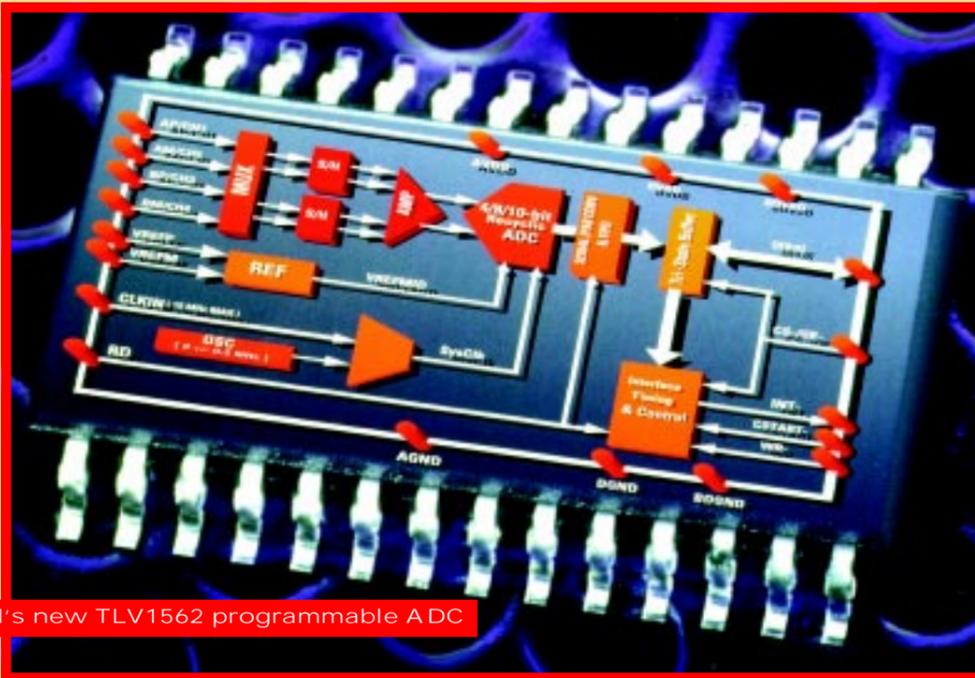


# INTEGRATION

[www.ti.com/sc/9809](http://www.ti.com/sc/9809)

## system design

# Re-defining



TI's new TLV1562 programmable ADC

## New TI data converters create more flexibility for designers working with DSPs

The industry's first high-speed, programmable resolution analog-to-digital (ADC) converter from Texas Instruments redefines system design for digital signal processor (DSP) applications.

The programmability of the new device, the TLV1562, provides system designers with more flexibility and ultimately first-to-market DSP solutions for portable digital radios, paging systems, process and motor controls, remote sensing, automotive systems, servo controls and communications systems such as wireless local loops.

### TLV1562 features

- Programmable at 2 MSPS at 10 bit, 3 MSPS at 8 bit and 7 MSPS at 4 bit maximum throughput (single channel)
- Single wide range supply: +5.5-V DC to +2.7-V DC
- Low supply current: 12 mA at 5.5 V, 7.8 mA at 2.7 V (max)
- Dual simultaneous sample and hold capability for matched I&Q demodulation
- TMS320 compatible parallel interface

### TLV5613/5619 features

- 8+4-bit and 12-bit parallel interface (TLV5613 and TLV5619, respectively)
- Low power consumption
- Buffered reference inputs
- Two speed modes — settling time vs. power consumption (TLV5613)

Along with the TLV1562, TI also offers the TLV5613 and TLV5619, the market's fastest 12-bit voltage output digital-to-analog converters (DACs), with a settling time of only 1 microsecond.

### The TLV1562

The resolution and sampling speed of the TLV1562 can be set to change dynamically during operation. Any of the three following combinations can be programmed: 10 bits resolution at 2 million samples per second (MSPS), 8 bits

See **DATA CONVERTERS** on page 2

**WIN BIG!**

## Convert your great ideas to cash in the Analog Design Challenge

The digital world can't function without analog, and Texas Instruments is putting up \$60,000 to prove it.

Designers with great ideas can contribute to the effort by entering the *EE Times* Analog Design Challenge. The worldwide contest is sponsored by TI, which will award \$60,000 for designs that most inventively and extensively use TI's

analog and mixed-signal products to address a real-world design challenge.

Regional winners — one each from North America, Europe, Asia and Japan — will be awarded \$5,000. A \$40,000 grand prize will be awarded to the best entry overall.

Free design kits are available and contain TI's Analog Design Challenge CD, which is packed with technical documentation and support information. The kits also include free TI product sample offers and discount coupons toward the purchase of an evaluation model (EVM).

Design kits must be requested by Jan. 15, 1999, and entries must be post-marked by March 1, 1999, to be eligible to win. Winners will be announced by April 19, 1999. ■



For complete information or to request an entry kit with contest rules, see: [www.ti.com/sc/9809](http://www.ti.com/sc/9809) or call 1-800-477-8924, ext. 5070.

## NETWORKING

# A powerful I-II punch

*TI's new ThunderSWITCH I and II devices bring high-performance, low-cost network solutions to the desktop*

Texas Instruments has extended its ThunderSWITCH™ portfolio with the introduction of two new single-chip product families targeting Ethernet, Fast Ethernet and Gigabit switching equipment. These next-generation products will enable network equipment manufacturers to develop high-performance desktop switches below \$15 per port for Ethernet and \$35 per port for Fast Ethernet.

