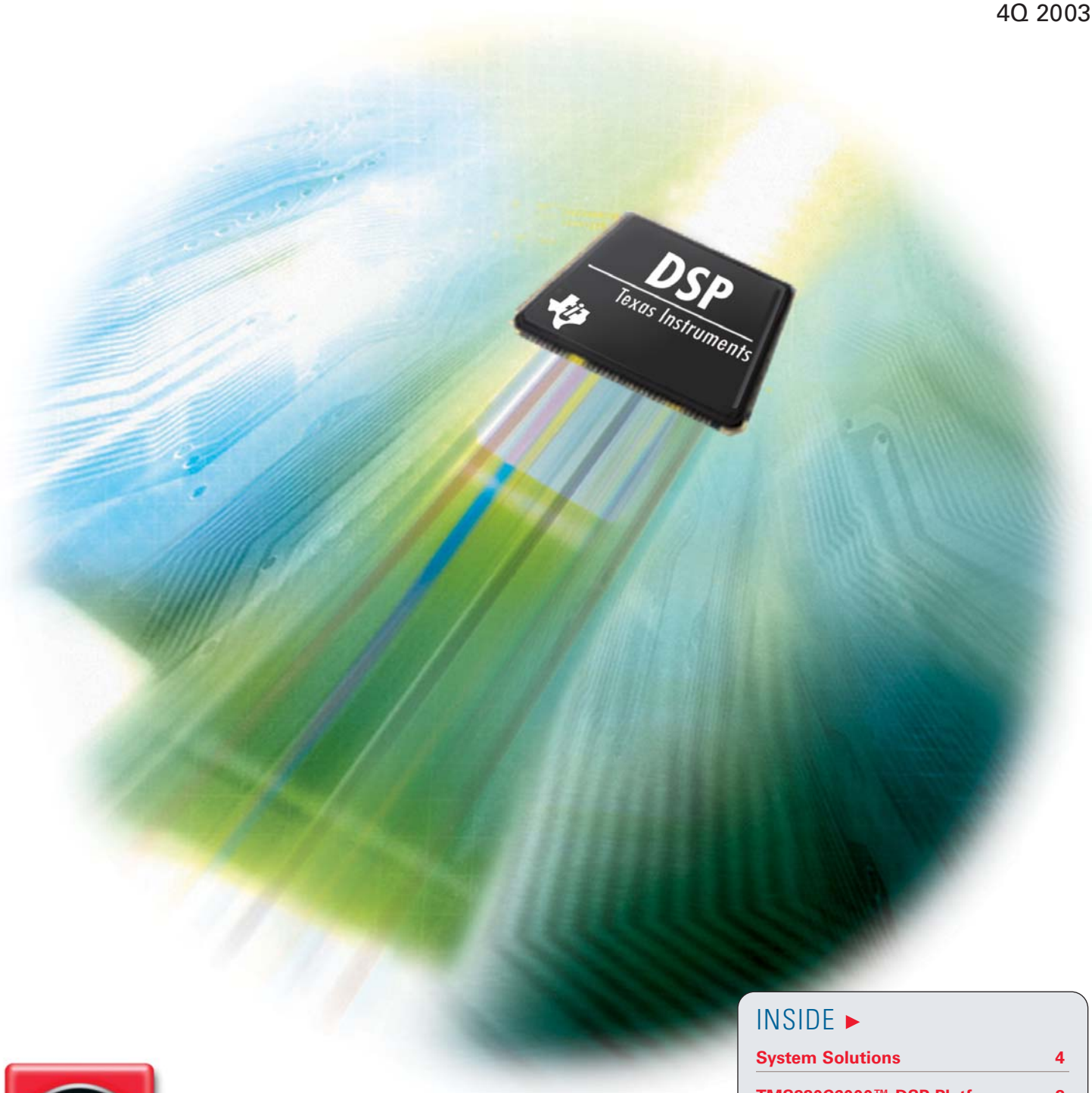
DSP SELECTION GUIDE

Digital Signal Processors • System Solutions • Development Tools

4Q 2003



DSP™ TEXAS INSTRUMENTS TECHNOLOGY

INSIDE ▶

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TI WORLDWIDE TECHNICAL SUPPORT

Internet

TI Semiconductor Product Information Center Home Page
support.ti.com

TI Semiconductor KnowledgeBase Home Page
support.ti.com/sc/knowledgebase

TI DSP Home Page
www.dspvillage.ti.com

TI DSP FTP Site
ftp.ti.com/pub/tms320bbs

Product Information Centers

Americas

Phone	+1(972) 644-5580
Toll Free	(800) 477-8924
Fax	+1(972) 927-6377
Software Registration/Upgrades	(972) 293-5050
Fax	(866) 855-8428
Hardware Repairs/Upgrades	(512) 615-4633
Internet/E-mail	support.ti.com/sc/pic/americas.htm

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INTRODUCTION TO TI DSP SOLUTIONS

DSP usage has become very diversified—from communications infrastructure to handheld, portable appliances. TI has worked with its customers and third parties to deliver DSP core architectures that are well established and optimized for diverging combinations of power-performance needs.

Advantages of designing with DSPs over other microprocessors:

- Single-cycle multiply-accumulate operations
- Real-time performance, simulation and emulation
- Flexibility
- Reliability
- Increased system performance
- Reduced system cost

Advantages of TMS320 DSPs over the competition:

- Highest performance DSPs
- Lowest power DSPs
- Market leaders in compatible analog and mixed signal solutions
- Manufacturing strength and commitment
- Wide variety of packaging options
- Better support from concept to completion
- Low-cost starter kits and evaluation modules
- Cycle-accurate simulators
- Optimizing high-level language compilers
- Feature-rich integrated development environment
- Real-time scan-based emulators
- Application software library
- Technical hotline and Internet presence
- Largest Third Party Network in the DSP industry
- eXpressDSP: Industry award-winning open software development tools

Since the launch of Texas Instruments' (TI) first single-chip Digital Signal Processor (DSP) in 1982, TI has provided designers an accelerated time-to-market with next-generation, breakthrough systems as well as complementary technology and support. Through a balance of general-purpose and application-specific processors, the TMS320™ DSP family delivers the most extensive selection of DSPs with three distinct architectures completely code compatible within each platform.

TMS320C6000™ DSP Platform – Combining high-performance hardware with considerable development resources, TI's C6000™ DSP platform provides cost efficiency and low power dissipation. Raising the bar in performance, the C6000 DSP platform offers the industry's fastest DSPs running at clock speeds up to 720 MHz and scalable to 1 GHz. The platform, which features a wide range of fully code-compatible devices, consists of the TMS320C64x™, TMS320DM64x™ and TMS320C62x™ DSP fixed-point generations as well as the TMS320C67x™ DSP floating-point generation. Optimal for designers working on targeted broadband infrastructure, performance audio and imaging applications, the C6000 DSP platform's performance ranges from 1200 to 5760 MIPS for fixed-point and 600 to 1350 MFLOPS for floating-point.

TMS320C5000™ DSP Platform – The C5000™ DSP platform offers a broad portfolio of over 20 devices, including the OMAP5910 processor, which integrates a TMS320C55x™ DSP core with a TI-enhanced ARM® on a single chip. With the industry's most power-efficient performance, peripheral options and small packaging, this platform provides designers a lead in today's portable Internet and wireless communication markets. Optimal for designers of power-sensitive systems, the C5000 DSP platform offers power consumption as low as 0.33 mA/MHz and performance up to 600 MIPS.

TMS320C2000™ DSP Platform – Offering the most comprehensive line of DSP solutions driving the digital control revolution, the C2000™ DSP platform provides the industry's highest performing and most code-efficient DSPs. With a unique combination of on-chip peripherals such as Flash memory, ultrafast A/D converters as well as robust CAN modules, the C2000 DSP platform sets the standard for performance and peripheral integration. The most recent C2000 DSP controllers, the TMS320F2810 and TMS320F2812 DSPs, target industrial automation, optical networking and automotive control applications and significantly reduce development time while delivering up to 12× performance of any existing programmable DSP controller.

Software and Development Tools – For accelerated DSP product development, the TMS320 DSP family is supported by eXpressDSP™ Software and Development Tools including Code Composer Studio™ Development Tools, DSP/BIOS™ kernel, TMS320 DSP Algorithm Standard for eXpressDSP Software as well as numerous options for reusable, modular software from the largest Third Party Network in the industry.

TMS320 Digital Signal Processors

For the most updated information, visit www.dspvillage.com

GETTING STARTED WITH TI DSPs

Web-Based DSP Support Tool Available Now

Responding to demand from engineers recently becoming more familiar with DSP, TI launched an easy-to-use, web-based tool that helps customers progress their designs from inspiration to implementation. Designers choosing to use TI DSPs in their real-time applications receive easy-to-access introductory DSP content through TI's Getting Started with DSP web site **(www.ti.com/gettingstarted),** which decreases the learning curve and accelerates products to market.

Due to a myriad of applications in multiple markets utilizing digital signal processing, the number of first-time DSP designers needing guidance on getting started is expanding. TI's new support tool reduces complexity and leaves engineers with a clear roadmap of actions and activities that will accelerate their development time.

This web-based tool answers the following primary questions:

- What is DSP?
- Which TI DSP should I use?
- How do I get going?
- What else can help me?

Basic Steps to Starting Development

- **Step One: Selecting a DSP Processor**
  If you are not sure which TI DSP platform will best suit your application, visit **Which TI DSP is Right for Me?** to assist you in your decision.
- **Step Two: Evaluation of DSP Technology and Tools**
  The Evaluation stage includes learning how to use a DSP, evaluation of the DSP as a possible processor solution, and evaluation of development tools.
- **Step Three: Initial Development**
  In the Initial Development stage, you have already decided which DSP to use, but beta boards have not been built. The tools to meet the needs of this stage include Code Composer Studio™ Development Tools and Evaluation Modules (EVMs).
- **Step Four: Product Development**
  In the Product Development stage, there is a need for full development capabilities – including debugging of product hardware and software. Tools designed to meet those needs include Code Composer Studio and emulation tools.
- As you progress in your development, you can speed your time-to-market by utilizing Texas Instruments Third Party Network. The Third Party Network offers the most extensive collection of digital signal processing development support in the industry.

The easily navigated site describes digital signal processing and offers extensive training on the subject. In addition, the site discusses how signal processing tasks can be implemented on a DSP as well as when to use such a device.

Since personal electronic devices have power, performance and price demands that are perfectly suited to a certain type of DSP, the site also aids designers in determining which TI DSP

platform is right for their applications. Providing the customers a clear understanding of each option, it connects to information such as white papers and technical briefs.

Aside from being a tutorial on TI DSPs, the site also offers precise information on how to begin designing, what problems to look for as well as how to solve those problems. With resources available both on and off the Web, customers can maximize their design time and employ the industry knowledge of TI's in-house experts.

Once the design process commences, the support does not stop. Texas Instruments developed the industry's most comprehensive support network that can be accessed using the new on-line tool. Building on the premise that a supplier should facilitate the design process, the network encompasses training, technical information and access to experts. TI will be completely supportive throughout the entire DSP design process.

To assist you in getting started with DSP, TI offers the free "The Essential Guide to Getting Started with DSP" CD-ROM which includes a variety of resources to start your DSP design. To order your free CD, visit: **www.ti.com/getstartedcd.** Or, to start utilizing the Getting Started with DSP web-based tool, visit **www.ti.com/gettingstarted**

TI DSP DEVICE NOMENCLATURE

Texas Instruments DSP device nomenclature includes a Prefix (signifying the device qualification status), the Device Family number (i.e., 320 or 32 for TI DSPs), a Technology symbol, the Device number (typically three to five alpha-numeric characters), a two or three character Package Type code, an optional Temperature Range character, and the Device Speed Range. Other variations do exist on a limited basis. See the specific device data sheet for additional information on device nomenclature for that device.

Typical DSP Device Nomenclature

TMS 320 C 6412 GDK ( ) 600

Prefix
TMX = Experimental device
TMP = Prototype device
TMS = Qualified device
SMJ = MIL-PRF-38535, QML
SM = High Rel (non-38535)
OMAP = OMAP

Device Family
32 or 320 = TMS320™ DSP Family

Technology
C = CMOS
DM = Digital Media
E = CMOS EPROM
F = CMOS Flash EEPROM
LC = Low-Voltage CMOS (3.3 V)
LF = Flash EEPROM (3.3 V)
UC = Low-Voltage CMOS [3 V (1.8-V core)]
VC = Low-Voltage CMOS [3 V (2.5-V core)]

Device Speed Range

C6000™ DSPs		C5000™ DSPs		C3x™ DSPs	
150 MHz	500 MHz	50 MIPS	120 MIPS	40 MFLOPS	80 MFLOPS
167 MHz	600 MHz	80 MIPS	160 MIPS	50 MFLOPS	120 MFLOPS
200 MHz	720 MHz	100 MIPS	200 MIPS	60 MFLOPS	150 MFLOPS
233 MHz					
250 MHz	5E0 (500-MHz core, 100-MHz EMIF)				
300 MHz	6E3 (600-MHz core, 133-MHz EMIF)				
400 MHz	7E3 (720-MHz core, 133-MHz EMIF)				

Temperature Range
Blank = 0°C to 90°C, commercial temperature, default for C6000 DSPs
Blank = –40°C to 100°C, default for C54x™ DSPs
A = –40°C to 105°C, extended temperature (C6000 DSPs)
A = –40°C to 85°C, extended temperature (C2000™ DSPs)
H = 0°C to 50°C
L = 0°C to 70°C
M = –55°C to 125°C
S = –55°C to 125°C (C5000 DSPs)
S = –40°C to 125°C (C2000 DSPs)

Package Type

FN	= 38-lead PLCC	GNY	= 284-pin plastic BGA
GDK	= 548-pin plastic BGA	GNZ	= 352-/548-pin plastic BGA
GDP	= 272-pin plastic BGA	GZG	= 289-pin MicroStar BGA
GDY	= 289-pin MicroStar BGA™	GZZ	= 201-pin MicroStar BGA
GEL	= 181-pin PGA	PG	= 64-pin PQFP
GFN	= 256-pin plastic BGA	PAG	= 64-pin TQFP
GGU	= 144-/169-pin MicroStar BGA	PBK	= 128-pin LQFP
GGW	= 176-/240-pin MicroStar BGA	PCM	= 144-pin PQFP
GHH	= 179-pin MicroStar BGA	PGE	= 144-pin LQFP
GHK	= 257-/288-pin MicroStar BGA	PGF	= 176-pin LQFP
GJC	= 352-pin plastic BGA	PQ	= 132-pin PQFP
GJL	= 352-pin plastic BGA	PYP	= 208-pin PowerPAD™ plastic QFP
GLS	= 384-pin plastic BGA	PZ	= 100-pin LQFP
GLW	= 340-pin plastic BGA	VF	= 32-pin LQFP
GLZ	= 532-pin plastic BGA		

Device

C6000 DSPs		C5000 DSPs		C2000 DSPs		C3x DSPs
6201	6701	549	5420	240	2810	30
6202	6711B	5401	5421	241	2812	31
6202B	6711C	5402	5441	242		32
6203B	6712	5402A	5470	243		33
6204	6712C	5404	5471	2401A		
6205	6713	5407	5501	2402A		
6211	DM640	5409	5502	2403A		
6211B	DM641	5409A	5509	2404A		
6411	DM642	5410	5509A	2406A		
6412		5410A	5510A	2407A		
6414		5416	5910			
6415		54CST				
6416		54V90				

For the *actual* device-specific part numbers, see the Product Specification Guides in this document.

For the most updated information, visit www.dspvillage.com

DSP SYSTEM SOLUTIONS

Flexible, cost-efficient and all digital end-to-end system solutions enable faster time-to-market and one-stop shopping. Making your design challenge easier, TI provides optimized system solutions that allow you to focus on end-product differentiation. Along with our systems expertise, we offer complete hardware applications with superior DSP and analog devices, application-specific software, comprehensive technical support, complete technical information and reference designs/evaluations modules (EVMs).

TI provides a wide range of end-equipment solutions for the following application areas:

- Audio
- Biometrics
- Digital Control
- Digital Media
- Software
- Telephony

Audio System Solutions

By offering flexible, cost-efficient, all digital end-to-end audio solutions, TI provides OEMs/ODMs with faster time-to-market and one-stop shopping. Leveraging the programmability, performance headroom and design flexibility of TI's leading DSP and Analog technologies, customers have the ability to build audio products with more functionality that offer a true lifelike sound experience at a lower overall system cost. Audio application areas include: Internet audio, digital radio, home entertainment, digital amplifiers, as well as many others.

Customers have more room to innovate and develop products faster with TI's audio solutions.

- Highest performance allows room for innovation with application-specific digital entertainment solutions.
- Programmability and scalability provide open-audio platforms for better differentiation.
- Compact form factor for cool product designs and great sound.
- Easy-to-use application-specific software and tools get you to market faster.

For more information, visit **www.ti.com/dspaudiosolutions**

Biometrics System Solution

Fingerprint Authentication Development Tool – The Fingerprint Authentication Development Tool (FADT) provides developers an easy-to-use, cost-effective way to evaluate and develop fingerprint authentication systems and products based on TI DSPs. The FADT (part number TMDSFDCFPC10) consists of a daughtercard with all the software to get you started, plus the industry's first multi-platform, DSP-based expansion board that can combine with several of TI's DSP starter kits (DSKs). The FADT is an ideal development tool for both entry-level and experienced designers, and its flexibility allows designers to choose from a range of integrated solutions. Developers also have access to TI's robust suite of eXpressDSP™ Software and Development Tools. This flexible and complete development environment for fingerprint authentication enables developers to quickly and inexpensively evaluate and develop systems and products based on TI DSPs, resulting in highly accurate products.

For more information, contact your authorized TI distributor or visit **www.ti.com/fadt**

Fingerprint Authentication Development Tool

DSP SYSTEM SOLUTIONS (CONTINUED)

Digital Control System Solutions

Digital signal controllers like TI's DSPs have emerged with the best combination of flexibility, efficiency and performance that makes them ideally suited for improving overall system capabilities and reducing system cost. As motor systems evolve with advanced features like sensorless AC induction vector control, current-shaped switched-reluctance control, and PMSM servo control, motor control designers benefit from reduced system costs, easier compliance with regulations on power consumption and EMI radiation, and improved efficiency and reliability. TI's TMS320C2000™ DSPs offer flexibility and ease of use via hardware and software solutions that enable motor control designs to get to market faster with more customized features, better performance and lower cost.

