thin surface mount package saving the designer valuable board space and money.

The TPA0102 is available in TIs patented PowerPAD™ 24-pin TSSOP (PWP) package. The PowerPAD package uses an exposed thermal pad, which can be soldered directly to the PCB, to provide extra heatsinking. When connected to ground planes in a typical multilayer board application, the PowerPAD package can dissipate over 2.5 W of power with zero airflow. This innovative method allows us to provide audio solutions in much smaller packages than competitive devices.

TPA0102 Block diagram







Cross Section view of the 24-pin PowerPAD™ Package

■ **Check box 03** for a datasheet.

Product Features

- THD+N <0.05% @ 1.5 W, 4 Ω
- High PSRR: 75 dB @ 5 V, 1 kHz
- Power-saving shutdown mode (I_{DD} < 1 µA)
- Automatic switching between stereo speaker and headphone mode
- Unique stereo input MUX adds design flexibility
- Characterized for operation from –20°C to 85°C

Suggested resale price

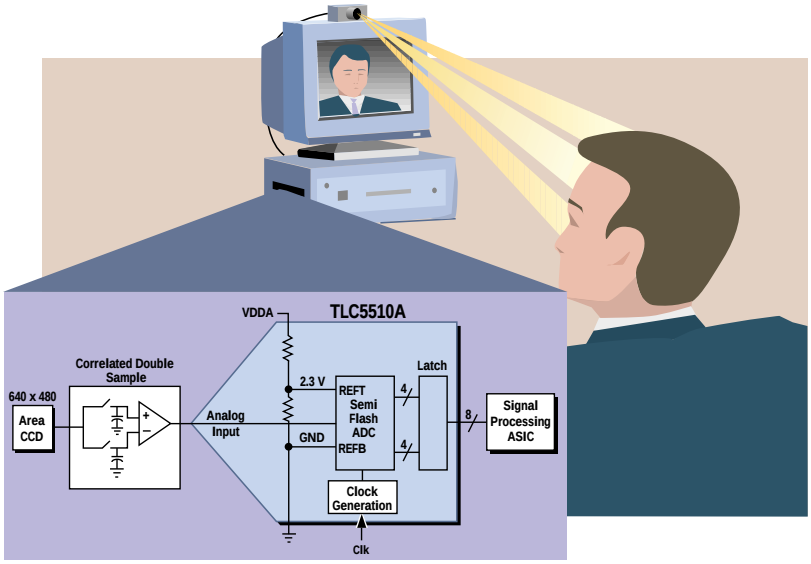
Quoted per device in quantities of 1,000

TPA0102PWPLE: $2.54

Product Features

- 20 MSPS with 8-bit resolution
- 0–4 V analog input range
- Latch-up free operation
- INL = ±0.75 LSB
- DNL = ±0.5 LSB
- Full power analog input bandwidth of 14 MHz (–1 dB)
- 90 mW power dissipation at 20 MSPS
- Characterized for operation from –20°C to 75°C

8-Bit, 20 MSPS ADC with 4-volts of analog input range



The TLC5510A is an 8-Bit, 20 MSPS ADC that combines the features of the previously announced TLC5510 with a wider 4-Volt analog input range.

The TLC5510A combines low-power with video speed and high accuracy in the industry standard pinout similar to the TLC5510, but features a 4-V (instead of a 2-Volt) analog input range. The wide 4 V input range allows the system designer to gain the signal up above common mode noise of the system board.

The TLC5510A is implemented with a multi-stage, semi-flash architecture that provides video speed conversion rates (20 MSPS) and significantly lower power consumption and cost than traditional flash converters. This architecture also provides excellent linearity accuracy with a Differential Non-Linearity (DNL) of ± 0.5 LSB and Integral Non-Linearity (INL) of ± 0.75 LSB. Like the TLC5510, the TLC5510A is an excellent choice for both Nyquist based and Correlated Double Sample systems. The analog input full power bandwidth (14 MHz at –1 dB) of the TLC5510A ensures full signal power out to the Nyquist frequency. In correlated double sample applications, like those found in CCD imaging systems, the analog input stage allows an analog input range of 0 to 4 V, thus eliminating the need to level shift the signal.

Other features include an inherent sample and hold, 3-State digital outputs, an internal reference network that will provide a standard video 2 V full range with a V_{DDA} of 5 V and (like all members of the TLC55xx family) immunity to latch-up problems if V_{DDA} and V_{DDD} are not equal. The TLC5510A operates from a single 5-V supply and typically dissipates only 90 mW of power. The TLC5510A is available in a 24-pin SOIC package.

■ **Check box 04** for a datasheet.