## ThunderSWITCH II TNETX4090

ThunderSWITCH II TNETX4090 is the industry's only single-chip 10/100/1000-Mb device that offers eight 10/100-Mb ports and one 100-Mb/1-Gb uplink port. The device uses RDRAM, which provides superior performance and a substantial savings over existing SDRAM-based solutions. Alternative solutions frequently require multiple switch chips and numerous high-cost, low-density memory devices to achieve similar performance.

The ThunderSWITCH II TNETX4090 has 4 Gb of memory bandwidth and 6 Gb of internal switching bandwidth, allowing OEMs to develop ultra-high performance, non-blocking switches. By also incorporating a rich feature set, the cost-effective device meets the needs of the rapidly growing 10/100/1000-Mb market.

Networking OEMs can build cost-effective high-density switches, greater than 24 10/100-Mb ports, by using multiple TNETX4090 devices connected via the cascade mode. This configuration will be further expanded later this year with the introduction of the second and third members of the ThunderSWITCH II family. Based on the existing architecture, they will provide expanded switch features, port densities and multi-gigabit speeds.

## ThunderSWITCH I

The ThunderSWITCH I product line is the industry's most complete family of single-chip solutions for use in 10BaseT desktop Ethernet switches. The four pin-for-pin compatible devices (*see box*) all support the same feature set. As a result, networking OEMs can build — on one common platform — switches of various port densities that share the same functionality. This enables OEMs to simplify designs, lower overall system cost and get to market quickly with solutions that provide the features needed to support emerging bandwidth-intensive applications.

All ThunderSWITCH I devices support cut-through and store-and-forward modes of operation, as well as user-



defined virtual LANs (VLANs). To reduce cost and number of pins, these devices use a pin optimized synchronous PHY interface with the TI TNETE2008 Octal 10-Mb PHY. This interface reduces the pin count by more than 75 percent. The ThunderSWITCH I products are the lowest-power switches available today; each has been fabricated in TI's 0.25 um process technology and has a core that operates at 2.5 V.

## Pricing and availability

ThunderSWITCH II TNETX4090 samples were scheduled to be available from TI and authorized distributors in August. Volume production is scheduled for 4Q98. ThunderSWITCH I family devices are sampling now. Volume production is scheduled for 3Q98.

Corresponding physical layer devices — the TNETE2008, TNETE2101 and TNETE2201 — are in production now. The TNETE2008 supports eight

10-Mb ports and works with the ThunderSWITCH I devices. It uses a proprietary synchronous PHY interface that reduces pin count by more than 75 percent. The TNETE2101 is a single-channel 10/100 PHY, and the TNETE2201 is a single-channel gigabit transceiver. ■

## ThunderSWITCH II

TNETX4090	52-pin BGA	\$90*
-----------	------------	-------

## ThunderSWITCH I

TNETX3270	240-pin QFP	\$95
TNETX3190	240-pin QFP	\$85
TNETX3151	240-pin QFP	\$76
TNETX3110	240-pin QFP	\$55
TNETE2008	120-pin QFP	\$10
TNETE2101	100-pin TQFP	\$ 5.75
TNETE2201	64-pin QFP	\$13

Suggested resale pricing in U.S. dollars in 10K quantity.  
\* All planned pricing.

ThunderSWITCH is a trademark of Texas Instruments.

→ For complete information, order **ThunderSWITCH II Product Bulletin (SPWT099)** and **ThunderSWITCH I Product Bulletin (SPWT100)**. See page 8.



## ThunderSWITCH I family

- TNETX3270 supports 24 10-Mb ports and three 10/100-Mb ports
- TNETX3190 supports 16 10-Mb ports and three 10/100-Mb ports
- TNETX3151 supports 12 10-Mb ports and three 10/100-Mb ports
- TNETX3110 supports 8 10-Mb ports and three 10/100-Mb ports

## Data converters

Continued from page 1

at 3 MS/PS and 4 bits at 7 MS/PS.

In addition, the device features a unique dual sample/hold (S/H) architecture. One input channel can be sampling while the second channel is converting analog signals. By switching between the two S/H channels, the device can output a continuous stream of digital data for long periods of time.

The converter also includes an internal code-conversion capability that offloads processing tasks from the DSP for improved system performance. Most other ADCs output binary code that must be converted by a DSP into two's complement code for further processing. The TLV1562 itself converts binary code into two's complement code and outputs this directly to the DSP, eliminating the need for the DSP to expend execution cycles on code conversion.

Finally, the device has a wide power supply range from 2.7 V to 5.5 V. In power-sensitive applications, such as mobile systems, the TLV1562 offers power consumption as low as 7.8 milli-amps for 2.7 V systems or 12 milli-amps for 5.5 V systems.

## The TLV5613 and TLV5619

The TLV5613 and TLV5619 are 12-bit DACs that have an internal amplifier for the fastest voltage outputs in the industry. Both devices can operate off of a single power supply in the range of 2.7 V to 5.5 V. The TLV5613 features an 8-bit parallel interface while the TLV5619 has a 12-bit parallel interface to the system's DSP or microprocessor.

The two devices have a power-down mode and consume little power when operating. Both are well suited to applications such as battery-powered test instruments, industrial controls, machine and motion control devices, cordless telephones, speech synthesis and communications modulators.