- **Application-Specific Software –** Provides complete working reference designs based on a modular software approach. These solutions are offered both in Assembly and "C" source code and are fully documented. TI's extensive application-specific software covers almost any type of motor, including single, 3-phase, sensored, sensorless and AC induction (ACI) motors. Additional information available at **www.ti.com/c2000appsw**

- **DMC Foundation Software –** To assist in the design of specific motor control systems, TI has created the first standardized Digital Motor Control (DMC) Foundation Software Library. This free library is a compilation of various DMC software modules and complete system solutions with thorough documentation to allow users to customize their own systems quickly. Some examples of the component modules are PID controllers, Clarke and Park transforms and PWM drivers. For more information, see **www.ti.com/c2000dsplib**

- **Evaluation Module –** The TMS320LF2407A Evaluation Module (EVM) gives designers a complete and cost effective way to take their designs from concept to production. The kit is the easiest way to fully evaluate and begin developing embedded applications. The application and foundation software modules are ready to run on TI's TMS320LF2407 EVM (part number TMDS3P701016A). Combining the powerful software and hardware tools, a complete technology demonstration kit is formed.

  Get more information on the Evaluation Module at: **www.ti.com/2407aevm**

Digital Media System Solutions

- **TMS320DM642 Evaluation Module (DM642 EVM) –** The DM642 EVM (part number TMDXEVM642) is a low-cost, high-performance video and imaging development platform designed to jump-start application development and evaluation of multi-channel and multi-format digital applications. Leveraging the high-performance TMS320C64x DSP core, this development platform supports TI's TMS320DM642, DM641 and DM640 digital media processors. This PCI form factor EVM is supported by award-winning eXpressDSP™ host tools and target software, allowing users to quickly and easily integrate eXpressDSP-compliant algorithms from over one hundred TI third parties into the included starterware, accelerating evaluation and development of digital media solutions.

  For more information, contact your authorized TI distributor or visit **www.ti.com/dm64xevm**

TMS320DM642 Evaluation Module

For the most updated information on DSP System Solutions, visit www.dspvillage.com

DSP SYSTEM SOLUTIONS (CONTINUED)

Digital Media System Solutions (Continued)

TMS320DM642 Digital Media Developer's Kit

- **TMS320DM642 Digital Media Developer's Kit (DM642 DMDK) –** The DMDK allows immediate development of multi-channel, multi-format digital media applications or other future-ready high-performance video and imaging applications. Loaded with starterware, supported by eXpressDSP™ host tools and target software and offered at an exceptional price/performance ratio, the DMDK (part number TMDXDMK642) is a comprehensive, fully integrated development platform and an easy-to-use, robust tool suite. Based on the high-performance TMS320C64x™ DSP core, this development platform supports TI's TMS320DM642, DM641 and DM640 digital media processors. The DMDK is ideal for developers who have minimal experience with DSP as well as developers who are experienced with programmable DSPs and want to add multimedia functionality to an existing or new product/system.

  For more information, contact your authorized TI distributor or visit **www.ti.com/dm64xdevkit**

- **Imaging Developer's Kit –** A complete and easy-to-use development environment for rapid prototyping of advanced video and imaging systems based on the TMS320C6000™ DSP platform. The Imaging Developer's Kit (IDK) (part number TMDX320026711) provides real-time programmable performance to support video and imaging industry trends towards high bandwidth streaming video and real-time image processing. The IDK brings together all of the hardware and software elements needed into one kit to speed new products to market and is complemented by third-party eXpressDSP™-compliant imaging algorithms. For more information, contact your TI sales representative or authorized TI distributor or visit our web site at **www.ti.com/idk**

Imaging Developer's Kit

Network Video Developer's Kit Bundle

- **Network Video Developer's Kit –** Powered by ultra-high performance TMS320C64x™ DSP technology, the Network Video Developer's Kit (NVDK) (part number TMDX3PNV6416S) gives designers a complete and cost effective way to speed to market next-generation digital media applications. The NVDK provides all the hardware and software required for developing imaging and video applications, including those requiring network connectivity. The NVDK addresses video/imaging customers' most pressing needs, including full software programmability, fast time-to-market and optimum system cost. The NVDK includes: an ATEME TMS320C6416 DSP video board, 10-/100-Mbps Ethernet daughter card, audio/video interface box, power supply and a CD-ROM with schematics, drivers for PCI board support library, and application samples and executable code demonstrations. The NVDK Bundle (NVDKCCS) adds Code Composer Studio™ IDE and XDS510PP-Plus emulator.

  For more information, contact your TI sales representative or authorized TI distributor or visit our web site at **www.ti.com/nvdk**

DSP SYSTEM SOLUTIONS (CONTINUED)

Software System Solution

The TMS320™ DSP Algorithm Standard Developer's Kit provides all the information necessary for application developers and system integrators to understand and utilize algorithms that are compliant to the standard.

TI's TMS320 DSP Algorithm Standard (part number TMDX320DAIS-07) is a single, standard set of coding conventions and application programming interfaces (APIs) for algorithm creators to "wrap" the algorithm for system-ready use. The standard includes algorithm programming rules that enable interoperability between different types of algorithms such as JPEG or MP3.

TI also provides tools to assist the developer in creating standardized algorithms.

The TMS320 DSP Algorithm Standard Developer's Kit has everything needed to get started. It contains:

- The TMS320 DSP Algorithm Standard Specification
- Application notes for both producers and users of algorithms
- Example code that builds on EVMs (evaluation modules) and DSKs (starter kits)
- Tools to help with creation of standard header files
- Demo that illustrates the simplicity of algorithm integration
- Support for C6000™, C5000™ and C2000™ DSP platforms

Download the TMS320 DSP Algorithm Standard Developer's Kit at **www.ti.com/algostanddevkit**

Telephony System Solutions

The TMS320C5000™ DSP-based Telephony Developer's Kits include ready-to-go software and hardware that reduce your development time and allow you to focus on end-product differentiation.

- **Client-Side Telephony Solution –** Customers developing remote data collection applications as well as applications requiring telephony co-processing or voiceband processing now have a powerful new tool with the TMS320C54CST version 2.0. With 14 on-board algorithms and up to 40 kW of customizable RAM, the DSP-based C54CST DSP is the industry's first complete one-chip solution – giving designers a comprehensive way of getting innovative industrial products to market quickly. For additional information visit **www.ti.com/cst**

- **Embedded V.90 Modem Developer's Kit –** Ideal for a variety of applications requiring Internet connectivity, the Embedded V.90 Modem Developer's Kit provides the hardware and software to cut power consumption as much as 90 percent and board space up to 40 percent over existing solutions – allowing an advanced analog modem to be placed in even the smallest spaces. This solution enables a new class of Internet access devices by consuming only 35 mW of power when running on a V.90 modem and requiring as little as 1.5 square inches of board space. Specifically this kit includes an evaluation board featuring a power-efficient TMS320C54V90 DSP; a line-powered DAA chip from PCTel; a CD with Quick Start Guide, technical manual and software driver file, RS-232 serial cable, RJ-11 phone line and a power supply. For more information regarding the TMS320C54V90 DSP and Embedded V.90 Modem Developer's Kit, visit: **www.ti.com/v90modem**

Embedded V.90 Modem Developer's Kit

Client-Side Telephony Developer's Kit

SPIRIT CORP
DSP Software Source

Telephony algorithms provided by SPIRIT-DSP

- **IP Telephone –** TI developed the first integrated silicon and software solution for IP phones, which means the majority of IP phones in development today leverage TI technology. Our solution is the leader in voice quality, matching or exceeding the audio quality of traditional circuit-switched telephony. We are also the leader in terms of availability of features and standards support, and are driving the evolution of related network protocols. Additional information can be found at **www.ti.com/ipphone1**

For the most updated information on DSP System Solutions, visit www.dspvillage.com

TMS320C64x™ DSP GENERATION, FIXED POINT

Highest Performance DSPs

Specifications

- TMS320C64x DSP high performance core provides scalable performance of up to 1 GHz
- The industry's fastest DSPs with up to 720-MHz/2880 MMACS performance
- C64x™ DSPs are 100% software compatible from the TI C62x™ DSPs

Applications

DSL and pooled modems, basestation transceivers, wireless LAN, enterprise PBX, multimedia gateway, broadband video transcoders, streaming video servers and clients, high-speed raster image processing (RIP) engines, network cameras

Features / Products

- 300- to 720-MHz options (1200 to 2880 MMACS) with a variety of peripheral sets

TMS320C6411 DSP – Low-cost C64x DSP performance

- 256-KBytes L2 memory

TMS320C6412 DSP – Low-cost and best C64x™ DSP performance for communications and general-purpose processing

- Flexible 32-bit PCI or 32-bit HPI or 10-/100-Mb Ethernet MAC
- 256-KBytes L2 memory

TMS320C6414 DSP – Setting the industry's performance standard

- Three multi-channel buffered serial ports (McBSPs)
- 32-bit host port interface (HPI)

TMS320C6415 DSP – Adds industry standard interfaces for multimedia and media gateway systems

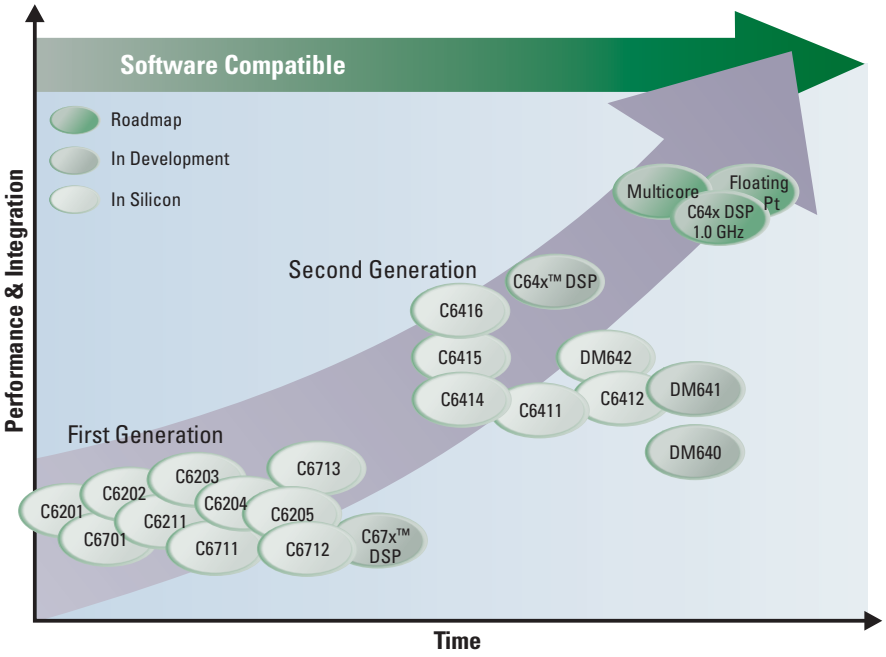
- Flexible 32-bit/33-MHz PCI or 32-bit HPI
- Optional universal test and operations PHY interface for ATM (UTOPIA) or McBSP

TMS320C6416 DSP – Customized for 3G wireless infrastructure

- Viterbi decoder co-processor (VCP) supports over 350 voice channels at 12.2 kbps
- Turbo decoder co-processor (TCP) supports 35 data channels at 384 kbps

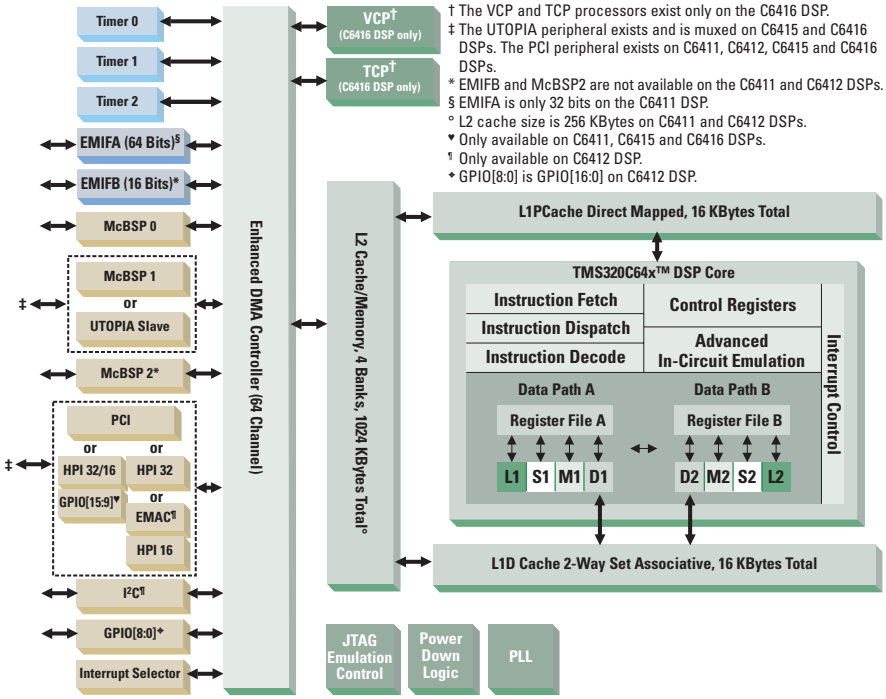
The easiest to use integrated development environment with the industry's best optimizing C compiler

TMS320C6000™ DSP Platform Roadmap



The TMS320C6000 DSP platform includes a wide range of devices that raise the bar in performance, set new levels of cost efficiency and offer on-chip peripheral integration to enable developers of high-performance systems to choose the device that best suits their specific application.

TMS320C6411/C6412/C6414/C6415/C6416 DSP Block Diagram



† The VCP and TCP processors exist only on the C6416 DSP.
‡ The UTOPIA peripheral exists and is muxed on C6415 and C6416 DSPs. The PCI peripheral exists on C6411, C6412, C6415 and C6416 DSPs.
* EMIFB and McBSP2 are not available on the C6411 and C6412 DSPs.
§ EMIFA is only 32 bits on the C6411 DSP.
° L2 cache size is 256 KBytes on C6411 and C6412 DSPs.
♥ Only available on C6411, C6415 and C6416 DSPs.
¶ Only available on C6412 DSP.
✦ GPIO[8:0] is GPIO[16:0] on C6412 DSP.

The C64x fixed-point DSPs offer the highest level of performance to address the demands of the digital age.

See page 35 for the TI Floating-Point DSP roadmap.

Digital Media Processor Features

TMS320DM640 – Low-cost, single-channel digital media processor

- 10-/100-Mb Ethernet MAC (EMAC)/MDIO
- One 8-bit BT656 video port (VP0)

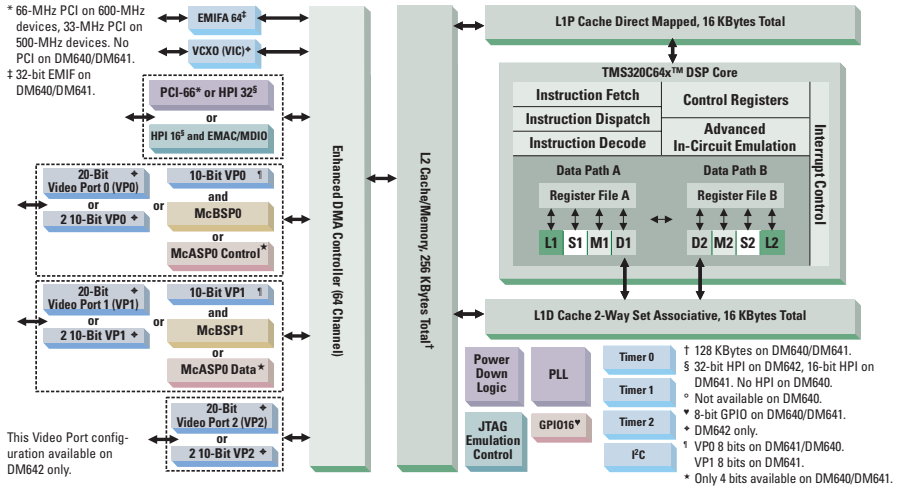
TMS320DM641 – Low-cost, multi-channel digital media processor

- 16-bit HPI or 10-/100-Mb EMAC/MDIO
- Two 8-bit BT656 video ports (VP0, VP1)

TMS320DM642 – Provides a rich peripheral set for multimedia client systems

- Flexible 8-bit audio serial port (McASP) and three 20-bit BT656 video ports (VP0, VP1, VP2)
- 66-/33-MHz PCI or 32-bit HPI or 10-/100-Mb EMAC/MDIO

TMS320DM640/DM641/DM642 DSP Block Diagram



The TMS320DM64x Digital Media processors give designers the industry's most powerful, flexible and easy-to-use solutions for high-performance digital media applications.