Suggested resale price

Quoted per device in quantities of 1,000

TLC5510AINSLE: $2.78

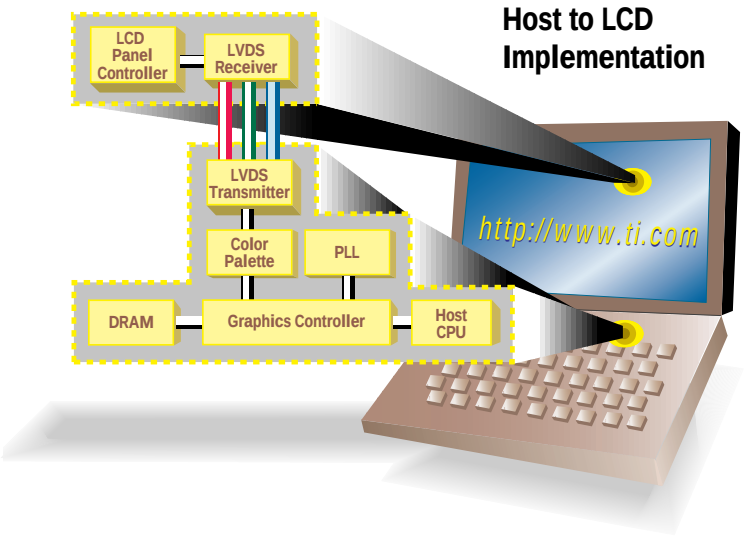
TI's Family of HIgh-speed 8-bit A/D Converters

Device Type	FS	AIN Range	SNR	Power Dissipation	INL	DNL
TLC5510	20 MSPS	0–2 V	46 dB	18 mA	±0.75 LSB	±0.5 LSB
TLC5510A	20 MSPS	0–4 V	46 dB	18 mA	±0.75 LSB	±0.5 LSB
TLC5540	40 MSPS	0–2 V	45.2 dB	17 mA	±1 LSB	±0.75 LSB

TI expands family of 3.3-V LVDS devices

The addition of the SN75LVDS83 through SN75LVDS86 to the previously released SN75LVDS81 and SN75LVDS82 expands TI's first generation FlatLink™ family of products. All of the products are designed to address the electrical noise and mechanical issues resulting from moving large amounts of binary data with traditional TTL signals. The electrical noise and electromagnetic interference (EMI) are reduced significantly by using low-voltage differential signaling between the transmitter and receiver. The width of the bus is reduced by employing serialization and then deserialization of the data.

FlatLink was developed to transfer display data and control signals from portable computer video display processor to flat-panel displays. Previously, the data interchange was accomplished through a wide synchronous parallel data transfer using single-ended signals. With increased resolution and color requirements, the necessary data transfer rate can not be achieved without increasing the bus width or EMI to an unacceptable level.



Although designed to address a specific application problem, FlatLink can be used to improve the performance of any wide parallel single-ended synchronous data connection.

These products operate with a single 3.3-V supply for lower power consumption. High data throughput is achieved by an internal 7x PLL which operates from a reference clock from 31 to 67.

The SN75LVDS83 allows the user to select either positive-going or negative-going clock edge triggering. The ‘LVDS83 has four 7-bit parallel-to-serial shift registers, PLL clock synthesizer and five ‘LVDS output buffers. The ‘LVDS84 and ‘LVDS85 are similar in architecture, but drop one of the parallel-to-serial shift registers and one output buffer, and fit in a 48-pin instead of the 56-pin package. The ‘LVDS86 is a companion receiver to the ‘LVDS84 and ‘LVDS85 transmitters, with three serial-to-parallel shift registers, PLL clock synthesizer and four ‘LVDS input buffers.

FlatLinks family of devices are compatible to existing competitive solutions in the market. Devices are available in 48-pin and 56-pin TSSOP.

■ **Check box 05** for a datasheet.

Product	Function	Feature	Pin/Pkg
SN75LVDS81	Transmitter	Negative clk Trigger	56 TSSOP
SN75LVDS82	Receiver	Negative clk Trigger	56 TSSOP
SN75LVDS83	Transmitter	User select clk trigger	56 TSSOP
SN75LVDS84	Transmitter	Negative clk Trigger	48 TSSOP
SN75LVDS85	Transmitter	Positive clk Trigger	48 TSSOP
SN75LVDS86	Receiver	Negative clk trigger	48 TSSOP

Product Features

- 227 Mbytes/sec
- Low EMI and low power (250 mW typ)
- Enhanced Replacement for TTL buses
- 28:4 (SN75LVDS83) or 21:3 (SN75LVDS84/85) data channel compression
- 3:21 data channel expansion with SN75LVDS86 receiver
- Single 3.3-V supply with 5-V tolerant inputs
- Characterized for operation from 0°–70°C