The devices come in 20-pin small outline integrated circuit (SOIC) and 20-pin thin shrink small outline (TSSOP) packages. The TLV1562 is scheduled to be available in 3Q98 from TI and authorized distributors. The two other data converters are available now. Planned pricing\* is \$4.50 for the TLV1562 and \$3.90 for the TLV5613 and the TLV5619. ■

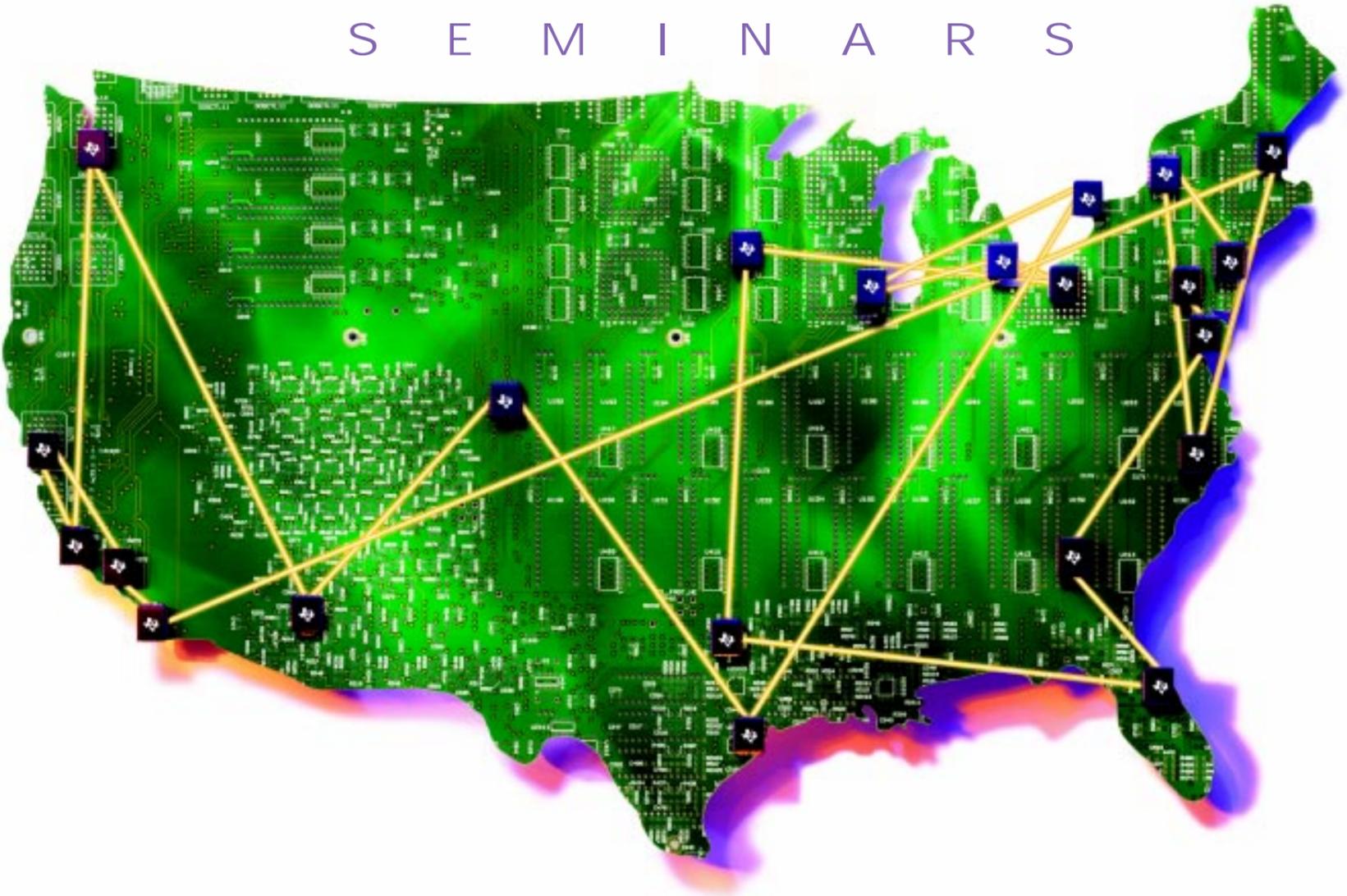
\* Suggested resale pricing in U.S. dollars in 1K quantity.

→ For complete information, order: **TLV5613 Data Sheet (SLAS174A)**, **TLV5619 Data Sheet (SLAS172B)** and **Sine-On: Data Converters (SLYM025)**. See page 8.

# *Special Focus on*

# DSP • ANALOG

S E M I N A R S



## Freeway to knowledge

To keep pace and move ahead in today's super competitive electronics industry, design engineers need the latest information about the newest products that can help them do their jobs more efficiently and effectively. Texas Instruments understands this need and is meeting it with a series of free seminars focusing on TI's world-leading digital signal processors (DSPs) and analog and mixed-signal solutions. For details, check out pages 4 and 5.

{ [www.ti.com/sc/seminar](http://www.ti.com/sc/seminar) }



Sharpen your skills by attending TI's free DSP and analog seminars, which begin in late September. You'll get the latest information on the newest TI devices and real-world applications.

# DSP • ANALOG

## How to register

→ To secure a spot for TI's DSP and analog seminars, register online at [www.ti.com/sc/seminar](http://www.ti.com/sc/seminar) or call 1-800-477-8924, ext. 1998.