TMS320C64x™ DSP GENERATION PRODUCT SPECIFICATION GUIDE – FIXED-POINT DSPs

Part Number	Internal RAM (Bytes) L1 Program Cache/ L1 Data Cache/ L2 Unified RAM/Cache	McBSP	Enhanced DMA (Channels)	COM°	Timers	MHz	Cycle (ns)	MIPS	Typical Activity Total Internal Power (W) (Full Device Speed)	Voltage (V) Core	Voltage (V) I/O	Packaging	1 KU ($U.S.)+
TMS32**C6416**DGLZ7E3	16K/16K/1M	2+UTOPIA*	64	PCI/HPI 32/16	3	720	1.39	5760**	1.27	1.4	3.3	532 BGA, 23 mm	299.49
TMS32**C6416**DGLZ6E3	16K/16K/1M	2+UTOPIA*	64	PCI/HPI 32/16	3	600	1.67	4800**	1.06	1.4	3.3	532 BGA, 23 mm	145.73
TMS32**C6416**DGLZ5E0	16K/16K/1M	2+UTOPIA*	64	PCI/HPI 32/16	3	500	2	4000**	0.64	1.2	3.3	532 BGA, 23 mm	105.89
TMS32**C6416**DGLZA5E0°	16K/16K/1M	2+UTOPIA*	64	PCI/HPI 32/16	3	500	2	4000**	0.64	1.25	3.3	532 BGA, 23 mm	127.07
TMS32**C6415**DGLZ7E3	16K/16K/1M	2+UTOPIA*	64	PCI/HPI 32/16	3	720	1.39	5760	1.27	1.4	3.3	532 BGA, 23 mm	282.70
TMS32**C6415**DGLZ6E3	16K/16K/1M	2+UTOPIA*	64	PCI/HPI 32/16	3	600	1.67	4800	1.06	1.4	3.3	532 BGA, 23 mm	131.16
TMS32**C6415**DGLZ5E0	16K/16K/1M	2+UTOPIA*	64	PCI/HPI 32/16	3	500	2	4000	0.64	1.2	3.3	532 BGA, 23 mm	96.18
TMS32**C6415**DGLZA5E0°	16K/16K/1M	2+UTOPIA*	64	PCI/HPI 32/16	3	500	2	4000	0.64	1.25	3.3	532 BGA, 23 mm	115.41
TMS32**C6414**DGLZ7E3	16K/16K/1M	3	64	HPI 32/16	3	720	1.39	5760	1.27	1.4	3.3	532 BGA, 23 mm	215.56
TMS32**C6414**DGLZ6E3	16K/16K/1M	3	64	HPI 32/16	3	600	1.67	4800	1.06	1.4	3.3	532 BGA, 23 mm	107.84
TMS32**C6414**DGLZ5E0	16K/16K/1M	3	64	HPI 32/16	3	500	2	4000	0.64	1.2	3.3	532 BGA, 23 mm	87.43
TMS32**C6414**DGLZA5E0°	16K/16K/1M	3	64	HPI 32/16	3	500	2	4000	0.64	1.25	3.3	532 BGA, 23 mm	104.92
TMS320**C6412**GDK600¶	16K/16K/256K	2	64	PCI/HPI/EMAC†	3	600	1.67	4800	1.06	1.4	3.3	548 BGA, 23 mm	49.48
TMS320**C6412**GDK500¶	16K/16K/256K	2	64	PCI/HPI/EMAC†	3	500	2	4000	0.64	1.2	3.3	548 BGA, 23 mm	43.13
TMS320**C6412**GNZ600¶	16K/16K/256K	2	64	PCI/HPI/EMAC†	3	600	1.67	4800	1.06	1.4	3.3	548 BGA, 27 mm	49.48
TMS320**C6412**GNZ500¶	16K/16K/256K	2	64	PCI/HPI/EMAC†	3	500	2	4000	0.64	1.2	3.3	548 BGA, 27 mm	43.13
TMS320**C6411**GLZ	16K/16K/256K	2	64	PCI/HPI 32/16	2✦	300	3.3	2400	0.64	1.2	3.3	532 BGA, 23 mm	42.21
TMS320**DM640**GDK400♥	16K/16K/128K	1	64	EMAC	3	400	2.5	1600	0.5	1.0	3.3	548 BGA, 23 mm	21.54
TMS320**DM640**GNZ400♥	16K/16K/128K	1	64	EMAC	3	400	2.5	1600	0.5	1.0	3.3	548 BGA, 27 mm	21.54
TMS320**DM641**GDK600♥	16K/16K/128K	2	64	HPI 16/EMAC	3	600	1.67	4800	1.1	1.4	3.3	548 BGA, 23 mm	40.44
TMS320**DM641**GDK500♥	16K/16K/128K	2	64	HPI 16/EMAC	3	500	2	4000	0.6	1.2	3.3	548 BGA, 23 mm	35.25
TMS320**DM641**GNZ600♥	16K/16K/128K	2	64	HPI 16/EMAC	3	600	1.67	4800	1.1	1.4	3.3	548 BGA, 27 mm	40.44
TMS320**DM641**GNZ500♥	16K/16K/128K	2	64	HPI 16/EMAC	3	500	2	4000	0.6	1.2	3.3	548 BGA, 27 mm	35.25
TMS320**DM642**GDK600¶	16K/16K/256K	2§	64	PCI/HPI 32/EMAC†	3	600	1.67	4800	1.06	1.4	3.3	548 BGA, 23 mm	53.93
TMS320**DM642**GDK500¶	16K/16K/256K	2§	64	PCI/HPI 32/EMAC†	3	500	2	4000	0.64	1.2	3.3	548 BGA, 23 mm	48.53
TMS320**DM642**GNZ600¶	16K/16K/256K	2§	64	PCI/HPI 32/EMAC†	3	600	1.67	4800	1.06	1.4	3.3	548 BGA, 27 mm	53.93
TMS320**DM642**GNZ500¶	16K/16K/256K	2§	64	PCI/HPI 23/EMAC†	3	500	2	4000	0.64	1.2	3.3	548 BGA, 27 mm	48.53

¶ Experimental units (TMX) available now. Production units (TMS) available 4Q03.
*** Plus on-chip Turbo (TCP) and Viterbi (VCP) coprocessors.*
§ The DM642 can be configured to have up to three serial ports in various video/McASP/McBSP combinations.
♥ Experimental units (TMX) available 4Q03. Production units (TMS) available 1Q04.
† The C6412, DM640, DM641 and DM642 can be configured to have either a 32-bit PCI or 32-bit HPI, or a 16-bit HPI with Ethernet MAC.
+ Prices are quoted per unit in U.S. dollars at 1 KU quantities. Prices represent year 2003 suggested resale pricing.
** UTOPIA pins muxed with a third McBSP.*
° HPI is selectable, 32-bit or 16-bit.
✦ A third timer is present but not pinned out.
New devices are listed in red.
¤ Extended temperature device, –40 to 105°C case temperature operation.
Note: Enhanced plastic and Military DSP versions are available for selected DSPs.

For the most updated information on TMS320C6000 DSPs, visit www.ti.com/c6000

TMS320C62x™ DSP GENERATION, FIXED POINT
TMS320C67x™ DSP GENERATION, FLOATING POINT

High Performance DSPs

Specifications

- 100% code-compatible DSPs: Fixed-point C62x™ DSP—16-bit multiply, 32-bit instructions and floating-point C67x™ DSP—32-bit instructions, single and double precision
- Four data memory access (DMA) channels with bootloading capability (enhanced DMA with 16 channels for C6211, C6711, C6712 and C6713 DSPs)
- Up to 7 Mbit on-chip memory
- Two multi-channel buffered serial ports (McBSPs) (three McBSPs for C6202 and C6203 DSPs)
- 16-bit host-port interface (HPI) (32-bit Expansion Bus for C6202, C6203 and C6204 DSPs)
- Two 32-bit timers
- 32-bit PCI interface (C6205 DSP only)
- Up to 2400 MIPS at 300 MHz (C6203 DSP)

C67x DSP only:

- IEEE floating-point format
- Up to 1350 MFLOPS at 225 MHz
- Two new multi-channel audio serial ports (McASP) (C6713 DSP) can support up to 16 stereo channels of I^2S and are compatible with S/PDIF transmit protocol

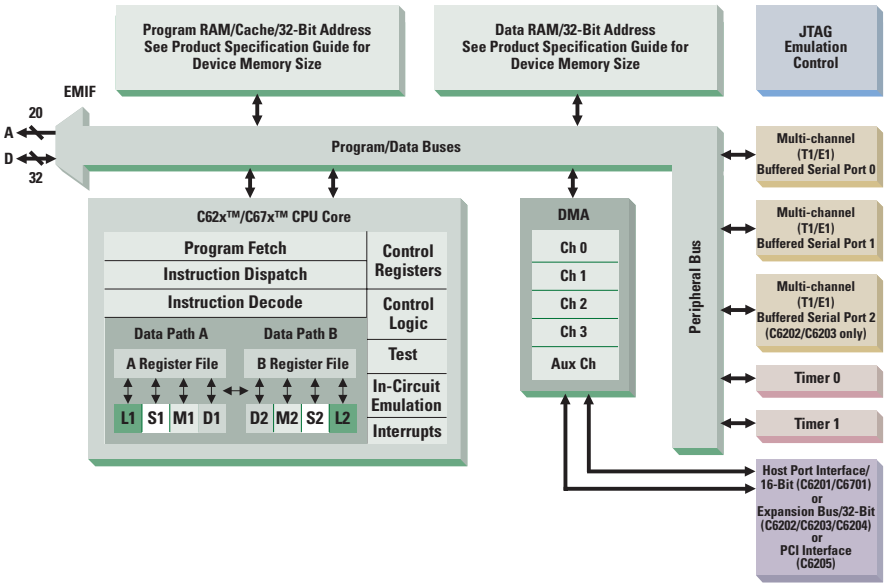
Applications

- Pooled modems
- Digital Subscriber Line (xDSL)
- Wireless basestations
- Central office switches
- Private Branch Exchange (PBX)
- Digital imaging
- Digital audio
- Call processing
- 3D graphics
- Speech recognition
- Voice over packet

Features

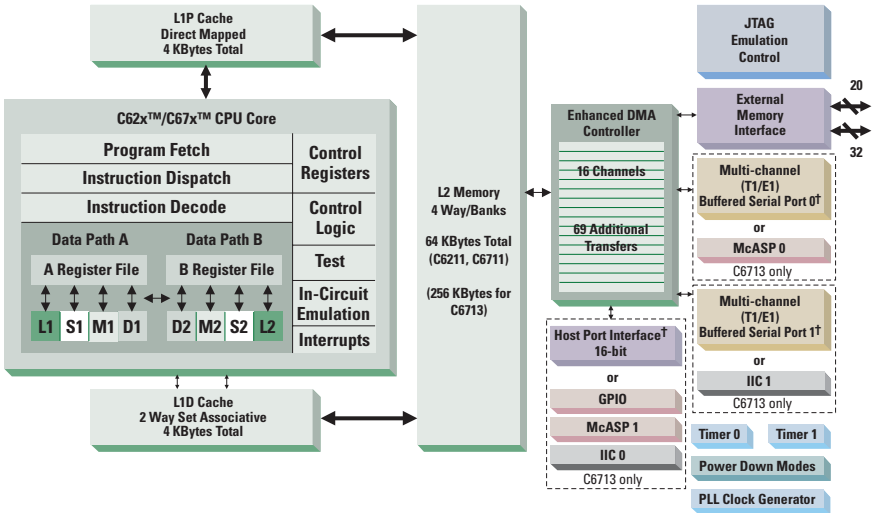
- C6000™ DSP Platform VelociTI™ advanced VLIW architecture
- Up to eight 32-bit instructions executed each cycle
- Eight independent, multi-purpose functional units and thirty-two 32-bit registers
- Industry's most advanced DSP C compiler and Assembly Optimizer maximize efficiency and performance

TMS320C6201/C6701/C6202/C6203/C6204/C6205 DSP Block Diagram



The fixed-point C6201 DSP is pin-for-pin compatible with the floating-point C6701 DSP offering easy code transfer resulting in significant savings in development, resource and manufacturing costs. Pin compatibility between the C6202, C6203 and C6204 DSPs allow for easy migration between several memory, price and performance options. The C6205 DSP is the first TI DSP with on-chip PCI.

TMS320C6211/C6711/C6712/C6713 DSP Block Diagram*



*The C6211 and C6711 DSPs' innovative two-level cache memory structure enables a breakthrough in system cost/performance. *The C6712 DSP features a 16-bit EMIF and no HPI. All C621x and C671x devices are pin compatible. The C6713 DSP is a superset of the C6711 DSP and will include I^2S, I^2C and S/PDIF transmit support as well as enhanced memory space.*

TMS320C62x™ DSP GENERATION PRODUCT SPECIFICATION GUIDE – FIXED-POINT DSPs

Part Number	RAM (Bytes) Data	RAM (Bytes) Prog	McBSP	DMA	COM	MHz	Cycle (ns)	MIPS	Typical Activity Total Internal Power (W) (Full Device Speed)	Voltage (V) Core	Voltage (V) I/O	Packaging	1 KU ($U.S.)+
TMS320**C6211B**GFN167	4K/4K/64K*		2	16†	HPI/16	167	6	1336	1.0	1.8	3.3	256 BGA, 27 mm	26.93
TMS320**C6211B**GFN150	4K/4K/64K*		2	16†	HPI/16	150	6.7	1200	0.9	1.8	3.3	256 BGA, 27 mm	21.54
TMS32**C6211B**GFNA150¤	4K/4K/64K*		2	16†	HPI/16	150	6.7	1200	0.9	1.8	3.3	256 BGA, 27 mm	25.85
TMS320**C6205**GHK200	64K	64K	2	4	PCI/32	200	5	1600	0.8	1.5	3.3	288 BGA, 16 mm	10.74
TMS320**C6205**GHKA200¤	64K	64K	2	4	PCI/32	200	5	1600	0.8	1.5	3.3	288 BGA, 16 mm	12.89
TMS320**C6204**GLW200	64K	64K	2	4	Exp. Bus/32	200	5	1600	0.8	1.5	3.3	340 BGA, 18 mm	20.92
TMS320**C6204**GHK200	64K	64K	2	4	Exp. Bus/32	200	5	1600	0.8	1.5	3.3	288 BGA, 16 mm	9.95
TMS320**C6204**GHKA200¤	64K	64K	2	4	Exp. Bus/32	200	5	1600	0.8	1.5	3.3	288 BGA, 16 mm	11.94
TMS320**C6203B**GNZ300	512K	384K	3	4	Exp. Bus/32	300	3.3	2400	1.3	1.5	3.3	352 BGA, 27 mm	71.62
TMS320**C6203B**GNY300	512K	384K	3	4	Exp. Bus/32	300	3.3	2400	1.3	1.5	3.3	384 BGA, 18 mm	71.62
TMS320**C6203B**GNZ173	512K	384K	3	4	Exp. Bus/32	250	4	2000	1.1	1.5°	3.3	352 BGA, 27 mm	60.43
TMS320**C6203B**GNY173	512K	384K	3	4	Exp. Bus/32	250	4	2000	1.1	1.5°	3.3	384 BGA, 18 mm	60.43
TMS32**C6203B**GNZA250¤	512K	384K	3	4	Exp. Bus/32	250	4	2000	1.1	1.5	3.3	352 BGA, 27 mm	71.62
TMS320**C6202B**GNZ300	128K	256K	3	4	Exp. Bus/32	300	3.3	2400	1.0	1.5	3.3	352 BGA, 27 mm	67.14
TMS320**C6202B**GNY300	128K	256K	3	4	Exp. Bus/32	300	3.3	2400	1.0	1.5	3.3	384 BGA, 18 mm	67.14
TMS320**C6202B**GNZ250	128K	256K	3	4	Exp. Bus/32	250	4	2000	0.9	1.5	3.3	352 BGA, 27 mm	55.95
TMS320**C6202B**GNY250	128K	256K	3	4	Exp. Bus/32	250	4	2000	0.9	1.5	3.3	384 BGA, 18 mm	55.95
TMS32**C6202B**GNZA250¤	128K	256K	3	4	Exp. Bus/32	250	4	2000	0.9	1.5	3.3	352 BGA, 27 mm	67.14
TMS320**C6202**GJL250	128K	256K	3	4	Exp. Bus/32	250	4	2000	2.1	1.8	3.3	352 BGA, 27 mm	110.08
TMS320**C6202**GLS250	128K	256K	3	4	Exp. Bus/32	250	4	2000	2.1	1.8	3.3	384 BGA, 18 mm	110.08
TMS320**C6202**GJL200	128K	256K	3	4	Exp. Bus/32	200	5	1600	1.7	1.8	3.3	352 BGA, 27 mm	94.03
TMS320**C6202**GLS200	128K	256K	3	4	Exp. Bus/32	200	5	1600	1.7	1.8	3.3	384 BGA, 18 mm	94.03
TMS320**C6202**GJLA200¤	128K	256K	3	4	Exp. Bus/32	200	5	1600	1.7	1.8	3.3	352 BGA, 27 mm	112.84
TMS320**C6202**GJLA233¤	128K	256K	3	4	Exp. Bus/32	233	4.3	1864	2.0	1.8	3.3	352 BGA, 27 mm	121.09
TMS320**C6201**GJC200	64K	64K	2	4	HPI/16	200	5	1600	1.3	1.8	3.3	352 BGA, 35 mm	82.70
TMS320**C6201**GJL200	64K	64K	2	4	HPI/16	200	5	1600	1.3	1.8	3.3	352 BGA, 27 mm	82.70
TMS320**C6201**GJCA200¤	64K	64K	2	4	HPI/16	200	5	1600	1.3	1.8	3.3	352 BGA, 35 mm	99.24
TMS320**C6201**GJLA200¤	64K	64K	2	4	HPI/16	200	5	1600	1.3	1.8	3.3	352 BGA, 27 mm	99.24

** The C6211 DSP's 72 KBytes of cache memory is comprised of 4 KBytes data cache, 4 KBytes program cache and 64 KBytes unified cache memory.* *New devices are listed in red.*
† Enhanced DMA. *¤ Extended temperature device, –40 to 105°C case temperature operation.* *° Device may operate at 300 MHz with 1.7-V core.*
+ Prices are quoted per unit in U.S. dollars at 1 KU quantities. Prices represent year 2003 suggested resale pricing. *Note: All devices include two timers.*
Note: Enhanced plastic and Military DSP versions are available for selected DSPs.