Suggested resale price

Quoted per device in quantities of 1,000

SN75LVDS83DGG: $6.13

Ultra fast voltage comparators

Product Features

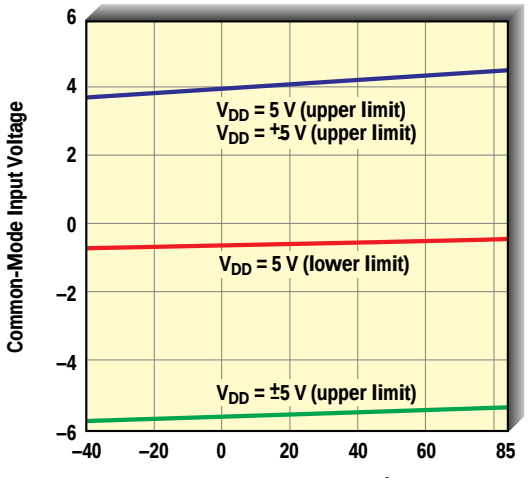
- Ultra-fast operation of 7.6 ns (typ)
- Low supply current of 10.6 mA (typ)
- Operates from single 5-V supply or from split ±5-V supplies
- Complementary outputs
- Low offset voltage of 0.5 mV (typ at 25°C)
- No minimum slew rate requirement
- Output latch capability

Two new voltage comparators from Texas Instruments combine ultra-fast operation, low power requirements and precision performance, all at an unexpected low price. The TL3016 and TL3116 comparators are designed to interface directly to TTL and are ideal choices for applications such as hard disk drives and high speed scanners.

The excellent high speed/low power performance of these devices (7.6 ns typical propagation delay time and 10.6 mA typical supply current) makes either device suitable for battery powered applications. The TL3016 and TL3116 also feature an input offset voltage of 0.5 mV typical, making them good choices for precision applications. These devices are designed to operate from either a single 5-V supply or split ±5 V supplies. The TL3016 provides the better speed/power comparison, while the TL3116 has a common mode input range that includes the negative supply rail. Both devices have complementary outputs that may be latched to retain the input data at the output.

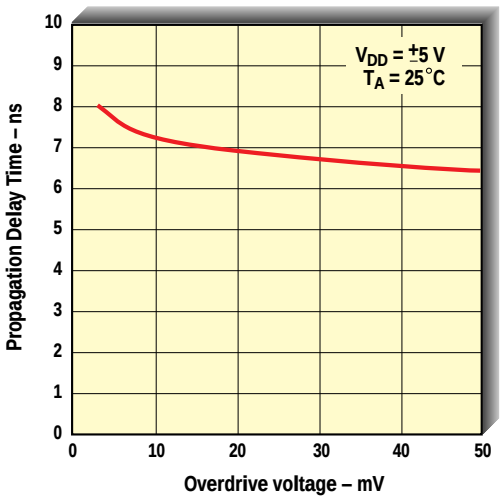
The new comparators are ideal performance upgrades to the LT1016 and LT1116, while consuming about half their power. The TI comparators are available in 8-pin SOIC and TSSOP for low profile packaging in high density circuits.

TL3116
Common-Mode Input Voltage vs. Free-air Temperature

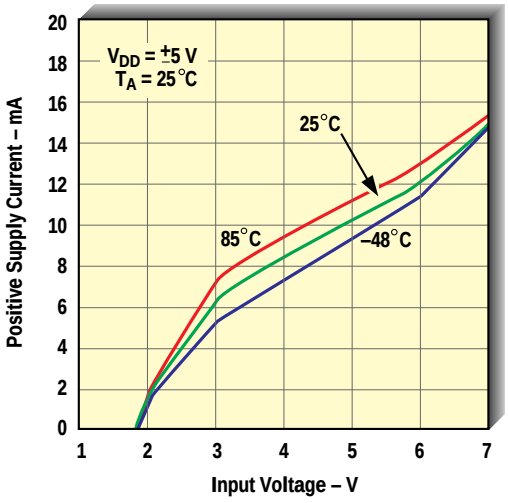


■ **Check box 05** for a datasheet.