## Free seminars, valuable information

Digital signal processors (DSPs) and complementary high-performance analog solutions from Texas Instruments are defining a new generation of electronic system performance. Now, designers can learn about implementing TI's cutting-edge, industry-leading DSP and analog technology in a 22-city seminar tour.

The seminars, which are free, will be held during a 40-day period from Sept. 28 through Nov. 6. They represent the year's best opportunity to learn how to use DSP and analog and mixed-signal solutions that help designers get to market quicker with lower cost and more highly differentiated systems.

Designers will get the latest information on the newest TI devices and real-world applications to help maximize design potential. The first day of each two-day seminar will focus on TI's powerful DSPs, and the second day will be devoted exclusively to TI's line of analog and mixed-signal products. To encourage designers even more, TI will give attendees free software, development tools and discounts on evaluation kits.

### Day 1: DSP

#### Introduction

- DSP Solutions: One-stop shopping
- System requirements and tradeoffs
- Three ISAs, one development environment
- Full range of TI high-performance devices

#### Working with TI's 'C5000/C6000 devices

- TMS320C6000
  - Achieving 'C6000 performance
  - Managing 'C6000 power
  - Interfacing easily with the 'C6000
  - Reducing system costs
- TMS320C5000
  - Achieving 'C5000 performance
  - Managing 'C5000 power
  - Interfacing easily with the 'C5000
  - Reducing system costs

#### Working in TI's development environment

- Software development flow
- What tools to use — and when
- Step-by-step demo of value-added development environment
- 'C6000 special features
- 'C5000 special features
- Tools roadmap

#### Getting to market faster with TI

- DSP and analog leadership
- Third party network
- Algorithm availability
- Hotline/technical support
- University program

#### Conclusion

\* Seminar content is subject to change based on TI's desire to provide attendees the most up-to-date and useful information.

### Day 2: Analog

#### Introduction

- System overview
- Seminar objectives
- Overview of analog and mixed-signal products
- Overview of tools

#### Amplifiers

- Operational amplifiers
  - Choosing the right op amp
  - Single power supply vs. dual supply
  - Universal op amp EVM
- Audio power amplifiers
  - Single-ended applications
  - Bridge-tied load applications
  - Linear audio power amplifiers
  - Digital audio power amplifiers
- High-speed amplifiers
  - Voltage mode vs. current mode
- Typical applications

#### Data converters

- Choosing the right data converter
- Sampling theory and converter errors
- AC and DC performance considerations
- Analog-to-Digital converters
  - New products and architectures
  - Sigma-Delta and pipeline converters
- Digital-to-Analog converters
- Audio interface circuits
- System solutions for audio applications

#### Power management

- Low drop-out linear regulators
- Switch mode controllers
- Supply voltage supervision
- Processor power systems
- Power supply layout considerations
- Power distribution switches

#### Data transmission

- Evolution of data transmission at TI
- Standards
- Low voltage differential signaling (LVDS)
- RS485 and SCSI systems
- General-purpose, single-ended transmission systems

#### Summary

- Analog systems
- Getting more information

### Coming soon to a location near you!

Whether you're on the East Coast, West Coast or some place in between, there's a seminar scheduled nearby. Check this list for dates and locations.

Sept. 28-29	Philadelphia, Pa.
Sept. 29-30	Baltimore, Md.
Oct. 1-2	Atlanta, Ga.
Oct. 5-6	Orlando, Fla.
Oct. 6-7	Dallas, Texas
Oct. 7-8	Minneapolis, Minn.
Oct. 8-9	Cleveland, Ohio
Oct. 12-13	Chicago, Ill.
Oct. 13-14	Detroit, Mich.
Oct. 14-15	Toronto, Canada
Oct. 15-16	Houston, Texas
Oct. 19-20	Denver, Colo.
Oct. 20-21	Phoenix, Ariz.
Oct. 21-22	Seattle, Wash.
Oct. 22-23	Woodland Hills, Calif.
Oct. 26-27	San Jose, Calif.
Oct. 28-29	Newport Beach, Calif.
Oct. 29-30	San Diego, Calif.
Nov. 2-3	Boston, Mass.
Nov. 3-4	Raleigh, N.C.
Nov. 4-5	Rochester, N.Y.
Nov. 5-6	Fairfield, N.J.



Digital Signal Processing Solutions (DSPS) — a combination of advanced DSPs and complementary analog and mixed-signal components from Texas Instruments — are the processing muscle behind many of today's applications.

# DSP • ANALOG

## Driving applications into the 21st century

The microprocessor revolutionized the electronics industry in the 1970s and 1980s by making personal computers (PCs) cost effective for average consumers. Today, DSP Solutions — a combination of advanced digital signal processor cores and highly optimized complementary analog and mixed-signal components — are the electronic engines that will drive powerful, cost-effective applications into the 21st century. DSP Solutions are used in everything from simple toys to sophisticated military guidance systems and antilock brakes to high-speed hard disk drives. They provide the processing muscle for digital cellular phones and the new ultra-high-speed digital subscriber line (DSL) remote access technologies.

### Here's a glimpse of TI's efforts in delivering DSP Solutions

#### ■ DSP market leader

TI offers the largest range of DSP cores, including the world's most powerful DSPs. With more than 10 times the performance of any previous DSPs, the TMS320C6000 DSPs are redefining application potential. As important as this device family is, though, it is just part of the TI product lineup. In fact, customers can choose the low system cost of fixed-point devices or the ease of use inherent in floating point. They also can select DSPs tailored to a variety of applications.