TMS320C67x™ DSP GENERATION PRODUCT SPECIFICATION GUIDE – FLOATING-POINT DSPs

Part Number	RAM (Bytes) Data/Prog	McBSP	DMA	COM	MHz	Cycle (ns)	MFLOPS	Typical Activity Total Internal Power (W) (Full Device Speed)	Voltage (V) Core	Voltage (V) I/O	Packaging	1 KU ($U.S.)+
TMS320**C6713**GDP225	4K/4K/256K*	2#	16°	HPI/16	225	4.4	1350	1.2	1.26	3.3	272 BGA, 27 mm	28.99
TMS320**C6713**GDPA200†	4K/4K/256K*	2#	16°	HPI/16	200	5	1200	1.2	1.26	3.3	272 BGA, 27 mm	28.99
TMS320**C6713**PYP200	4K/4K/256K*	2#	16°	HPI/16	200	5	1200	1.0	1.2	3.3	208 TQFP, 28 mm	23.25
TMS320**C6713**PYPA167†	4K/4K/256K*	2#	16°	HPI/16	167	6	1000	1.0	1.2	3.3	208 TQFP, 28 mm	23.25
TMS320**C6712C**GDP150	4K/4K/64K*	2	16°	–	150	6.7	900	0.7	1.26	3.3	272 BGA, 27 mm	14.95
TMS320**C6712**GFN100	4K/4K/64K*	2	16°	–	100	10	600	0.8	1.8	3.3	256 BGA, 27 mm	18.06
TMS320**C6711C**GDP200	4K/4K/64K*	2	16°	HPI/16	200	5	1200	0.9	1.26	3.3	272 BGA, 27 mm	21.55
TMS32**C6711C**GDPA167†	4K/4K/64K*	2	16°	HPI/16	167	6	1000	0.9	1.26	3.3	272 BGA, 27 mm	21.55
TMS320**C6711B**GFN150	4K/4K/64K*	2	16°	HPI/16	150	6.7	900	1.1	1.8	3.3	256 BGA, 27 mm	30.77
TMS32**C6711B**GFNA100†	4K/4K/64K*	2	16°	HPI/16	100	10	600	1.1	1.8	3.3	256 BGA, 27 mm	25.85
TMS320**C6711B**GFN100	4K/4K/64K*	2	16°	HPI/16	100	10	600	0.8	1.8	3.3	256 BGA, 27 mm	21.54
TMS**C6701**GJC16719V	64K/64K	2	4	HPI/16	167	6	1000	1.4	1.9	3.3	352 BGA, 35 mm	113.13
TMS320**C6701**GJC150	64K/64K	2	4	HPI/16	150	6.7	900	1.3	1.8	3.3	352 BGA, 35 mm	78.57
TMS320**C6701**GJCA120†	64K/64K	2	4	HPI/16	120	8.3	720	1.3	1.8	3.3	352 BGA, 35 mm	94.28

** Format represents cache memory architecture: [data cache] / [program cache] / [unified cache]* *New devices are listed in red.*
° Enhanced DMA. *† Extended temperature device, –40 to 105°C case temperature operation.* *Note: All devices include two timers.*
 # The C6713 DSP can be configured to have up to three serial ports in various McASP/McBSP combinations by not utilizing the HPI. Other configurable serial options include I^2C and additional GPIO.
+ Prices are quoted per unit in U.S. dollars at 1 KU quantities. Prices represent year 2003 suggested resale pricing.
Note: Enhanced plastic and Military DSP versions are available for selected DSPs.

For the most updated information on TMS320C6000 DSPs, visit www.ti.com/c6000

TMS320C6000™ DSP PLATFORM TOOLS, SOFTWARE AND SUPPORT

C6000™ DSP PLATFORM HARDWARE DEVELOPMENT TOOLS

Description	Part Number	$U.S.+
TMS320C6713 DSP Starter Kit (DSK)	TMDSDSK6713 (U.S. part number) TMDSDSK6713-0E (European part number)	395
TMS320C6416 DSP Starter Kit (DSK)	TMDSDSK6416 (U.S. part number) TMDSDSK6416-0E (European part number)	395
Fingerprint Authentication Development Tool	TMDSFDCFPC10	245
TMS320DM642 Digital Media Developer's Kit (DM642 DMDK)	TMDXDMK642 (U.S. part number) TMDXDMK642-0E (European part number)	6,495
Network Video Developer's Kit (NVDK)	TMDX3PNV6416S (U.S. part number) TMDX3PNV6416SE (European part number)	4,495
Network Video Developer's Kit Bundle§*	NVDKCCS (U.S. part number) NVDKCCSE (European part number)	6,595
EVALUATION MODULES (EVMs)		
TMS320DM642 Evaluation Module	TMDXEVM642 (U.S. part number) TMDXEVM642-0E (European part number)	1,995
TMS320C67x™ EVM Bundle*	TMDSEVM6701-4	3,495
TMS320C67x EVM board only (CCStudio sold separately)	TMDSBRD6701	1,995
JTAG EMULATORS		
XDS560™ PCI-Based High-Performance JTAG Emulator	TMDXEMU560	3,995
XDS510PP-Plus – Parallel Port Emulator for Windows	TMDSEMUPP (U.S. part number) TMDSEMUPP-0E (European part number)	1,500
XDS510™ USB-Based Emulator for Windows	TMDSEMUUSB	1,995

+ Prices are quoted in U.S. dollars and represent year 2003 suggested resale pricing. *New tools are listed in red.*
§ NVDK bundle available only through Texas Instruments eStore (includes NVDK plus C6000 Code Composer Studio™ and XDS510PP-Plus emulator).
** Includes Code Composer Studio Development Tools, DSP/BIOS™ kernel, code generation tools (C/C++ compiler/assembler/linker), RTDX™, target hardware board and device drivers. Please see the features supported by platform matrix on page 68 for more details.*
† Includes Code Composer Studio Development Tools, DSP/BIOS kernel, code generation tools (C/C++ compiler/assembler/linker) with 256K limited application size, RTDX, EVM board with device drivers and profile-based compiler.

C6000 DSP PLATFORM SOFTWARE DEVELOPMENT TOOLS§

Description	Part #	$U.S.+
C6000™ DSP Code Composer Studio Development Tools† Bundled with Annual S/W Subscription Supports C62x™, C67x™ and C64x™ DSP products	TMDSCCS6000-1	3,595
C6000 DSP Code Composer Studio Development Tools Annual S/W Subscription	TMDSSUB6000	600
Essential Guide to Getting Started with DSP CD-ROM Includes C6000™ DSP Code Composer Studio™ 90-Day Free Evaluation Tools‡	SPRC119 (**www.dspvillage.ti.com/freetools**)	**Free**
TMS320C6000 DSP Chip Support Library	SPRC090	**Free**
TMS320C62x DSP Library	SPRC091	**Free**
TMS320C62x DSP Image Library	SPRC093	**Free**
TMS320C64x DSP Library	SPRC092	**Free**
TMS320C64x DSP Image Library	SPRC094	**Free**
TMS320C67x DSP Library	SPRC121	**Free**
TMS320C67x DSP Fast Run-Time Support Library (Fast RTS)	SPRC060	**Free**

+ Prices are quoted in U.S. dollars and represent year 2003 suggested resale pricing.
† Includes Code Composer Studio Development Tools, DSP/BIOS™, code generation tools (C/C++ compiler/assembler/linker), XDS510™ and XDS560™ device drivers (emulation software), RTDX™, simulator and profile-based compiler. Please see the features supported by platform matrix on page 68 for more details.
‡ Includes full-featured Code Composer Studio Development Tools, code generation tools (C/C++ compiler/assembler/linker) and simulator all limited to 90 days.

TMS320C6000™ DSP PLATFORM TOOLS DOCUMENTATION

Hardware Reference Guides	Web Search Literature #
TMS320C6201/C6701 DSP Evaluation Module User's Guide	SPRU269
TMS320C6x™ DSP Multi-channel Evaluation Module Reference Guide	SPRU308
TMS320C6x DSP Multi-channel Evaluation Module User's Guide	SPRU285
Software Reference Guides	
TMS320C6000 DSP Optimizing C Compiler User's Guide	SPRU187
Debugger User's Guide	SPRU188
TMS320C6000 DSP Programmer's Guide	SPRU198
TMS320C6000 DSP Assembly Language Tools User's Guide	SPRU186
Code Composer Studio Getting Started Guide	SPRU509
TMS320C67x™ DSP Library Programmer's Reference Guide	SPRU657

Software Reference Guides (Cont'd)	Web Search Literature #
TMS320™ DSP/BIOS™ User's Guide	SPRU423
TMS320C6000 DSP/BIOS Application Programming Interface (API) Reference Guide	SPRU403
TMS320C6000 DSP Instruction Set Simulator	SPRU546
Code Coverage and Multi-Event Profiler User's Guide	SPRU624
Technical Reference	
TMS320C6201/C6701 DSP Evaluation Module Technical Reference	SPRU305
Product Bulletins	
XDS560™ Emulator Product Bulletin	SPRB148
Network Video Developer's Kit Product Bulletin	SPRT247
TMS320DM64x™ Digital Media Development Tools Product Bull.	SPRT281

Check the TI web site for a complete listing of technical documentation including application notes.

C6000™ DSP LITERATURE AND RELATED TECHNICAL DOCUMENTATION

Data Sheets	Web Search Literature #
TMS320C6201 DSP Data Sheet	SPRS051
TMS320C6202/TMS320C6202B DSP Data Sheet	SPRS104
TMS320C6203 DSP Data Sheet	SPRS086
TMS320C6204 DSP Data Sheet	SPRS152
TMS320C6205 DSP Data Sheet	SPRS106
TMS320C6211/TMS320C6211B DSP Data Sheet	SPRS073
TMS320C6701 DSP Data Sheet	SPRS067
TMS320C6711/TMS320C6711B DSP Data Sheet	SPRS088
TMS320C6712 DSP Data Sheet	SPRS148
TMS320C6713 DSP Data Sheet	SPRS186
TMS320C6411 DSP Data Sheet	SPRS196
TMS320C6412 DSP Data Sheet	SPRS219
TMS320C6414 DSP Data Sheet	SPRS146
TMS320C6415 DSP Data Sheet	SPRS146
TMS320C6416 DSP Data Sheet	SPRS146
TMS320DM642 DSP Data Sheet	SPRS200
TMS320DM641/DM640 DSP Data Sheet	SPRS222
Technical Briefs and Overviews	
TMS320C6000 DSP Technical Brief	SPRU197
TMS320C64x™ DSP Technical Overview	SPRU395
Hardware User's Guides	
TMS320C6000 DSP CPU and Instruction Set Reference Guide	SPRU189
TMS320C6000 DSP Peripherals Reference Guide	SPRU190
TMS320C62x/64x DSP FastRTS Library Programmer's Reference	SPRU653
TMS320C6000 DSP Instruction Set Simulator Technical Overview	SPRU600
TMS320C6000 DSP Multi-channel Audio Serial Port (McASP) Reference Guide	SPRU041

Hardware User's Guides (Cont'd)	Web Search Literature #
TMS320C6000 DSP I2C Module Reference Guide	SPRU175
TMS320C6000 DSP Phase-Locked Loop (PLL) Controller Peripheral Reference Guide	SPRU233
Software User's Guides	
TMS320C6000 DSP Programmer's Guide	SPRU198
Turbo Decoder Coprocessor User's Guide	SPRU534
TMS320C64x DSP Viterbi Decoder Coprocessor Reference Guide	SPRU533
Cache Analysis User's Guide	SPRU575
Product Bulletins	
TMS320C64x DSP Product Bulletin	SPRT236
TMS320C6411 DSP Product Bulletin	SPRT237
TMS320C67x Floating-Point DSP Generation Product Bulletin	SPRT196
TMS320DM64x Digital Media Processors Product Bulletin	SPRT277
Application Notes	
How to Begin Development Today with the TMS320C6411 DSP	SPRA374
How to Begin Development Today with the C6414, C6415, and C6416 DSPs	SPRA718
How to Begin Development Today with the C6713 Floating-Point DSP	SPRA809
TMS320C6411 DSP Power Consumption Summary	SPRA373
TMS320C6414, C6415, and C6416 DSP Power Consumption Summary	SPRA811
Migrating from TMS320C6211B/TMS320C6711B to TMS320C6711C DSPs	SPRA837
TMS320C6713 Digital Signal Processor Optimized for High-Performance Multichannel Audio Systems	SPRA921
White Papers	
The Future of DSP	SPRY049
Comparing Apples, Oranges and Gigahertz: Why is a DSP Gigahertz so Special?	SPRY050

Check the TI web site for a complete listing of technical documentation including application notes.

For the most updated information on TMS320C6000 DSPs, visit www.ti.com/c6000

TMS320C6000™ DSP FOUNDATION SOFTWARE TECHNICAL DOCUMENTATION

Foundation Software Reference Guides	Web Search Literature #
TMS320C6000 DSP Peripheral Support Library Programmer's Reference Guide	SPRU273
TMS320C6000 DSP Chip Support Library API Reference Guide	SPRU401
TMS320C6000 DSP DSK Board Support Library API User's Guide	SPRU432
TMS320C62x™ DSP Image/Video Library Programmer's Reference	SPRU400

Foundation Software Reference Guides (Cont'd)	Web Search Literature #
TMS320C62x DSP Library Programmer's Reference	SPRU402
TMS320C64x™ DSP Library Programmer's Reference	SPRU565
TMS320C64x DSP Image/Video Processing Library Programmer's Reference	SPRU023
TMS320C67x™ DSP Library Programmer's Reference	SPRU657
TMS320C67x DSP Fast RTS Library User's Guide	SPRU100

Check the TI web site for a complete listing of technical documentation including application notes.

TMS320™ DSP ALGORITHM STANDARD TECHNICAL DOCUMENTATION

Software Reference Guides	Web Search Literature #
TMS320 DSP Algorithm Standard Rules and Guidelines	SPRU352
TMS320 DSP Algorithm Standard API Reference	SPRU360
TMS320 DSP Algorithm Standard Demonstration Application	SPRU361
TMS320 DSP Algorithm Standard Developer's Guide	SPRU424

Application Notes	Web Search Literature #
A Case Study in DSP Systems Integration – The TI 3rd Party Vocoder Demonstration	SPRA734
Making DSP Algorithms Compliant with the TMS320 DSP Algorithm Standard	SPRA579
The TMS320 DSP Algorithm Standard – White Paper	SPRA581
Using the TMS320 DSP Algorithm Standard in a Dynamic DSP System	SPRA580
Using the TMS320 DSP Algorithm Standard in a Static DSP System	SPRA577

Check the TI web site for a complete listing of technical documentation including application notes.

C6000™ DSP PLATFORM PRODUCT SUPPORT

C6000 DSP Application Notes	**www.ti.com/c6000appnotes**
C6000 DSP Benchmarks	**www.ti.com/c6000bench**
C6000 DSP Signal Processing Libraries	**www.ti.com/c6000dsplib**

DATA CONVERTERS, DSP CODECS AND POWER MANAGEMENT PRODUCTS FOR THE TMS320C6000™ DSP PLATFORM

TI Data Converter Products for DSP:

- Data converter plug-ins for TI's Code Composer Studio™ Development Tools
- DSP friendly interfaces
- 12-, 14-, 16-bit dynamic external bus interface (parallel or serial)
- 8- through 24-bit ADC resolution
- 8- through 20-bit DAC resolution
- Pin compatible upgrade path to higher resolutions
- Evaluation modules and product samples readily available

Codec Products

- TI's Codec products are optimized for interfacing to TMS320™ DSPs
- Offer products for a variety of applications including those optimized for audio, modem, ADSL and video

Power Management Products

Switching Regulators

- DC/DC controllers for high flexibility and excellent value
- SWIFT™ DC/DC converters for simple design and fewer components

Low Dropout Regulators (LDOs)

- High-current LDOs available for simpler power management solutions
- Feature-rich products available offering Reset, Power Good pin and ultra-low dropout voltages
- TSSOP PowerPAD™ package improves thermal performance while saving space

Supply Voltage Supervisors (SVS)

- Designed to protect the DSP and maintain data integrity
- Dual SVSs designed to monitor both C6000™ DSP core and I/O voltage rails
- Small packaging saves PCB space

Plug-In Power Solutions

- Complete power solution
- EMI and reliability tested

ANALOG-TO-DIGITAL CONVERTERS FOR THE TMS320C6000 DSP PLATFORM

Model	Res. (Bits)	Sampling Rate (kSPS)	# Input Chan.	Input Voltage (V)	Power (mW/V)	Price Start 1 KU ($U.S.)+
ADS1243	24	0.015	4 Diff/8 SE	PGA (1-128), ±2.5	0.6 mW/+2.7/+5 V	4.00
ADS1242	24	0.015	2 Diff/4 SE	PGA (1-128), ±2.5	0.6 mW/+2.7/+5 V	3.64
ADS1241	24	0.015	4 Diff/8 SE	PGA (1-128), ±2.5	0.6 mW/+2.7/+5 V	4.00
ADS1240	24	0.015	2 Diff/4 SE	PGA (1-128), ±2.5	0.6 mW/+2.7/+5 V	3.64
ADS1218	24	0.78	4 Diff/8 SE	PGA (1-128), ±2.5	0.6 mW/+2.7/+5 V	8.86
ADS1217	24	0.78	4 Diff/8 SE	PGA (1-128), ±5	0.6 mW/+2.7/+5 V	7.54
ADS1216	24	0.78	4 Diff/8 SE	PGA (1-128), ±2.5	0.6 mW/+2.7/+5 V	7.54
ADS1251	24	20	1 Diff	Vref, ±5	5/+5	5.31
ADS1252	24	41	1 Diff	Vref, ±5	40/+5	5.31
ADS1253	24	20	4 Diff	Vref, ±5	5/+5	6.38
ADS1254	24	20	4 Diff	Vref, ±5	3/+5 and +1.8, +5	6.38