TL3016
Propagation Delay Time vs. Overdrive Voltage



TL3016
Positive Supply Current vs. Input Voltage



Suggested resale price

Quoted per device in quantities of 1,000

TL3016/TL3116CD: $1.04

TL3016/TL3116ID: $1.17

TL3016/TL3116CPWLE: $1.17

TL3016/TL3116IPWLE: $1.30

20-Bit stereo A/D and D/A offers professional audio

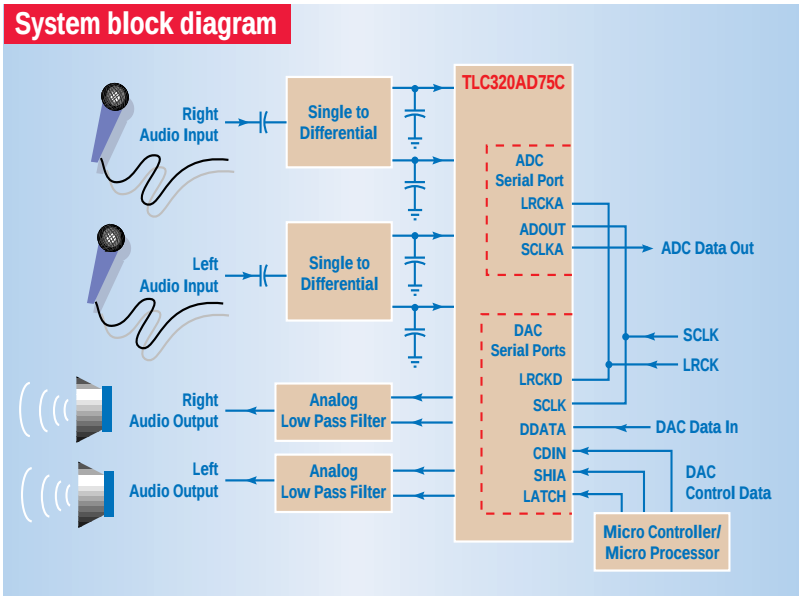
The TLC320AD75 provides a complete stereo audio conversion system for high performance digital audio applications. The device includes 20-bit stereo A/D and D/A conversion in a single low cost package. The ADC achieves Signal-to-Noise ratios of 100 dB at sample rates up to 48 kHz. In addition, the device operates from either 5 V only or separate 5 V and 3.3 V power supply configurations. Typical power dissipation for the device is 400 mW or 2 mW in standby.

The 'AD75 DAC uses sigma delta technology and a PWM output to achieve a signal to noise ratio (SNR) of 104 dB on playback. When the PWM output is connected to an external lowpass reconstruction filter, the resulting THD+N is typically 0.0013%. The device features digital attenuation, digital de-emphasis filtering, and soft mute via a separate serial port. Using the control port, pre-emphasized recordings can be filtered at industry standard settings for 32, 44.1, and 48 kHz sample rates. Also via the control port, downstream gain adjustments can be eliminated using the built in programmable attenuator.

Key Applications for this device include:

- **Consumer Audio: CD, MD, DVD, Keyboards, etc.**
- **Business Audio: Workstation, PC**
- **General Purpose High Resolution Data Conversion**

System block diagram



The 'AD75 ADC builds on the success of the other members of TI's family of high performance audio ADCs, the TLC320AD57 and TLC320AD58. All three devices utilize sigma delta technology to achieve the high standards available. The ADC provides separate analog and digital power management pins as well as both master and slave modes for a variety of applications.

The TLC320AD75 is available in a 56-pin SSOP package.

■ **Check Box 06** for a datasheet.

Product Features

■ 20-Bit Stereo A/D & D/A

■ SNR of 100 dB on ADC & 104 dB on DAC

■ Up to 48 KHz sample rates on ADC & DAC

■ Digital attenuation & soft mute on DAC

■ 64X A/D and 32X D/A sigma delta conversion

Suggested resale price

Quoted per device in quantities of 1,000

TLC320AD75CDL: $6.20

E V M K I T S

Each EVM kit contains a fully-assembled evaluation board, data sheet, and a User's Guide for the evaluation board. Some kits also include applications notes, plus necessary software, cables and connectors.

To order any of the EVM kits listed, please call our toll-free order desk number 1-800-477-8924 x 5800.

TLC320AD55	**16-bit sigma delta AIC**	**$75^{00}**
TLC320AD56	**16-bit sigma-delta AIC**	**$75^{00}**
TPS9104	**Integrated power supply, audio power system**	**$50^{00}**
TPS6735	**5 V, 200 mA inverting DC-DC converter**	**$50^{00}**
TLC5510	**8-bit, 40 MSPS ADC**	**$50^{00}**
TLC5540	**8-bit, 40 MSPS ADC**	**$50^{00}**
TLV2543	**3 V, 12-bit analog-to-digital converter**	**$75^{00}**
TLC2543	**5 V, 12-bit analog-to-digital converter**	**$75^{00}**
TLC2932	**50 MHz phase locked loop**	**$85^{00}**
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PC404-1401 (TSL1401)	**400 DPI array**	**$124.95**
PC404-1402 (TSL1402)	**400 DPI array**	**$127.95**

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