TI's expertise in application-specific integrated circuit (ASIC) methodology, including Timeline Technology, not only allows customers to achieve high levels of integration in specialized silicon but also to create multi-function, DSP-based standard devices. TI also leads the industry in adding peripherals, such as memory, onto the chip to help the DSP core work faster and more efficiently.

#### ■ Analog market leader

Offering a broad range of technically advanced building blocks to integrated solutions, TI recently became the No. 1 supplier to the industry, according to market research firm Dataquest. Complex mixed-signal devices translate the data of our senses into digital language so the DSP can do its work in refining and correcting the information. Then, they take the DSP output and turn it back into analog data that can display video on a screen, play music through stereo speakers or control a motor. Analog technology is a key factor in the digital revolution, and with a broad selection of industry-leading amplifiers, data converters and other analog and mixed-signal devices, TI is a key player in providing this technology that's helping the world go digital.

#### ■ Leadership in end-equipment markets

Using DSP cores and analog chips as the foundation, TI has created leadership positions in selected end equipments such as wireless (e.g., digital cellular), mass storage (e.g., hard-disk drives) and networking (e.g., ThunderSWITCH Ethernet switches). Specific knowledge of the end-system is a powerful differentiator to help customers design next-generation systems.

#### ■ Building for the future

TI is committed to the DSP Solutions market, so much so that it dedicated \$100 million to a venture capital fund to accelerate market development efforts linked to digital signal processing. And TI also has dedicated money and other resources to educational endeavors to train the DSP designers of tomorrow.

### How to register

→ To secure a spot for TI's DSP and analog seminars, register online at [www.ti.com/sc/seminar](http://www.ti.com/sc/seminar) or call 1-800-477-8924, ext. 1998.

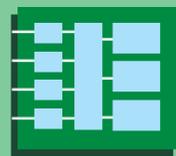
### Examples from the DSP presentation

The DSP and analog seminars will be packed with information on how to use DSP and analog and mixed-signal solutions. Here's a sample of what to expect.

- System requirements needed
- Working with TI's 'C6000/'C5000
- Working in TI's development environment

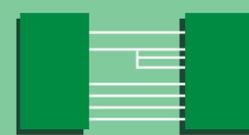
■ The one-day DSP seminar will focus on TI's high performance platforms.

#### ■ Introducing: New device



■ Attendees will be introduced to newly announced devices from both the 'C6000 and 'C5000 platforms.

#### ■ Interfacing: 'C54x host 'C54x HPI



■ Architecture reviews will include code examples, application examples and interfacing options.

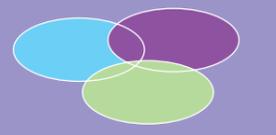
#### ■ Tools: Code Composer debugger



■ The afternoon tools session will include a step-by-step demonstration of TI's new value-added development cycle.

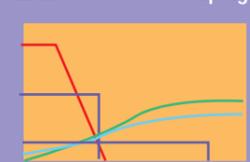
### Examples from the MSP presentation

#### ■ Op amps technology overview



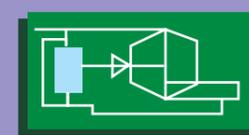
■ Major factors in choosing an op amp will be on one session's agenda.

#### ■ Effect of noise shaping



■ Graphs will be used in discussions about several data converter architectures, including the Sigma-Delta.

#### ■ Controller layout considerations



■ Aspects of designing successful power supply systems will be covered.

#### ■ ANSI Standard Physical Layer



■ Explanations will include the importance of understanding the relationship between key data transmission standards.

# Resource Guide

## THIRD-PARTY NEWS

### Third-party application software and development guide

Stay up-to-date with products and services available through TI's growing third-party network with the latest edition of the TI DSP Third-Party Application Software and Development Guide. To order online, see [www.ti.com/sc/dsp\\_3pguide](http://www.ti.com/sc/dsp_3pguide). For complete information, order: **Third-Party Guide CD-ROM (SPRC013A)**. See page 8.

### Distributor network adds value for TI customers

Meeting customers' needs is at the heart of the relationship between Texas Instruments and its authorized distributors.

Through a thorough process, TI has developed a distributor network that broadens TI's customer base and extends customers' access to TI's industry-leading products. The benefits for customers include available inventory ready to be shipped upon request, extensive technical resources (engineers who know TI products) and logistics expertise to consolidate customers' requirements.

With its distributors, TI has a strong, long-term relationship and a two-pronged strategy: to win designs for TI's Digital Signal Processing Solutions (DSPS) and to sell volume products.

TI views its distributors as an extension of the company and makes sure they are financially sound, committed to the business, have successful track records and can add value to customers. TI also puts a great deal of effort into training for distributors.

"We've got dedicated training resources to make sure distributors can handle a situation as well as or better than TI," said John Simari, director of North America Distribution.

As a result of careful planning, TI's distribution channel in North America includes the region's top five distributors — Arrow, Avnet, Future, Marshall and Wyle. Worldwide, TI is aligned with a mix of global, multi-regional and local distributors. As customers move their operations to many parts of the world, distributors are expanding their reach to improve service by opening sales and logistics facilities in different regions throughout the world.

TI continues to work with its distributor network to ensure the right mix of distributors in each region to serve TI's customer base.