Model	Res. (Bits)	Sampling Rate (kSPS)	# Input Chan.	# ADC/ Chan.	Input Voltage (V)	Power (mW/V)	Price Start 1 KU ($U.S.)+
ADS8320	16	100	1 Diff	1	Vref	1.8 mW/+2.7/+5 V	6.33
ADS8321	16	100	1 Diff	1	Vref	4.5 mW/+5 V	6.33
TLC4541	16	200	1 SE	1	Vref	17.5 mW/+5 V	7.00
TLC4545	16	200	1 pDiff	1	Vref	17.5 mW/+5 V	7.00
ADS8364	16	500	6 Diff	6	±2.5 V @ +2.5	85 mW/+5 V	17.21
ADS8324	14	50	1 Diff	1	Vref	2.5 mW/+1.8/+3.6 V	3.95
TLC3545	14	200	1 pDiff	1	Vref	17.5 mW/+5 V	4.75
TLC3544	14	200	4 SE	1	4	29 mW/+5 V	7.09
TLC3548	14	200	8 SE	1	4	29 mW/+5 V	7.58
TLC3574	14	200	4 SE	1	± 10	30 mW/+5 V	7.50
TLC3578	14	200	8 SE	1	± 10	30 mW/+5 V	9.36
TLV2548	12	200	8 SE	1	+2,4	4.5 mW/+2.7/+5 V	4.71
TLV2544	12	200	4 SE	1	+2,4	4.5 mW/+2.7/+5 V	4.30
TLV2553	12	200	11 SE	1	Vref	2.2 mW/+2.7/+5 V	4.05
TLV2556	12	200	11 SE	1	Vref	2.2 mW/+2.7/+5 V	4.20
TLC2574	12	200	4 SE	1	+2,4	4.5 mW/+2.7/+5 V	4.63
TLC2578	12	200	8 SE	1	Vref	2.3 mW/+2.7/+5 V	5.55
TLV2541	12	200	1 SE	1	Vref	2.3 mW/+2.7/+5 V	3.54
ADS7841	12	200	2 Diff/4 SE	1	Vref	3.5 mW/+2.7/+5 V	2.53
ADS7844	12	200	4 Diff/8 SE	1	Vref	3.5 mW/+2.7/+5 V	2.94
TLC2551	12	400	1 SE	1	Vref	15 mW/+5 V	3.74
TLC2552	12	400	2 SE	1	Vref	15 mW/+5 V	3.74
TLC2554	12	400	4 SE	1	+4	33 mW/+5 V	5.06
TLC2555	12	400	1 SE	1	Vref	15 mW/+5 V	3.74
TLC2558	12	400	8 SE	1	+4	33 mW/+5 V	5.56
TLC3541	14	200	1 SE	1	Vref	17.5mW/+5 V	4.75
TLV1504	10	200	4 SE/3 PE	1	Vref	2.7mW/+2.7 V	3.26
TLV1508	10	200	8 SE/7 PE	1	Vref	2.7mW/+2.7 V	3.36
TLV1570	10	1250	8 SE	1	Vref	8mW/+2.7 V	2.73
TLV1571	10	1250	1 SE	1	Vref	12mW/+2.7 V	2.64
TLV1572	10	1250	1 SE	1	Vref	12mW/+2.7 V	2.38
TLV1578	10	1250	8 SE	1	Vref	30mW/+2.7 V	2.75
TLV2542	12	200	2 SE	1	Vref	2.3 mW/+2.7/+5 V	3.54
TLV2545	12	200	1 SE	1	Vref	2.3 mW/+2.7/+5 V	3.53
AFE8201	12	80,000	1 Diff	1	Vref	450 mW/+3 V	25.00

Model	Res. (Bit)	Sampling Rate-kSPS	# Input Chan.	Interface	Input Voltage (V)	Power (mW/V)	Price Start 1 KU ($U.S.)+
THS1206	12	6000	2 Diff/4 SE	P12	+2.5	216 mW/+5 V	13.16
THS1207	12	6000	2 Diff/4 SE	P12	+2.5	186 mW/+5 V	12.13
THS12082	12	8000	1 Diff/2 SE	P12	+2.5	186 mW/+5 V	10.07
THS1209	12	8000	1 Diff/2 SE	P12	+2.5	186 mW/+5 V	9.04
THS10064	10	6000	2 Diff/4 SE	P10	+2.5	186 mW/+5 V	8.06
THS1007	10	6000	2 Diff/4 SE	P10	+1.5, +3.5	186 mW/+3,+5V	7.04
THS10082	10	8000	1 Diff/2 SE	P10	+2.5	186 mW/+5 V	6.02
THS1009	10	8000	1 Diff/2 SE	P10	+1.5, +3.5	186 mW/+3,+5 V	5.00

For a complete list of data converter development tools see "Design Resources" on our web site at ***dataconverter.ti.com*** *or consult the 3Q 2003 Data Converter Selection Guide. SE = Single-Ended, Diff = Differential, Iin = Current Input*
+ Prices are quoted per unit in U.S. dollars at 1 KU quantities. Prices represent year 2003 suggested resale pricing.
Download FREE Data Converter Plug-In for TI Code Composer Studio™ at ***www.ti.com/sc/dcplug-in***

For the most updated information on TI Analog products, visit analog.ti.com

DIGITAL-TO-ANALOG CONVERTERS FOR THE TMS320C6000™ DSP PLATFORM

Model	Res. (Bits)	Settling Time (µs)	# Output D/As	Output (V)	Power Voltage(s)	Price Start 1 KU ($U.S.)+
DAC1220	20	10 ms	1	+5	3 mW/+5 V	6.33
DAC8501	16	10	1	+Vref/MDAC	1 mW/+2.7,+5 V	2.83
DAC8531	16	10	1	+Vref	1 mW/+2.7,+5 V	2.83
DAC1221	16	10 ms	1	+2.5	1 mW/+3 V	5.01
TLV5638	12	1	2	+2,4	4.5 mW/+2.7,+5 V	4.89
DAC7512	12	10	1	+Vcc	0.7 mW/+2.7,+5 V	1.37
DAC7513	12	10	1	+Vref	0.7 mW/+2.7,+5 V	1.37
TLV5630	12	1/3	8	Vref	18 mW/+5 V	9.02
TLV5610	12	1/3	8	Vref	18 mW/+5 V	9.41
TLV5630	12	1/3	8	Vref	18 mW/+5 V	9.02
TLV5636	12	1/3.5	1	+2,4	4.5 mW/+2.7, +5 V	3.82
TLV5618A	12	2.5/12	2	Vref	2.4 mW/+2.7, +5 V	4.25
TLV5616	12	3/9	1	Vref	0.9 mW/+2.7, +5 V	2.86
TLV5614	12	3/9	4	Vref	3.6 mW/+2.7, +5 V	8.26
TLV5608	10	1/3	8	Vref	18 mW/+5 V	4.74
TLV5637	10	1/3	2	+2,4	4.2 mW/+5 V	4.53
TLV5631	10	1/3	8	Vref	18 mW/+5 V	5.12
TLV5617A	10	2.5/12	2	Vref	2.1 mW/+2.7, +5 V	3.41
TLV5604	10	3/9	4	Vref	3.3 mW/+2.7, +5 V	4.79
TLV5606	10	3/9	1	Vref	0.9 mW/+2.7, +5 V	1.77
TLV5625	8	2.5	2	Vref	2.1 mW/+2.7, +5 V	1.74
TLV5623	8	3	1	Vref	0.9 mW/+2.7, +5 V	1.25
TLV5626	8	1/3	2	+2,4	5.1 mW/+2.7, +5 V	2.22
TLV5629	8	1/3	8	Vref	15 mW/+2.7, +5 V	2.98
TLV5632	8	1/3	8	+2,4	18 mW/+2.7, +5 V	3.19
TLV5624	8	1/3.5	1	+2,4	4.5 mW/+2.7, +5 V	1.65
TLC5618A	12	2.5	2	Vref	3 mW/+5V	4.74

*For a complete list of data converter development tools see "Design Resources" on our web site at **dataconverter.ti.com** or consult the 3Q 2003 Data Converter Selection Guide.*
+ Prices are quoted per unit in U.S. dollars at 1 KU quantities. Prices represent year 2003 suggested resale pricing.
*Download FREE Data Converter Plug-In for TI Code Composer Studio™ at **www.ti.com/sc/dcplug-in***

DSP CODECS FOR THE C6000™ DSP PLATFORM

Model	Codec Channels	Sampling Rate (kSPS)	SNR (dB)	DSP Interface	Host Interface	Analog Outputs (Ohms)	Core Power Supply (Digital/Analog) (V)	Logic I/O (V)	Power Dissipation (w/o Speaker) (mW)	Price 1 KU ($U.S.)+
TLV320AIC12	1	26	88	Pulse FS SMARTDM	I^2C, S^2C	600 (1), 16 (2)	1.8/2.7 to 3.6	2.7 to 3.6	10	2.75
TLV320AIC13	1	26	88	Pulse FS SMARTDM	I^2C, S^2C	600 (1), 16 (2)	1.8/2.7 to 3.6	1.1 to 3.6	10	2.95
TLV320AIC14	1	26	88	Pulse FS SMARTDM	I^2C, S^2C	600 (1)	1.8/2.7 to 3.6	2.7 to 3.6	10	2.35
TLV320AIC15	1	26	88	Pulse FS SMARTDM	I^2C, S^2C	600 (1)	1.8/2.7 to 3.6	1.1 to 3.6	10	2.71
TLV320AIC20	2	26	87	Pulse FS SMARTDM	I^2C, S^2C	600 (1), 150 (2), 8 (1)	1.8/2.7 to 3.6	2.7 to 3.6	20	3.51
TLV320AIC10	1	22	84	Frame, Pulse FS	S^2C	600 (2)	3 to 5.5	3 to 5.5	39	2.12
TLV320AIC11	1	22	84	Frame, Pulse FS	S^2C	600 (2)	3 to 5.5	1.1 to 5.5	39	2.12
TLV320AIC21	2	26	87	Pulse FS SMARTDM	I^2C, S^2C	600 (1), 150 (2), 8 (1)	1.8/2.7 to 3.6	1.1 to 3.6	20	3.71
TLC320AIC24	2	26	87	Pulse FS SMARTDM	I^2C, S^2C	600 (1), 150 (2)	1.8/2.7 to 3.6	2.7 to 3.6	20	3.40
TLC320AIC25	2	26	87	Pulse FS SMARTDM	I^2C, S^2C	600 (1), 150 (2)	1.8/2.7 to 3.6	1.1 to 3.6	20	3.60
AFE1230	1	1700	–	Serial	–	–	5	3.1 to 5.0	750	14.57

** Evaluation Modules available.*
*For a complete list of data converter evaluation modules, please see our web site at **www.ti.com/sc/evms***

SUGGESTED POWER MANAGEMENT SOLUTIONS FOR THE C6000 DSP PLATFORM FOR NON-PORTABLE APPLICATIONS

Output Current	250 mA	500 mA	750 mA	1 A	2 A	4 A	6 A	8 A
Dual Plug-In Module	–	–	–	PT6940	PT6940	PT6940	PT6940	–
Plug-In Module	PT5520	PT5520	PT5520	PT5520	PT5500	PT5400	PT5400	PT6600
DC/DC Converter (w/ FETs)	TPS62200	TPS62000	TPS62050	TPS62040	TPS54310	TPS54610	TPS54610	TPS54910
DC/DC Controller	TPS40000	TPS40000	TPS40000	TPS40000	TPS40000	TPS40000	TPS40000	TPS40000
Dual LDO[1]	TPS70702	TPS70102	TPS767D301	TPS767D301	TPS70302	–	–	–
Low Dropout Regulator (LDO)	TPS76601	REG103	TPS77701	TPS76701	TPS75201	TPS75601	–	–

Supervised Voltage	1.2 V	1.4 V	1.5 V	1.8 V	2.5 V	3.3 V		
Dual SVS[2]	TPS3110E12	TPS3110K33	TPS3110K33	TPS3305-18	TPS3305-25	N/A		
Supply Voltage Supervisor (SVS)	TPS3123J12	TPS3801-01	TPS3123G15	TPS3128E18	TPS3823-25	TPS3823-33		

Note 1: Current shown for powering DSP core. I/O current capability for the Dual LDO is rated approximately 50% of core current. Adjustable output voltage part numbers shown. Fixed voltages also available.
*Note 2: Other supervised voltage is 3.3 V. See **power.ti.com** for a complete product offering.*

To order free Data Converter, Codec or Power Management samples, visit analog.ti.com

TMS320C55x™ DSP GENERATION, FIXED POINT

Industry's Best Power Efficiency

Specifications

- C55x™ DSP core delivers 300 MHz for up to 600-MIPS performance
- TMS320C5510 DSPs are in production today and TMS320C5509 DSPs are sampling today
- Software compatible across the entire C5000™ DSP platform

Applications

- Feature-rich, miniaturized personal and portable products
- 2G, 2.5G and 3G cell phones and basestations
- Digital audio players
- Digital still cameras
- Electronic books
- Voice recognition
- GPS receivers
- Fingerprint/Pattern recognition
- Wireless modems
- Headsets
- Biometrics

Features

- Advanced automatic power management
- Configurable idle domains to extend your battery life
- Shortened debug for faster time-to-market

C5501/C5502 DSPs – The Price and Performance Leaders

- 300-MHz clock rate
- 32-/64-KB RAM, 32-KB ROM
- Two/Three multi-channel buffered serial ports (McBSPs), I²C, general-purpose timers, watchdog timer, UART
- 16-/32-bit EMIF

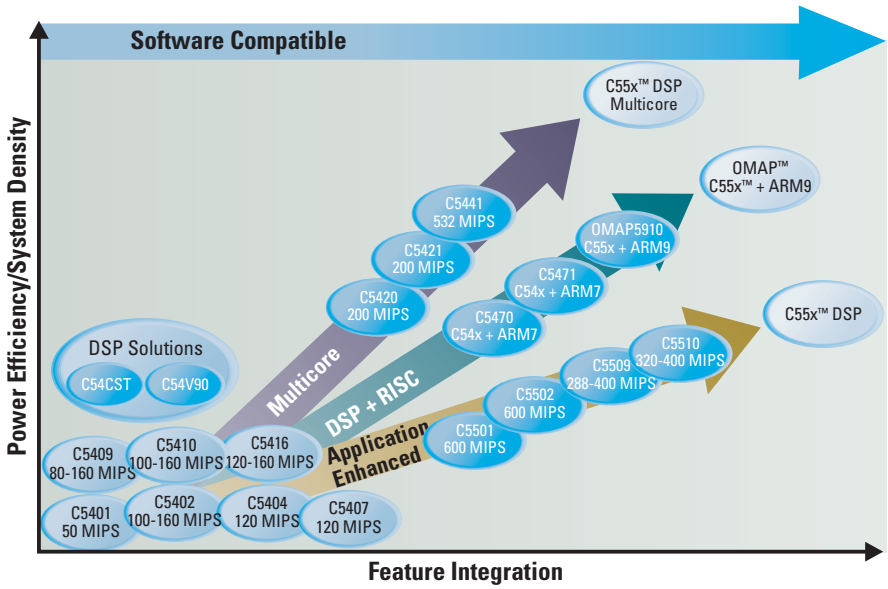
C5509 DSP – The Portable and Connected DSP

- 144-MHz/200-MHz clock rate
- 256-KB RAM, 64-KB ROM
- Three McBSPs, I²C, watchdog timer, general-purpose timers

New C5509 DSP Peripherals:

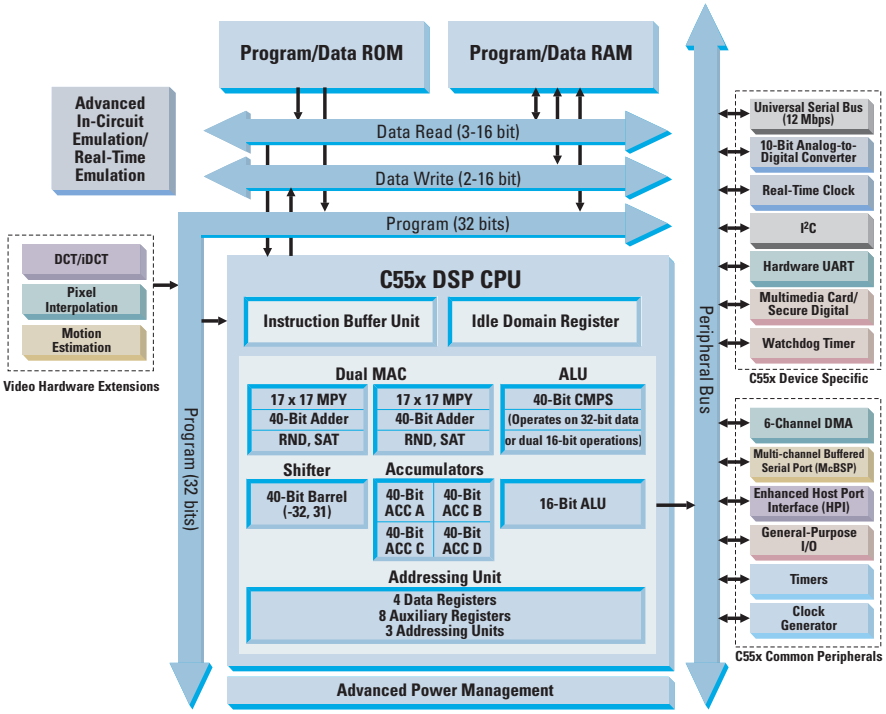
- USB 1.1 full-speed (12 Mbps), 10-bit ADC, real-time clock (RTC), glueless media interfaces to MMC and SD

TMS320C5000™ DSP Platform Roadmap



The C5000 DSPs span the applications spectrum with core performance extended to 300 MHz.

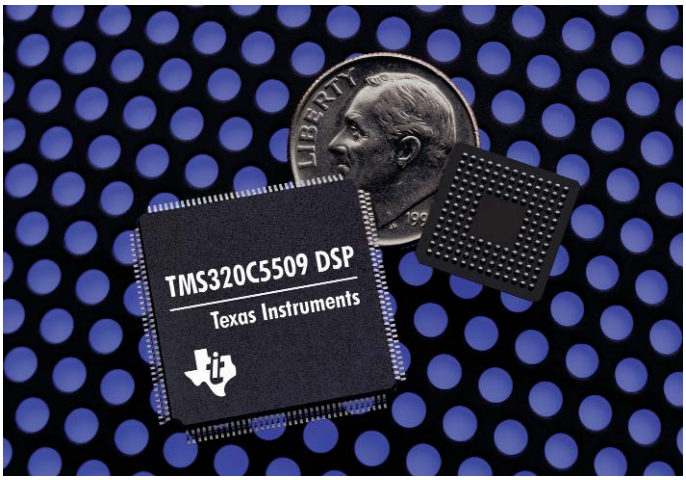
TMS320C55x™ DSP Generation Block Diagram



The C55x DSP core is driving digital applications ranging from portable Internet appliances to high-speed wireless to power-efficient infrastructure.

For the most updated information on TMS320C5000 DSPs, visit www.ti.com/c5000

MicroStar BGA™ Package Comparison



The ultra-small physical size (12 mm × 12 mm × 1.4 mm) of the C5000™ DSP MicroStar BGA (ball grid array) packaging can also help increase the performance per square inch for MIPS-intensive or space-constrained applications. The C5509 DSP is also pictured in a 144-pin LQFP.