"We're fully committed to the success of our distributor partners," Simari said. "We think we have the best in the industry and that customers need to draw on the strength and resources of TI and our distributors." ■

## PIC SUPPORT

To maintain and increase its level of commitment to customers, TI's Semiconductor Product Information Center (SCPIC) delivers efficient, cost-effective technical and non-technical assistance. The SCPIC was established in 1991 to supplement TI's sales force by providing product information, first-level application support, literature and sample fulfillment services.

TI SCG Home Page:  
[www.ti.com/sc](http://www.ti.com/sc)

TI Distributors:  
[www.ti.com/sc/docs/distmenu.htm](http://www.ti.com/sc/docs/distmenu.htm)

### Product Information Centers

#### Americas

Phone +1-972-644-5580  
Fax +1-972-480-7800  
E-mail [SC-Infomaster@ti.com](mailto:SC-Infomaster@ti.com)

#### Europe, Middle East and Africa

Deutsch +49-8161 80 3311  
English +44-1604 66 3399  
Français +33-1-30 70 1164  
Italiano +33-1-30 70 1167  
Fax +33-1-30 70 1032  
E-mail [epic@ti.com](mailto:epic@ti.com)

#### Japan

International +81-3-3457-0972  
Domestic +0120-81-0026  
Fax Int'l. +81-3-3457-1259  
Domestic +0120-81-0036  
E-mail [pic-japan@ti.com](mailto:pic-japan@ti.com)

#### Asia

Website [www.ti.com/asia/docs/sales.htm](http://www.ti.com/asia/docs/sales.htm)  
(To get toll-free hotline for each location)  
Fax +886-2-2378-6808  
+82-2-551-2828 (Korea)  
E-mail [tiasia@ti.com](mailto:tiasia@ti.com)

## APP REPORT

■ Shared memory interface with the TMS320C54x DSP: This application note describes how to share memory (SRAM, FIFO, Dual-Port RAM) between a TMS320C54x DSP and host or other DSP. There are several ways to implement this task. The simplest way is to use a TMS320C54x with a Host Port Interface, if it is suitable for the design and the 2K-by-16 block of memory is large enough. This internal memory area is then available with no glue logic required.

→ For complete information, see [www.ti.com/sc/9809](http://www.ti.com/sc/9809).

# News

## MSP430 microcontrollers

TI's MSP430 microcontroller family, which provides an ULTRA-low power solution, is now available for the first time in North America. The product family, first introduced in Europe, offers a high-performance 16-bit reduced instruction set computing (RISC) microcontroller unit (MCU) and integrated peripherals at industry-leading MIPS/Watt performance. Fully active, the MSP430 devices consume only 400 uA ( $V_{cc} = 3$ ), and in sleep mode they consume only 0.1 uA. This combination is ideal for utility metering, industrial metering, high-precision portable measurement and home measurement such as thermostats, smoke detectors and security systems.

The family of devices features an integrated 14-bit resolution A/D converter, a powerful hardware multiplier, an on-chip crystal display (LCD) driver, a universal asynchronous receiver/transmitter (UART/SPI), powerful timers, an internal oscillator and JTAG. The on-chip integration of these peripherals makes the MSP430 the highest performing, lowest power single-chip solution for most battery-powered applications.

The MSP430 family is fully supported by a development tool set including a Windows™-based software simulator, evaluation boards with assembler and linker, C-compiler with industry-leading efficiency, in-circuit emulators, UV-EEPROM devices, programming adapter or gang programmer for one-time programmable (OTP) and a JTAG tool set for debug.

Suggested resale pricing of 10K OTP devices starts at \$4.50\*. Suggested resale pricing of 100K ROM devices starts at \$1.75. ■

\*Pricing in U.S. dollars.

Windows is a trademark of Microsoft Corp.

→ For complete information, order: **MSP430 Family Brochure (SLAB034) and Data Sheets (SLAS163, SLAS164, SLAS165A)**. See page 8.

## New DSPs combine low power dissipation with high performance in a small space

Two new digital signal processors (DSPs) from Texas Instruments combine the industry's lowest power dissipation with 100 MIPS of performance into a package the size of a thumbnail. These power-efficient, ultra-small DSPs, the TMS320C549 and the recently disclosed TMS320C5410, will allow designers of wireless and wireline communications systems to provide more channels per watt than any other DSPs on the market.

The devices are progressive evolutions of the same core code-compatible architecture. Each one has greater integration of on-chip memory, with 32K and 64K words of on-chip RAM, respectively. The roadmap for this generation has plans for DSPs with even more on-chip RAM.

Both DSPs feature the lowest power dissipation of any DSP available today. At 100 MIPS, these devices dissipate only 0.45 mA/MIPS. With a core supply voltage of 2.5 V, the power dissipation is less than 115 mW using on-chip resources.

The 'C549 and 'C5410 are well suited to applications such as computer telephony voice-processing equipment, voice-over internet protocol (VOIP) gateways, digital and small office/home office (SOHO) PBX systems, and wireless local loop, LAN and digital PBX systems. In addition, these DSPs can be used in space-constrained applications such as digital radios and portable information appliances, which require DSP performance at low power.

The 'C5410 features two new peripherals: the

## 10-channel preamp

Texas Instruments now offers a new current-bias/voltage-sense preamplifier for use with 4-terminal magneto-resistive (MR) heads in high-performance disk drives. This preamp, the 32R1590AR, supports data rates up to 350 Mbit/s and features read input voltage noise of 0.5 nV/rt. Hz and read input current noise of 6 pA/rt. Hz, offering superior system noise performance.