TMS320C55x™ DSP GENERATION PRODUCT SPECIFICATION GUIDE

Part Number	RAM (Bytes)	ROM (Bytes)	Security	DAT/PRO (ADDR) (Words)	USB	ADC	UART	I²C	RTC	McBSP[!]	MMC/ SD	Voltage (V) Core	Voltage (V) I/O	COM	Timers[§]	Cycles (ns)	MIPS	Packaging	1 KU ($U.S.)[+]
TMS320**VC5510A**GGW2	320K	32K	–	8M	–	–	–	–	–	3	–	1.6	3.3	HPI16	2	5	400	240 BGA°	24.00
TMS320**VC5510A**GGW1	320K	32K	–	8M	–	–	–	–	–	3	–	1.6	3.3	HPI16	2	6.25	320	240 BGA°	20.50
TMS320**VC5510A**GGWA2[ᵅ]	320K	32K	–	8M	–	–	–	–	–	3	–	1.6	3.3	HPI16	2	5	400	240 BGA°	34.65
TMS320**VC5510A**GGWA1[ᵅ]	320K	32K	–	8M	–	–	–	–	–	3	–	1.6	3.3	HPI16	2	6.25	320	240 BGA°	27.80
TMS320**VC5509A**PGE2[¶]	256K	64K	Y[‡]	8M	Y	Y	–	Y	Y	3	Y	1.6	3.3	HPI16	2*	5	400	144 LQFP	20.50
TMS320**VC5509A**GHH2[¶]	256K	64K	Y[‡]	8M	Y	Y	–	Y	Y	3	Y	1.6	3.3	HPI16	2*	5	400	179 BGA°	20.50
TMS320**VC5509**PGE31	256K	64K	Y[‡]	8M	Y	Y	–	Y	Y	3	Y	1.6	3.3	HPI16	2*	6.9	288	144 LQFP	20.00
TMS320**VC5509**GHH31	256K	64K	Y[‡]	8M	Y	Y	–	Y	Y	3	Y	1.6	3.3	HPI16	2*	6.9	288	179 BGA°	20.00
TMS320**VC5502**PGF3[#ᵅ]	64K	32K	–	8M	–	–	Y	Y	–	3	–	1.26	3.3	HPI16/8	3*	3.3	600	176 LQFP	11.75
TMS320**VC5502**GGW3[#ᵅ]	64K	32K	–	8M	–	–	Y	Y	–	3	–	1.26	3.3	HPI16/8	3*	3.3	600	176 BGA°	11.75
TMS320**VC5502**PGF2[#ᵅ]	64K	32K	–	8M	–	–	Y	Y	–	3	–	1.26	3.3	HPI16/8	3*	5	400	176 LQFP	8.85
TMS320**VC5502**GZZ2[#ᵅ]	64K	32K	–	8M	–	–	Y	Y	–	3	–	1.26	3.3	HPI16/8	3*	5	400	201 BGA°	8.85
TMS320**VC5501**PGF3[#ᵅ]	32K	32K	–	8M	–	–	Y	Y	–	2	–	1.26	3.3	HPI16/8	3*	3.3	600	176 LQFP	6.50
TMS320**VC5501**GZZ3[#ᵅ]	32K	32K	–	8M	–	–	Y	Y	–	2	–	1.26	3.3	HPI16/8	3*	3.3	600	201 BGA°	6.50

Note: All devices include 6-channel DMA and software PLL.
New devices are listed in red.

[!] Multi-channel buffered serial port (McBSP)
° MicroStar BGA package
[‡] 8 Kword Secure ROM and JTAG disconnect option
[§] 3 = Two general-purpose timers and one 32-bit DSP/BIOS™ kernel counter, 2 = Two general-purpose timers
** Plus 1 additional programmable watchdog timer*
[ᵅ] Extended temperature device, –40 to 85°C case temperature operation
[¶] Initial experimental (TMX) devices available now. Qualified (TMS) units available in 4Q03.
[#] Initial experimental (TMX) devices available now. Qualified (TMS) units available in 1Q04.
[+] Prices are quoted per unit in U.S. dollars at 1 KU quantities. Prices represent year 2003 suggested resale pricing.
Note: Enhanced plastic and Military DSP versions are available for selected DSPs.

TMS320C54x™ DSP GENERATION, FIXED POINT

Power-Efficient Performance DSPs

Specifications

- 16-bit fixed-point DSPs
- Power dissipation as low as 60 mW for 100 MIPS
- Single- and multi-core products delivering 30–532 MIPS performance
- 1.2-, 1.8-, 2.5-, 3.3- and 5-V versions available
- Three power-down modes
- Integrated RAM and ROM configurations
- Auto-buffered serial port
- Multi-channel buffered serial port
- Host port interface
- Ultra-thin packaging (100-, 128-, 144- and 176-pin LQFPs; 144-, 176- and 169-pin MicroStar BGAs™)
- 6-channel DMA controller per core

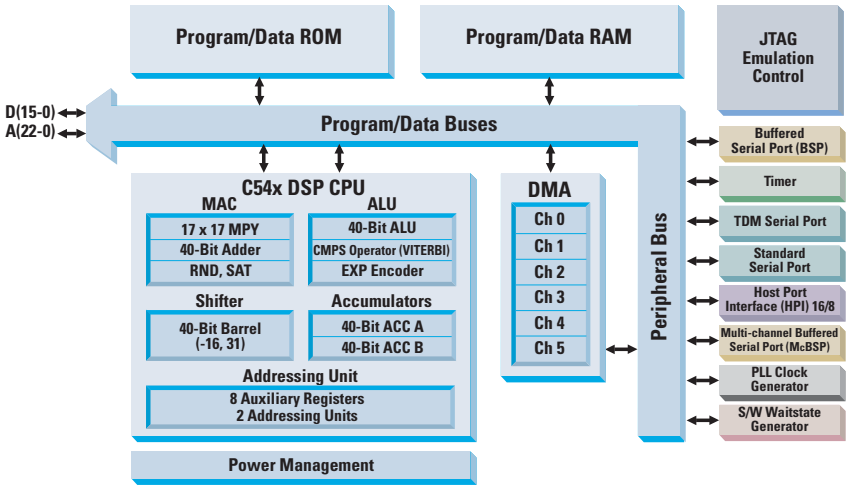
Applications

- Digital cellular communications
- Personal communications systems (PCS)
- Pagers
- Personal digital assistants
- Digital cordless communications
- Wireless data communications
- Networking
- Computer telephony
- Voice over packet
- Portable Internet audio
- Modems

Features

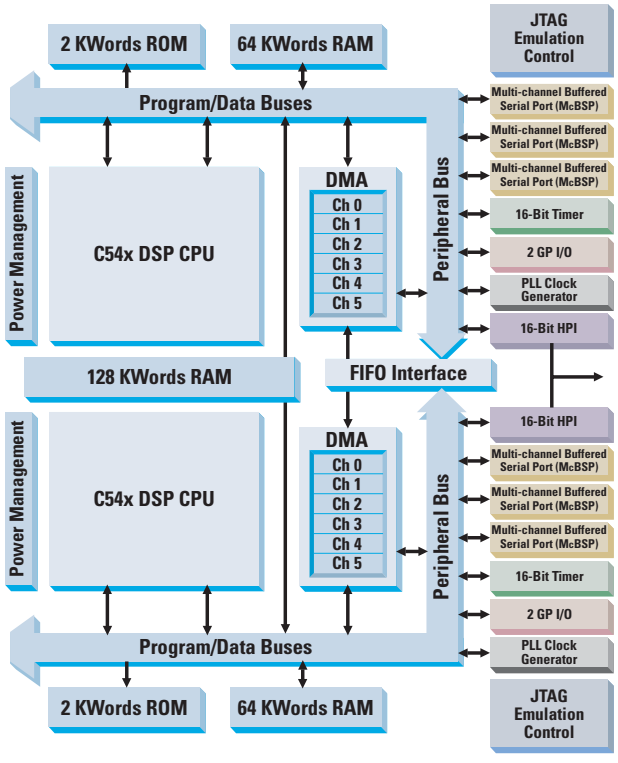
- Integrated Viterbi accelerator
- 40-bit adder and two 40-bit accumulators to support parallel instructions
- 40-bit ALU with a dual 16-bit configuration capability for dual one-cycle operations
- 17 × 17 multiplier allowing 16-bit signed or unsigned multiplication
- Four internal buses and dual address generators enable multiple program and data fetches and reduce memory bottleneck
- Single-cycle normalization and exponential encoding
- Eight auxiliary registers and a software stack enable advanced fixed-point DSP C compiler
- Power-down modes for battery-powered applications

TMS320C54x DSP Generation Block Diagram



This block diagram of the TMS320C54x DSP is a comprehensive diagram showing all peripheral options. C54x™ DSPs are optimized to meet the performance, cost and low-power needs of wireless and wireline communications systems as well as emerging applications like IP phones, VoP and portable applications.

TMS320C5421 Multicore DSP Block Diagram



The C5420 and C5421 DSPs are dual-core DSPs targeted at carrier-class voice and video end equipments. The C5441 DSP features four C54x DSP cores on a single piece of silicon, offering 532 MIPS and is targeted at high-channel-density solutions.

For the most updated information on TMS320C5000 DSPs, visit www.ti.com/c5000

TMS320C54x™ DSP GENERATION PRODUCT SPECIFICATION GUIDE

Part Number**	RAM (Bytes)	ROM (Bytes)	DAT/PRO (ADDR) (Bytes)	SER	Voltage (V) Core**	Voltage (V) I/O	COM	Timers	PLL	Cycles (ns)	MIPS	Packaging	1 KU ($U.S.)+
TMS320**VC5416**PGE160	256K	32K	128K/16M	3‡§	1.5	3.3	HPI 8/16	1	SW	6.25	160	144 LQFP	25.57
TMS320**VC5416**GGU160	256K	32K	128K/16M	3‡§	1.5	3.3	HPI 8/16	1	SW	6.25	160	144 BGA°	25.57
TMS320**VC5416**PGE120	256K	32K	128K/16M	3‡§	1.5	3.3	HPI 8/16	1	SW	8.33	120	144 LQFP	23.01
TMS320**VC5416**GGU120	256K	32K	128K/16M	3‡§	1.5	3.3	HPI 8/16	1	SW	8.33	120	144 BGA°	23.01
TMS320**VC5410A**PGE16	128K	32K	128K/16M	3‡§	1.6	3.3	HPI 8/16	1	SW	6.25	160	144 LQFP	15.30
TMS320**VC5410A**GGU16	128K	32K	128K/16M	3‡§	1.6	3.3	HPI 8/16	1	SW	6.25	160	144 BGA°	15.30
TMS320**VC5410A**PGE12	128K	32K	128K/16M	3‡§	1.5	3.3	HPI 8/16	1	SW	8.33	120	144 LQFP	13.81
TMS320**VC5410A**GGU12	128K	32K	128K/16M	3‡§	1.5	3.3	HPI 8/16	1	SW	8.33	120	144 BGA°	13.81
TMS320**VC5410**PGE100	128K	32K	128K/16M	3‡§	2.5	3.3	HPI 8	1	SW	10	100	144 LQFP	30.40
TMS320**VC5410**GGW100	128K	32K	128K/16M	3‡§	2.5	3.3	HPI 8	1	SW	10	100	176 BGA°	30.40
TMS320**VC5409A**PGE16	64K	32K	128K/16M	3‡§	1.6	3.3	HPI 8/16	1	SW	6.25	160	144 LQFP	12.73
TMS320**VC5409A**GGU16	64K	32K	128K/16M	3‡§	1.6	3.3	HPI 8/16	1	SW	6.25	160	144 BGA°	12.73
TMS320**VC5409A**PGE12	64K	32K	128K/16M	3‡§	1.5	3.3	HPI 8/16	1	SW	8.33	120	144 LQFP	11.15
TMS320**VC5409A**GGU12	64K	32K	128K/16M	3‡§	1.5	3.3	HPI 8/16	1	SW	8.33	120	144 BGA°	11.15
TMS320**UC5409**PGE-80	64K	32K	128K/16M	3‡§	1.8	1.8–3.6	HPI 8/16	1	SW	12.5	80	144 LQFP	13.66
TMS320**UC5409**GGU-80	64K	32K	128K/16M	3‡§	1.8	1.8–3.6	HPI 8/16	1	SW	12.5	80	144 BGA°	13.66
TMS320**VC5409**PGE100	64K	32K	128K/16M	3‡§	1.8	3.3	HPI 8/16	1	SW	10	100	144 LQFP	9.74
TMS320**VC5409**GGU100	64K	32K	128K/16M	3‡§	1.8	3.3	HPI 8/16	1	SW	10	100	144 BGA°	9.74
TMS320**VC5409**PGE-80	64K	32K	128K/16M	3‡§	1.8	3.3	HPI 8/16	1	SW	12.5	80	144 LQFP	7.93
TMS320**VC5409**GGU-80	64K	32K	128K/16M	3‡§	1.8	3.3	HPI 8/16	1	SW	12.5	80	144 BGA°	7.93
TMS320**VC5407**PGE	80K	256K	128K/16M	3‡§	1.6	3.3	HPI	1	SW	8.33	120	144 LQFP	9.50
TMS320**VC5407**GGU	80K	256K	128K/16M	3‡§	1.6	3.3	HPI	1	SW	8.33	120	144 BGA°	9.50
TMS320**VC5404**PGE	32K	128K	128K/16M	3‡§	1.6	3.3	HPI	1	SW	8.33	120	144 LQFP	8.00
TMS320**VC5404**GGU	32K	128K	128K/16M	3‡§	1.6	3.3	HPI	1	SW	8.33	120	144 LQFP	8.00
TMS320**VC5402A**PGE16	32K	32K	128K/16M	3‡§	1.6	3.3	HPI 8	1	SW	6.25	160	144 LQFP	10.13
TMS320**VC5402A**GGU16	32K	32K	128K/16M	3‡§	1.6	3.3	HPI 8	1	SW	6.25	160	144 BGA°	10.13
TMS320**UC5402**PGE-80	32K	8K	128K/2M	2‡§	1.8	1.8–3.6	HPI 8	2	SW	12.5	80	144 LQFP	6.79
TMS320**UC5402**GGU-80	32K	8K	128K/2M	2‡§	1.8	1.8–3.6	HPI 8	2	SW	12.5	80	144 BGA°	6.79
TMS320**VC5402**PGE100	32K	8K	128K/2M	2‡§	1.8	3.3	HPI 8	2	SW	10	100	144 LQFP	5.12
TMS320**VC5402**GGU100	32K	8K	128K/2M	2‡§	1.8	3.3	HPI 8	2	SW	10	100	144 BGA°	5.12
TMS320**VC5401**PGE50	16K	8K	128K/2M	2‡§	1.8	3.3	HPI 8	2	SW	20	50	144 LQFP	4.10
TMS320**VC5401**GGU50	16K	8K	128K/2M	2‡§	1.8	3.3	HPI 8	2	SW	20	50	144 BGA°	4.10
TMS320**VC549**PGE-120	64K	32K	128K/16M	3!*	2.5	3.3	HPI 8	1	SW	8.3	120	144 LQFP	31.93
TMS320**VC549**GGU-120	64K	32K	128K/16M	3!*	2.5	3.3	HPI 8	1	SW	8.3	120	144 BGA°	31.93
TMS320**VC549**PGE-100	64K	32K	128K/16M	3!*	2.5	3.3	HPI 8	1	SW	10	100	144 LQFP	26.64
TMS320**VC549**GGU-100	64K	32K	128K/16M	3!*	2.5	3.3	HPI 8	1	SW	10	100	144 BGA°	26.64
TMS320**LC549**PGE-80	64K	32K	128K/16M	3!*	3.3	3.3	HPI 8	1	SW	12.5	80	144 LQFP	24.19
TMS320**LC549**GGU-80	64K	32K	128K/16M	3!*	3.3	3.3	HPI 8	1	SW	12.5	80	144 BGA°	24.19
TMS320**C54CST**PGE†	80K	256K	128K/16M	2	1.5	3.3	HPI 8/16	2	SW	8.33	120	144 LQFP	8.25
TMS320**C54CST**GGU†	80K	256K	128K/16M	2	1.5	3.3	HPI 8/16	2	SW	8.33	120	144 BGA°	8.25
TMS320**C54V90**PGE	80K	256K	128K/16M	2	1.5	3.3	HPI 8/16	2	SW	8.5/17	118/59	144 LQFP	10.35
TMS320**C54V90**GGU	80K	256K	128K/16M	2	1.5	3.3	HPI 8/16	2	SW	8.5/17	118/59	144 BGA°	10.35

! 1 buffered serial port (C549 has 2) *** Nomenclature for core: C = 5 V; LC = 3.3 V; VC = 2.5 V or less; UC = 1.8 V or less*
** 1 TDM serial port* *‡ Multi-channel buffered serial port (McBSP)* *§ 6-channel DMA per core* *° MicroStar BGA™ package*
+ Prices are quoted per unit in U.S. dollars at 1 KU quantities. Prices represent year 2003 suggested resale pricing.
† Client side telephony (CST) software bundle information on page 7. *Note: Enhanced plastic and Military DSP versions are available for selected DSPs.*

MULTICORE DSP PRODUCT SPECIFICATION GUIDE

Part Number**	RAM (Bytes)	ROM (Bytes)	DAT/PRO (ADDR) (Bytes)	SER	Voltage (V) Core**	Voltage (V) I/O	COM	Timers	PLL	Cycles (ns)	MIPS	Packaging	1 KU ($U.S.)+
TMS320**VC5441**PGF†	1280K	–	128K/512K	12‡§	1.6	3.3	HPI 16	4	SW	7.5	532	176 LQFP	112.09
TMS320**VC5441**GGU†	1280K	–	128K/512K	12‡§	1.6	3.3	HPI 16	4	SW	7.5	532	169 BGA	112.09
TMS320**VC5421**PGE200†	512K	8K	128K/512K	6‡§	1.8	3.3	HPI 16	2	SW	10	200	144 LQFP	59.07
TMS320**VC5421**GGU200†	512K	8K	128K/512K	6‡§	1.8	3.3	HPI 16	2	SW	10	200	144 BGA	59.07
TMS320**VC5420**PGE200†°	400K	–	128K/512K	6‡§	1.8	3.3	HPI 16	2	SW	10	200	144 LQFP	57.66
TMS320**VC5420**GGU200†°	400K	–	128K/512K	6‡§	1.8	3.3	HPI 16	2	SW	10	200	144 BGA	57.66
TMS320**C5420**PGEA200†ᵅ	400K	–	128K/512K	6‡§	1.8	3.3	HPI 16	2	SW	10	200	144 LQFP	74.96
TMS320**C5420**GGUA200†ᵅ	400K	–	128K/512K	6‡§	1.8	3.3	HPI 16	2	SW	10	200	144 BGA	74.96

° Internal bootloader not available on VC5420 DSP *‡ Multi-channel buffered serial port (McBSP)* *§ 6-channel DMA per core* *New devices are listed in red.*
† Multicore devices (VC542x = 2; VC544x = 4) *** Nomenclature for core: C = 5 V; LC = 3.3 V; VC = 2.5 V or less; UC = 1.8 V or less*
ᵅ Extended temperature device, –40 to 100°C case temperature operation.
+ Prices are quoted per unit in U.S. dollars at 1 KU quantities. Prices represent year 2003 suggested resale pricing.
Note: Enhanced plastic and Military DSP versions are available for selected DSPs.

TMS320C5000™ DSP + RISC, FIXED POINT

System-Level DSPs

Applications:

- Internet appliances
- Enhanced gaming
- Webpad
- Point-of-sale
- Medical devices
- Industry-specific PDAs
- Telematics
- Digital media processing
- Security
- Software-defined radio

Features:

OMAP5910 dual-core processor includes both:

150-MHz TI-enhanced ARM925 microprocessor:

- 16-KB instruction cache and 8-KB data cache
- Data and instruction MMUs
- 32-bit and 16-bit instruction sets

150-MHz TMS320C55x™ DSP core with:

- 24-KB instruction cache
- 160-KB SRAM
- Hardware accelerators for video algorithms

Peripherals and on-chip resources:

- 192-KB shared SRAM
- Two 16-bit memory interfaces for SDRAM and Flash
- Nine-channel system DMA controller
- LCD controller
- USB 1.1 host and client
- MMC/SD card interface
- Seven serial ports plus three UARTs
- Nine timers
- Keyboard interface
- Small, 289-pin, 12 mm × 12 mm (GZG) or 19 mm × 19 mm (GDY) MicroStar BGA™ package options
- Typical active power consumption under 250 mW

OMAP5910 Processor Supports:

- Microsoft® Windows™ CE
- Linux®
- Accelerated Technologies Nucleus™
- WindRiver Systems VxWorks™
- Texas Instruments DSP/BIOS™ kernel
- And many more

EMBEDDED OMAP™ PROCESSOR: OMAP5910

Addressing the Needs of Next-Generation Embedded Designers

Sampling today, the dual-core OMAP5910 processor integrates a TMS320C55x™ DSP core with a TI-enhanced ARM925 on a single chip for the optimal combination of application performance and low power consumption. This unique architecture offers an attractive solution to both DSP and ARM developers, by providing the low-power, real-time signal processing capabilities of a DSP coupled with the command and control functionality of an ARM.

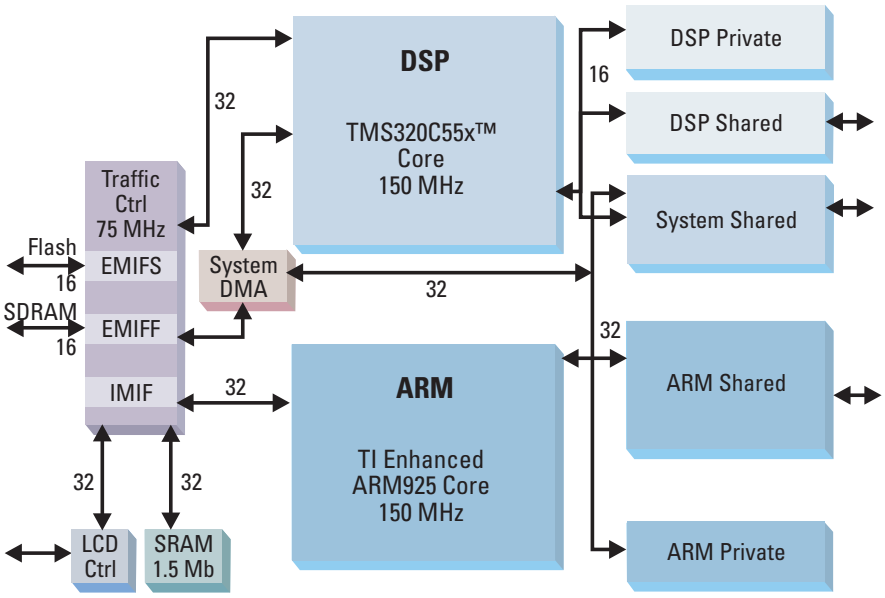
TI's software development support, OMAP Technology Centers, OMAP Developer's Network, and third-party tools provide a user-friendly software development ecosystem. The OMAP5910 processor is ideal for designers working with devices that require embedded applications processing in a connected environment.

Familiar Development Environment Speeds Design Cycle

The OMAP5910 processor enables embedded developers to program using familiar development environments by supporting leading operating systems such as Microsoft® Windows™ CE, Linux®, Accelerated Technology's Nucleus™, WindRiver's VxWorks™ and TI's DSP/BIOS™ real-time scalable kernel.

This open development environment makes it possible for designers to deliver innovative products to the market faster, utilizing familiar tools, a standard application programming interface (API) and a seamless interface to the DSP through an optimized interprocessor communication mechanism. The built-in interprocessor communication mechanism eliminates the need for developers to program the RISC and DSP independently resulting in reduced programming efforts.

OMAP5910 Peripheral Block Diagram



OMAP5910 processor diagram with ARM925 and C55x™ DSP cores and peripherals.

For the most updated information on OMAP processors, visit www.omap.com

TMS320C5000™ DSP + RISC, FIXED POINT (CONTINUED)

Software and Tools

To aid you in developing your application with an OMAP5910 processor, the following development tools and software are available:

- The Innovator™ Development Kit for the OMAP™ platform is a modular development platform that supports multiple operating systems allowing maximum hardware and software design flexibility.
- Code Composer Studio™ IDE for the OMAP platform: integrates all host and target tools in a unified environment, which simplifies DSP configuration and optimization.
- A growing base of TI DSP-based software modules from third parties including over 70 eXpressDSP™-compliant, interoperable algorithms.

Support

OMAP Technology Centers (OTCs) are a network of third parties with extensive development experience on the OMAP platform. They have system-level expertise in operating systems, software development and hardware integration. OTCs work with customers to develop a custom integration package. Additionally, the OMAP Developer's Network includes a number of independent companies and consultants that develop applications for the OMAP platform.

Samples and Availability

The OMAP5910 processor is in volume production in the GZG package with volume production in the GDY package scheduled for September 2003. Please contact an authorized TI distributor for further information.

OMAP5910 PROCESSOR TECHNICAL DOCUMENTATION

An on-line, downloadable literature kit is available at **www.omap.com/rd/omap5910** and contains the following:

Technical Documentation

- OMAP5910 Data Manual (SPRS197)
- OMAP5910 Technical Reference (SPRU602)
- OMAP5910 Silicon Errata (SPRZ016)
- System Initialization for the OMAP5910 Device (SPRA828)
- Configuring CCStudio for OMAP Debugging (SPRA807)
- OMAP ARM Data Throughput Analysis (SPRA893)
- OMAP5910 ARM Program Throughput Analysis (SPRA891)
- OMAP System DMA Throughput Analysis (SPRA883)
- OMAP5910 DSP External Memory Performance (SPRA888)

Block Diagrams

- OMAP5910 Device Block Diagram
- OMAP5910 System Block Diagram

White Papers

- Multimedia Technologies on Terminals Based on OMAP Platform
- Enabling the Killer Application
- Bringing Streaming Video to Wireless Handheld Devices
- Programming Considerations for Developing Next-Generation Wireless Embedded Applications
- Reducing Security Threats to 2.5G and 3G Wireless Applications

OMAP5910 PROCESSOR ON-LINE TRAINING

OMAP5910 Processor Product Overview	**www.ti.com/omap5910**
OMAP Application Development Using DSP/BIOS™ Bridge for Symbian OS	**www.ti.com/omapsymbian**
An Efficient Hardware and Software Architecture for Dual-Core OMAP Processor Systems	**www.ti.com/omap5910**
Software Development for OMAP Processors: High-Level Operating Systems and Integration of DSP Algorithms	**www.ti.com/omapdevelopers**
Fast and Flexible Development for OMAP Processors Using the Innovator™ Development Kit	**www.ti.com/omapinnovator**

OMAP PROCESSOR PRODUCT SPECIFICATION GUIDE

Part Number	CPU	Frequency (MHz)	RAM (Bytes)	ROM (Bytes)	External Memory I/F	DMA	Timers	Serial Ports	Misc	Voltage (V) Core	Voltage (V) I/O	Packaging	1 KU ($U.S.)+
OMAP**5910**JGZG2	C55x	150	160K	32K	SDRAM*, ASYNC*	6 Ch	3 GP, 1 WDT	2 McBSP*, 2 MCSI*	3 Video HW Accel, 14 GPIO*, MMU	1.6	1.8/ 2.75/3.3§	289 BGA°, 12 × 12 mm	28.80
	ARM9TDMI	150	192K†		SDRAM, ASYNC	9 Ch	1 OS, 3 GP, 1 WDT	3 Host or 2 Host/ 1 Function USB 1.1, 1 McBSP, µwire, I²C, HDQ, 3 UARTs (1 IrDA)†	LCD, Camera, MMC/SD, RTC, Keypad, 10 GPIO, MMU				
OMAP**5910**JGDY2	C55x	150	160K	32K	SDRAM*, ASYNC*	6 Ch	3 GP, 1 WDT	2 McBSP*, 2 MCSI*	3 Video HW Accel, 14 GPIO*, MMU	1.6	1.8/ 2.75/3.3§	289 BGA°, 19 × 19 mm	32.00
	ARM9TDMI	150	192K†		SDRAM, ASYNC	9 Ch	1 OS, 3 GP, 1 WDT	3 Host or 2 Host/ 1 Function USB 1.1, 1 McBSP, µwire, I²C, HDQ, 3 UARTs (1 IrDA)†	LCD, Camera, MMC/SD, RTC, Keypad, 10 GPIO, MMU				

** Shared with the ARM9TDMI.* *† Shared with the C55x™ CPU.* *§ External memory interfaces may use 1.8-, 2.75- or 3.3-V nominal.*
° MicroStar BGA™ package options – GZG: 12 × 12 mm (OMAP5910JGZG2) or GDY: 19 × 19 mm (OMAP5910JGDY2)
+ Prices are quoted per unit in U.S. dollars at 1 KU quantities. Prices represent year 2003 suggested resale pricing.
Note: Enhanced plastic and Military DSP versions are available for selected DSPs.

TMS320C5000™ DSP + RISC, FIXED POINT (CONTINUED)

Specifications

- Dual CPU processor integrating a TMS320C54x™ DSP core and an ARM7TDMI™ RISC
- 1.8-volt core and 3.3-volt peripherals
- JTAG scan-based emulation of DSP and RISC cores
- 257-ball MicroStar BGA™ package

Features

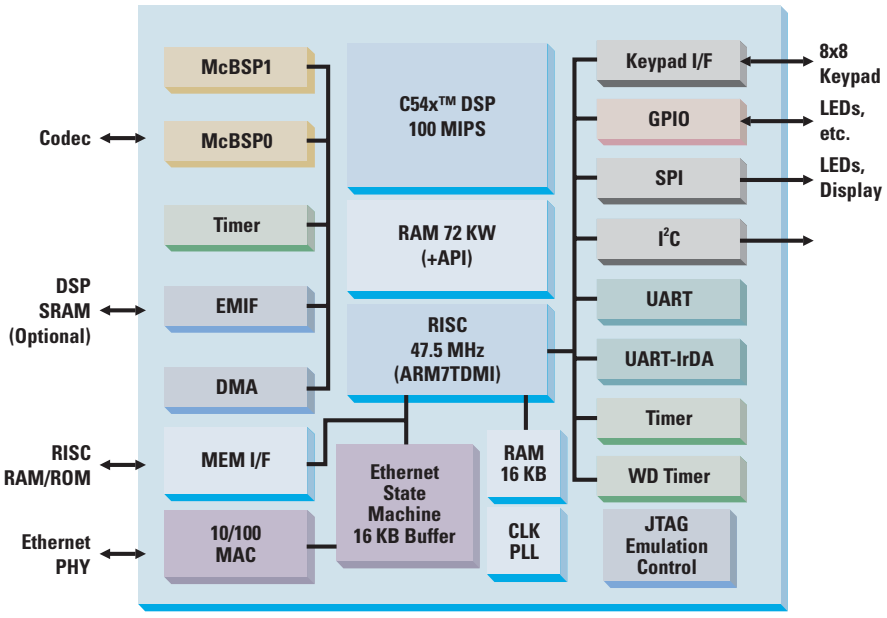
TMS320C54x DSP core subsystem

- 100-MIPS operation
- 72-Kwords RAM
- Two multi-channel buffered serial ports (McBSPs)
- Direct memory access (DMA) controller
- Phase-locked loop
- External memory interface
- ARM port interface (API)

ARM7TDMI RISC core subsystem

- 47.5-MHz operation
- 16-KByte zero-wait-state SRAM
- Memory interface (SDRAM, SRAM, ROM, Flash)
- Single-port 10/100 Base-T Ethernet interface (C5471 DSP only)
- 36 general-purpose I/O (ARMI/O)
- Two UARTs (one IrDA)
- Serial peripheral interface (SPI)
- I²C interface
- Three timers (one watchdog)
- Phase-locked loop

TMS320C5470/5471 System-Level DSP Block Diagram



The system-level DSPs integrate C54x™ DSP with an ARM7 RISC and the most widely-used embedded operating systems. The C5470/C5471 DSPs deliver DSP-enabled performance for low-cost connected applications such as wireless data, smart pen pads, text-to-speech, voice recognition command control, access point controller, networked security, industrial control and emergency radio.

TMS320C5000 DSP + RISC PRODUCT SPECIFICATION GUIDE

Part Number**	CPU	Frequency (MHz)	RAM (Bytes)	ROM (KBytes)	External Memory Interface	DMA	Timers	Serial Ports	Ethernet/ HPNA	MISC	Core Supply Voltage (V)	I/O Supply Voltage (V)	1 KU ($U.S.)+
TMS320**VC5470**GHK°	C54x	100	144K (72K × 16 bits)	N/A	ASYNC	6 Ch	1	2 McBSPs	–	PLL, API	1.8	3.3	11.53
	ARM7TDMI	47.5	16K (4K × 32 bits)	N/A	SDRAM, ASYNC		2	1 I²C, 1 SPI, 2 UARTs (1 IrDA)	–	PLL, 36 GPIO, WD	1.8	3.3	
TMS320**VC5470**GHKA°¤	C54x	100	144K (72K × 16 bits)	N/A	ASYNC	6 Ch	1	2 McBSPs	–	PLL, API	1.8	3.3	13.50
	ARM7TDMI	47.5	16K (4K × 32 bits)	N/A	SDRAM, ASYNC		2	1 I²C, 1 SPI, 2 UARTs (1 IrDA)	–	PLL, 36 GPIO, WD	1.8	3.3	
TMS320**VC5471**GHK°	C54x	100	144K (72K × 16 bits)	N/A	ASYNC	6 Ch	1	2 McBSPs	–	PLL, API	1.8	3.3	12.56
	ARM7TDMI	47.5	16K (4K × 32 bits)	N/A	SDRAM, ASYNC		2	1 I²C, 1 SPI, 2 UARTs (1 IrDA)	10/100 MAC	PLL, 36 GPIO, WD	1.8	3.3	
TMS320**VC5471**GHKA°¤	C54x	100	144K (72K × 16 bits)	N/A	ASYNC	6 Ch	1	2 McBSPs	–	PLL, API	1.8	3.3	14.63
	ARM7TDMI	47.5	16K (4K × 32 bits)	N/A	SDRAM, ASYNC		2	1 I²C, 1 SPI, 2 UARTs (1 IrDA)	10/100 MAC	PLL, 36 GPIO, WD	1.8	3.3	

° 257-ball MicroStar BGA package.
¤ Extended temperature device, –40 to 85°C case temperature operation.
+ Prices are quoted per unit in U.S. dollars at 1 KU quantities. Prices represent year 2003 suggested resale pricing.
Note: Enhanced plastic and Military DSP versions are available for selected DSPs.

New devices are listed in red.

For the most updated information on TMS320C5000 DSPs, visit www.ti.com/c5000

TMS320C5000™ DSP PLATFORM TOOLS, SOFTWARE AND SUPPORT

C5000™ DSP PLATFORM HARDWARE DEVELOPMENT TOOLS

Description	Part #	$U.S.+
C5000™ DSP STARTER KITS (DSKs)		
TMS320C54x™ DSP Starter Kit (DSK), TMS320C5416 DSP based*	TMDSDSK5416 (U.S. part number) TMDSDSK5416-0E (European part number)	395
TMS320C55x™ DSP Starter Kit (DSK), TMS320C5510 DSP based*	TMDSDSK5510 (U.S. part number) TMDSDSK5510-0E (European part number)	395
Fingerprint Authentication Development Tool	TMDSFDCFPC10	245
OMAP™ DEVELOPMENT KIT		
Deluxe Innovator™ Development Kit for OMAP†	INNOVATOREVMV1	2,995
Innovator Development Kit demo	**www.dspvillage.com/multimedia/innovator.ram**	Free
JTAG EMULATORS		
XDS560™ PCI-Based High-Performance JTAG Emulator	TMDXEMU560	3,995
XDS510PP-Plus – Parallel Port Emulator for Windows	TMDSEMUPP (U.S. part number) TMDSEMUPP-0E (European part number)	1,500
XDS510™ USB-Based Emulator for Windows	TMDSEMUUSB	1,995

+ Prices are quoted in U.S. dollars and represent year 2003 suggested resale pricing. *New tools are listed in red.*
** Includes a DSK version of Code Composer Studio™ Development Tools restricted for use only with the DSP target board included in the kit, power supply and cables.*
Please see the features supported by platform matrix on page 68 for more details.