The device supports a bias range of 6 to 12 mA for MR heads from 40 to 80 Ohms and delivers programmable read gains from 150 to 300 V/V over a selectable bandwidth from 150 to 225 MHz. Write voltage swings from 16 V peak-to-peak are supported with typical head current rise times of just 0.9 ns. Write current range is 20 to 60 mA, and advanced features like write unsafe detect, programmable write damping control and enhanced

write-to-read recovery are provided for improving overall drive design.

The 32R1590AR also offers full programmable operation with a high-speed serial port provided to control head selection, write current, write damping, bias current, thermal asperity compensation, mode selection and other critical drive parameters. This enhanced programmability enables drive designers to evaluate new head/media combinations quickly and adaptive control of key parameters for system optimization.

The device is packaged as solder bumped die for flip chip or bare die for die-on-flex applications. Samples are now available. ■

32R1590AR \$12.95

Suggested resale pricing in U.S. dollars in 1K quantity.

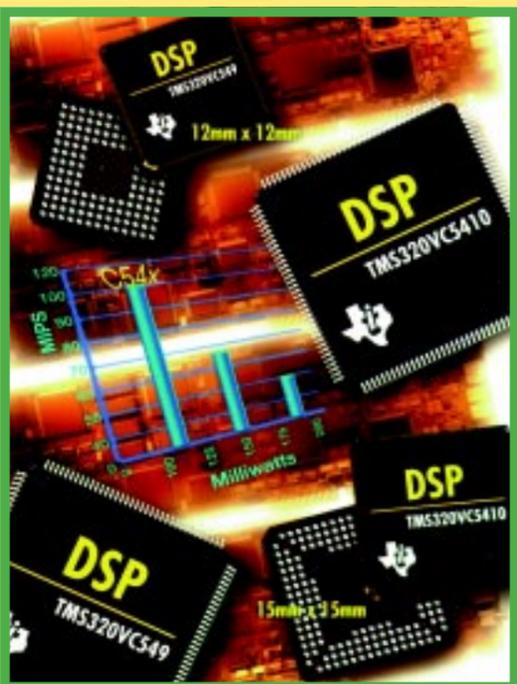
→ For complete information, see: [www.ti.com/sc/9809](http://www.ti.com/sc/9809). For literature, send an e-mail message to [info@tus.ssi1.com](mailto:info@tus.ssi1.com).

# Briefs



ON THE WEB

Order more information about products in *Integration* through our site on the World Wide Web. Check it out at [www.ti.com/sc/9809](http://www.ti.com/sc/9809).



## 'C54x reference design

TI's 'C54x dual-board reference design capitalizes on the increased density of the microStar BGA package and provides a mechanism for developers to understand the specifics of designing with the 'C549 microStar BGA before committing resources to creating dedicated hardware using these devices.

The prototype integrates a wide range of TI parts into a 200-MIPS multipurpose board geared toward general telecommunications, networking and telephony applications. It will allow developers to gain insight into what they should and should not do in the manufacturing process. Interested designers and developers can download full schematics and a manual outlining the reference design from TI website [www.ti.com/sc/details52](http://www.ti.com/sc/details52). The board is not available for resale.

The reference design centers around two 100-MIPS 'C549 DSPs in the 144-ball

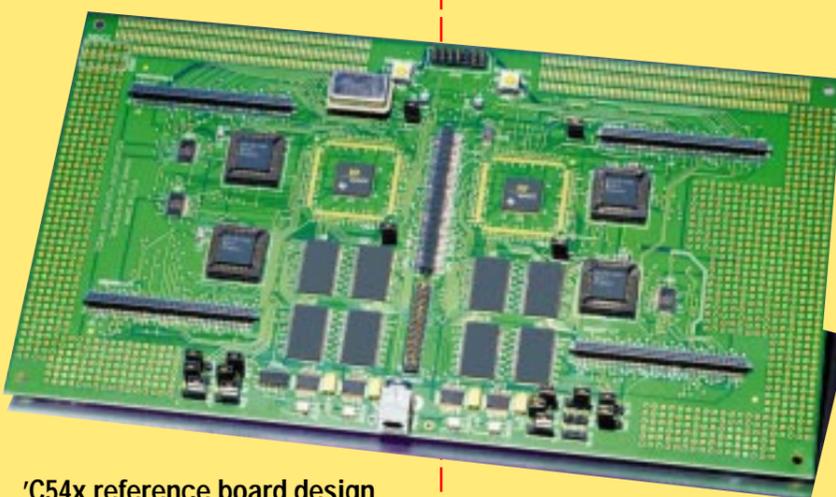
microStar BGA package. The space-saving microStar package measures 12 x 12 x 1.4 mm, thereby reducing board space over similar pin-count thin quad flat packs (TQFP).

Each 'C549 DSP uses a dual power supply to increase performance and lower power dissipation. The reference platform uses TI power-supply management devices to handle the separate I/O and core power supplies.

For designers who prefer TI's TQFP, the reference board also includes a layout for the 176-pin TQFP option of the recently disclosed 'C5410 DSP. This added feature enables the same development environment to be used for either the 'C549 or 'C5410 DSPs. ■

Pricing in U.S. dollars. microStar is a trademark of Texas Instruments.

→ For complete information, order: 'C549 White Paper (SPRA469) and 'C5410 White Paper (SPRA470). See page 8.



'C54x reference board design

Multi-Channel Buffered Serial Port (McBSP) and the DMA (direct memory access) controller. The McBSP enables full-duplex, bi-directional communication and direct interface to T1/E1 frames or H.100 telephony standards. It supports multi-channel transmit-and-receive up to 128 channels and data sizes from 8 bits to 32 bits.

The six-channel DMA controller adds flexibility and enhanced performance. The peripherals operate independently of the CPU, maximizing the efficiency of the device.

Samples and production quantities of the 'C549 are available now. Samples of the 'C5410 are planned for October 1998, and production quantities are scheduled to be available in 2Q99. Pricing for production quantities of 10,000 is \$25\* for the 100-MIPS 'C549 and expected to be \$29.85 for the 100-MIPS 'C5410.

The 'C549 and 'C5410 are available in TQFP (thin quad flat pack) and microStar BGA™ packages. ■

## Power supply for DSP solutions

TI's TPS56xx family of integrated power supply devices for high-performance DSP solutions delivers higher output drive capability and offers a higher level of integration than is available on the market. With this capability, designers of high-performance DSP applications can lower system costs and increase power supply efficiency up to 95 percent, depending on the specific application.

Advanced hysteretic control features, not typically found in comparable power supply devices, have been integrated into the TPS56xx family. These features allow the devices to monitor their output and maintain the precise level of power needed for effective system operation. With programmable hysteretic controls, the devices are able to quickly respond and compensate for load transients when system functions dictate that the power supply output must suddenly increase or decrease.

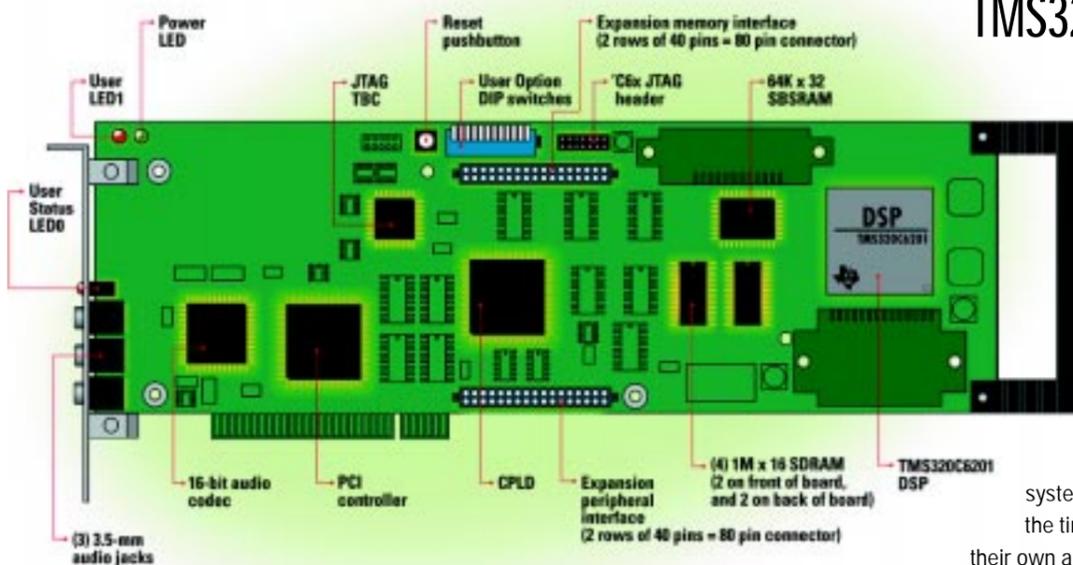
This family of power supply devices consist of the TPS5615, TPS5618, TPS5625 and TPS5633 with output voltages of 1.5 V, 1.8 V, 2.5 V and 3.3 V, respectively. With this range of voltages, designers can more easily implement mixed voltage systems. For example, a 1.8-V supply can be used for a DSP core while a 3.3-V device is used for the DSP's input/output (I/O) functions.

The TPS56xx family comes in TI's PowerPAD™ package for improved thermal characteristics. Limited samples of the devices are now available. Evaluation modules, demonstration boards and application notes also will be available. ■

TPS56xx devices 28-pin TSSOP \$2.20\*

\*Planned pricing. Suggested resale pricing in U.S. dollars in 1K quantity. PowerPAD is a trademark of Texas Instruments.

→ For complete information, order Product Bulletin (SLVT140A). See page 8.



'C62x PCI board diagram

## TMS320C62x EVM

TI's TMS320C62x EVM makes it easier than ever for system designers to begin development with the world's most powerful digital signal processor (DSP).

The 'C62x EVM provides a comprehensive development platform that allows designers to run application software on target 'C62x hardware, providing a platform to benchmark their

system. The EVM saves designers the time and expense of building their own application test board — in turn allowing them to get powerful 'C62x-based designs to market quickly.

Part of an extensive range of TI and third-

party development resources, the 'C62x EVM is a combination of hardware and software that gives designers the tools to build the most advanced DSP applications. The EVM kit includes a PCI board based on the TMS320C62x fixed-point DSP family, 'C62x code generation and C source debugger tools, Windows® 95 and Windows NT drivers, host PC and DSP software application programming interfaces (APIs), example applications with source code, various utility applications and all relevant documentation.

The EVM kit is available through Oct. 15, 1998, for a special \$995\* price. That's a \$1,000 savings off of the \$1,995 list price. Code-generation tools alone are normally priced at \$1,495. ■

\* All pricing in U.S. dollars.

→ For complete information, order Product Bulletin (SPRT159). See page 8.