C5000 DSP PLATFORM SOFTWARE DEVELOPMENT TOOLS

Description	Part #	$U.S.+
C5000 DSP Code Composer Studio Development Tools* bundled with Annual S/W Subscription Supports C54x™, C55x™ and C5000 multicore DSPs	TMDSCCS5000-1	3,595
C5000 DSP Code Composer Studio Development Tools Annual S/W Subscription	TMDSSUB5000	600
Code Composer Studio 90-Day Free Evaluation Tools‡ for OMAP CD-ROM	SPRC049	**Free**
Code Composer Studio Development Tools for the OMAP Platform* bundled with Annual S/W Subscription Supports OMAP devices, C54x, C55x, ARM7, ARM9, C5000 DSP + RISC and multicore DSPs	TMDSCCSOMAP-1	5,400
Code Composer Studio Development Tools for OMAP Platform Annual S/W Subscription	TMDSSUBOMAP	900
Essential Guide to Getting Started with DSP CD-ROM Includes C5000 Code Composer Studio 90-Day Free Evaluation Tools‡	SPRC119 **(www.ti.com/freetools)**	**Free**
C54x™ DSP Software Library	SPRC099	**Free**
C55x™ DSP Software Library	SPRC100	**Free**
C55x DSP Imaging Software Library	SPRC101	**Free**

+ Prices are quoted in U.S. dollars and represent year 2003 suggested resale pricing.
** Includes Code Composer Studio Development Tools, DSP/BIOS™ kernel, code generation tools (C/C++/assembler/linker), XDS510™ and XDS560™ device drivers (emulation software), RTDX™, and simulators. Please see the features supported by platform matrix on page 68 for more details.*
‡ Includes full-featured Code Composer Studio Development Tools, code generation tools (C compiler/assembler/linker) and simulator all limited to 90 days.

C5000 DSP PLATFORM TOOLS DOCUMENTATION

Software Reference Guides	Web Search Literature #
TMS320C55x DSP Programmer's Guide	SPRU376
TMS320C55x DSP Optimizing C/C++ Compiler User's Guide	SPRU281
TMS320C55x DSP Assembly Language Tools User's Guide	SPRU280
TMS320C54x DSP Instruction Set Simulator Technical Overview	SPRU598
TMS320C54x DSP Optimizing C/C++ Compiler User's Guide	SPRU103
Code Composer Studio Getting Started Guide	SPRU509
TMS320™ DSP/BIOS™ User's Guide	SPRU423
TMS320C5000 DSP/BIOS Application Programming Interface (API) Reference Guide	SPRU404

Software Reference Guides (Cont'd)	Web Search Literature #
TMS320C54x DSP Assembly Language Tools User's Guide	SPRU102
OMAP Instruction Set Simulator Technical Overview	SPRU601
TMS320C55x DSP Instruction Set Simulator Technical Overview	SPRU599
TMS320C54x DSP Chip Support Library API User's Guide	SPRU420
TMS320C55x DSP Chip Support Library API User's Guide	SPRU433
TMS320C55x DSP CSL USB Programmer's Reference	SPRU511
Product Bulletin	
XDS560 Emulator Product Bulletin	SPRB148

Check the TI web site for a complete listing of technical documentation including application notes.

TMS320C5000™ DSP LITERATURE AND RELATED TECHNICAL DOCUMENTATION

Data Sheets	Web Search Literature #
TMS320C54x/LC54x/VC54x DSP Data Sheet	SPRS039
TMS320VC5401 DSP Data Sheet	SPRS153
TMS320VC5402 DSP Data Sheet	SPRS079
TMS320UC5402 DSP Data Sheet	SPRS096
TMS320VC5404/VC5407 DSP Data Sheet	SPRS007
TMS320VC5409 DSP Data Sheet	SPRS082
TMS320UC5409 DSP Data Sheet	SPRS101
TMS320VC5409A DSP Data Sheet	SPRS140
TMS320VC5410 DSP Data Sheet	SPRS075
TMS320VC5410A DSP Data Sheet	SPRS139
TMS320VC5416 DSP Data Sheet	SPRS095
TMS320VC5420 DSP Data Sheet	SPRS080
TMS320VC5421 DSP Data Sheet	SPRS098
TMS320VC5441 DSP Data Sheet	SPRS122
TMS320C5470 DSP Data Sheet	SPRS017
TMS320C5471 DSP Data Sheet	SPRS180
TMS320C54CST DSP Data Sheet	SPRS187
TMS320VC5502 DSP Data Sheet	SPRS166
TMS320VC5509 DSP Data Sheet	SPRS163
TMS320VC5510 DSP Data Sheet	SPRS076
OMAP5910 Processor Data Sheet	SPRS197
OMAP5910 Processor Silicon Errata	SPRZ016
Technical Briefs and Overviews	
TMS320C55x™ DSP Technical Overview	SPRU393
TMS320C55x DSP Functional Overview	SPRU312

Hardware User's Guides	Web Search Literature #
TMS320C54x™ DSP CPU & Peripherals, Volume 1	SPRU131
TMS320C54x DSP Mnemonic Instruction Set, Volume 2	SPRU172
TMS320C54x DSP Algebraic Instruction Set, Volume 3	SPRU179
TMS320C54x DSP Enhanced Peripherals Guide, Volume 5	SPRU302
TMS320C55x DSP CPU Reference Guide	SPRU371
TMS320C55x DSP Algebraic Instruction Set Reference Guide	SPRU375
TMS320C55x DSP Mnemonic Instruction Set Reference Guide	SPRU374
TMS320C55x DSP Peripherals Reference Guide	SPRU317
TMS320VC547x DSP CPU and Peripherals Reference Guide	SPRU038
OMAP5910 Processor Technical Reference	SPRU602
TMS320C55x DSP Peripherals Reference Guide	SPRU317
Software User's Guides	
TMS320C54x DSP Application Guide, Volume 4	SPRU173
TMS320C55x DSP Library (DSPLIB) Programmer's Reference	SPRU422
TMS320C54x-to-TMS320C55x DSP Code Migration Reference Guide	SPRU429
TMS320C55x DSP Image/Video Processing Library Programmer's Reference	SPRU037
TMS320C54x DSP Library Programmer's Reference	SPRU518
Product Bulletins	
Client-Side Telephony Solution Product Bulletin	SPRT228
Embedded V.90 Modem Solution Product Bulletin	SPRT226
Application Notes	
System Initialization for the OMAP5910 Device	SPRA828
Configuring Code Composer Studio™ for OMAP Debugging	SPRA807
White Paper	
The Future of DSP	SPRY049

Check the TI web site for a complete listing of technical documentation including application notes.

C5000™ DSP FOUNDATION SOFTWARE TECHNICAL DOCUMENTATION

Foundation Software Reference Guides	Web Search Literature #
TMS320C54x DSP Chip Support Library API User's Guide	SPRU420
TMS320C54x DSP Library Programmer's Reference	SPRU518
TMS320C55x DSP Chip Support Library API User's Guide	SPRU433
TMS320C55x DSP CSL USB Programmer's Reference Guide	SPRU511

Foundation Software Reference Guides (Cont'd)	Web Search Literature #
TMS320C55x DSP Library Programmer's Reference	SPRU422
TMS320C55x DSP Image/Video Processing Library Programmer's Reference	SPRU037

Check the TI web site for a complete listing of technical documentation including application notes.

TMS320™ DSP ALGORITHM STANDARD TECHNICAL DOCUMENTATION

Software Reference Guides	Web Search Literature #
TMS320 DSP Algorithm Standard Rules and Guidelines	SPRU352
TMS320 DSP Algorithm Standard API Reference	SPRU360
TMS320 DSP Algorithm Standard Demonstration Application	SPRU361
TMS320 DSP Algorithm Standard Developer's Guide	SPRU424

Application Notes	Web Search Literature #
A Case Study in DSP Systems Integration – The TI 3rd Party Vocoder Demonstration	SPRA734
Making DSP Algorithms Compliant with the TMS320 DSP Algorithm Standard	SPRA579
The TMS320 DSP Algorithm Standard White Paper	SPRA581
Using the TMS320 DSP Algorithm Standard in a Dynamic DSP System	SPRA580
Using the TMS320 DSP Algorithm Standard in a Static DSP System	SPRA577

Check the TI web site for a complete listing of technical documentation including application notes.

C5000 DSP PLATFORM PRODUCT SUPPORT

C5000 DSP Application Notes	**www.ti.com/c5000appnotes**
C5000 DSP Benchmarks	**www.ti.com/c5000bench**
C5000 DSP Foundation Software	**www.ti.com/c5000dsplib**

For the most updated information on TMS320C5000 DSPs, visit www.ti.com/c5000

DATA CONVERTERS, DSP CODECS AND POWER MANAGEMENT PRODUCTS FOR THE TMS320C5000™ DSP PLATFORM

TI's Data Converter products are optimized for easy interface to TMS320™ DSPs.

Our Analog-to-Digital and Digital-to-Analog converters cover applications such as:

- Audio
- Graphics
- Communications
- Modems
- Cellular phones
- Video capture and digital imaging
- Industrial control and disk-drive servo-loop control
- Automotive
- Electronic instrumentation
- Digital audio
- Any DSP-based system

Codec Products

- TMS320 DSP-optimized codecs
- Suitable for audio, modem, ADSL and video applications (among others)

Power Management Products

Low Dropout Regulators (LDOs)

- Dual LDOs for available for split-rail C5000™ DSPs
- Feature-rich products available offering Reset, Power Good pin, and ultra-low quiescent current
- Small SOT23 packaging available

DC/DC Boost Converters

- Up to 90% efficiency – lengthens battery life
- Space-saving TSSOP PowerPAD™ packaging

Switching Regulators

- DC/DC controllers for high flexibility and excellent value
- SWIFT™ DC/DC converters for simple design and fewer components

Supply Voltage Supervisors (SVS)

- Designed to protect the DSP and maintain data integrity
- Small packaging

Plug-In Power Solutions

- Complete power solution for multiple C5000 DSPs
- EMI and reliability tested

ANALOG-TO-DIGITAL CONVERTERS FOR THE TMS320C5000 DSP PLATFORM

Model	Res. (Bits)	Sampling Rate (kSPS)	# Input Chan.	Input Voltage (V)	Power (mW/V)	Price Start 1 KU ($U.S.)+
ADS1240	24	0.015	2 Diff/4 SE	PGA (1-128), ±2.5	0.6 mW/+2.7/+5V	3.64
ADS1241	24	0.015	4 Diff/8 SE	PGA (1-128), ±2.5	0.6 mW/+2.7/+5V	4.00
ADS1216	24	0.78	4 Diff/8 SE	PGA (1-128), ±2.5	0.6 mW/+2.7/+5V	6.54
ADS1251	24	20	1 Diff	Vref, ±5	5/+5	5.31
ADS1252	24	41	1 Diff	Vref, ±5	40/+5	5.31
ADS1253	24	20	4 Diff	Vref, ±5	5/+5	6.38
ADS1254	24	20	4 Diff	Vref, ±5	3/+5 and +1.8, +5	6.38

Model	Res. (Bits)	Sampling Rate (kSPS)	# Input Chan.	# ADC/ Chan.	Input Voltage (V)	Power (mW/V)	Price Start 1 KU ($U.S.)+
ADS8320	16	100	1 Diff	1	Vref	1.8 mW/+2.7/+5 V	6.33
ADS8321	16	100	1 Diff	1	Vref	4.5 mW/+5 V	6.33
TLC4541	16	200	1 SE	1	Vref	17.5 mW/+5 V	7.00
TLC4545	16	200	1 pDiff	1	Vref	17.5 mW/+5 V	7.00
ADS8364	16	500	6 Diff	6	±2.5V @ +2.5	413 mW/+5 V	17.21
ADS8324	14	50	1 Diff	1	Vref	2.5 mW/+1.8/+3.6 V	3.95
TLC3545	14	200	1 pDiff	1	Vref	17.5 mW/+5 V	4.75
TLC3541	14	200	1 SE	1	Vref	17.5 mW/+5 V	4.75
TLC3544	14	200	4 SE	1	4	29 mW/+5 V	7.09
TLC3548	14	200	8 SE	1	4	29 mW/+5 V	7.58
TLC3574	14	200	4 SE	1	±10	30 mW/+5 V	7.50
TLC3578	14	200	8 SE	1	±10	30 mW/+5 V	9.36
TLV2548	12	200	8 SE	1	+2,4	4.5 mW/+2.7/+5 V	4.71
TLV2541	12	200	1SE	1	Vref	2.3 mW/+2.7/+5 V	3.54
TLV2542	12	200	2SE	1	Vref	2.3 mW/+2.7/+5 V	3.54
TLV2544	12	200	4 SE	1	+2,4	4.5 mW/+2.7/+5 V	4.30
TLV2545	12	200	1 SE	1	Vref	2.3 mW/+2.7/+5 V	3.53
TLV2553	12	200	11 SE	1	Vref	2.2 mW/+2.7/+5 V	4.05
TLV2556	12	200	11 SE	1	Vref	2.2 mW/+2.7/+5 V	4.20
TLC2574	12	200	4 SE	1	+2,4	4.5 mW/+2.7/+5 V	4.63
TLC2578	12	200	8 SE	1	Vref	2.3 mW/+2.7/+5 V	5.55
ADS7841	12	200	2 Diff/4 SE	1	Vref	3.5 mW/+2.7/+5 V	2.53
ADS7844	12	200	4 Diff/8 SE	1	Vref	3.5 mW/+2.7/+5 V	2.94
TLC2551	12	400	1 SE	1	Vref	15 mW/+5 V	3.74
TLC2552	12	400	2 SE	1	Vref	15 mW/+5 V	3.74
TLC2555	12	400	1 SE	1	Vref	15 mW/+5 V	3.74
TLC2554	12	400	4 SE	1	+4	33 mW/+5 V	5.06
TLC2558	12	400	8 SE	1	+4	33 mW/+5 V	5.56
TLC1514	10	400	4 SE/3 PE	1	Vref	22 mW/+5 V	2.78
TLC1518	10	400	8 SE/7 PE	1	Vref	22 mW/+5 V	3.29
TLV1504	10	200	4 SE/3 PE	1	Vref	2.7 mW/+2.7 V	3.26
TLV1508	10	200	8 SE/7 PE	1	Vref	2.7 mW/+2.7 V	3.36
TLV1570	10	1250	8 SE	1	Vref	8 mW/+2.7 V	2.73
TLV1571	10	1250	1 SE	1	Vref	12 mW/+2.7 V	2.64
TLV1572	10	1250	1 SE	1	Vref	12 mW/+2.7 V	2.38
TLV1578	10	1250	8 SE	1	Vref	30 mW/+2.7 V	2.75
AFE8201	12	80,000	1 Diff	1	Vref	450 mW/+3 V	25.00

Model	Res. (Bits)	Sampling Rate (kSPS)	# Input Chan.	# ADC/ Chan.	Input Voltage (V)	Power (mW/V)	Price Start 1 KU ($U.S.)+
THS1206	12	6000	2 Diff/4 SE	P12	+2.5	216 mW/+5 V	13.16
THS1207	12	6000	2 Diff/4 SE	P12	+2.5	186 mW/+5 V	12.13
THS12082	12	8000	1 Diff/2 SE	P12	+2.5	186 mW/+5 V	10.07
THS1209	12	8000	1 Diff/2 SE	P12	+2.5	186 mW/+5 V	9.04
THS10064	10	6000	2 Diff/4 SE	P10	+2.5	186 mW/+5 V	8.06
THS1007	10	6000	2 Diff/4 SE	P10	+1.5,+3.5	186 mW/+3,+5 V	7.04
THS10082	10	8000	1 Diff/2 SE	P10	+2.5	186 mW/+5 V	6.02
THS1009	10	8000	1 Diff/2 SE	P10	+1.5,+3.5	186 mW/+3,+5 V	5.00

*For a complete list of data converter development tools see "Design Resources" on our web site at **dataconverter.ti.com** or consult the 3Q 2003 Data Converter Selection Guide. SE = Single-Ended, Diff = Differential, Iin = Current Input*
+ Prices are quoted per unit in U.S. dollars at 1 KU quantities. Prices represent year 2003 suggested resale pricing.
*Download FREE Data Converter Plug-In for TI Code Composer Studio™ at **www.ti.com/sc/dcplug-in***

DIGITAL-TO-ANALOG CONVERTERS FOR THE TMS320C5000™ DSP PLATFORM

Model	Res. (Bits)	Settling Time (µs)	# Output D/As	Output (V)	Power Voltage(s)	Price Start 1 KU ($U.S.)+
DAC8501	16	10	1	+Vref/MDAC	1 mW/+2.7,+5 V	2.83
DAC8531	16	10	1	+Vref	1 mW/+2.7,+5 V	2.83
DAC1221	16	10	1	+2.5	1 mW/+3 V	5.01
TLV5638	12	1	2	+2,4	4.5 mW/+2.7,+5 V	4.89
DAC7512	12	10	1	+Vcc	0.7 mW/+2.7,+5 V	1.37
DAC7513	12	10	1	+Vref	0.7 mW/+2.7,+5 V	1.37
TLV5610	12	1/3	8	Vref	18 mW/+5 V	9.41
TLV5630	12	1/3	8	Vref	18 mW/+5 V	9.02
TLV5636	12	1/3.5	1	+2,4	4.5 mW/+2.7,+5 V	3.82
TLV5618A	12	2.5/12	2	Vref	2.4 mW/+2.7,+5 V	4.25
TLV5616	12	3/9	1	Vref	0.9 mW/+2.7,+5 V	2.86
TLV5614	12	3/9	4	Vref	3.6 mW/+2.7,+5 V	8.26
TLV5637	10	1/3	2	+2,4	4.2 mW/+5 V	4.53
TLV5608	10	1/3	8	Vref	18 mW/+5 V	4.74
TLV5631	10	1/3	8	Vref	18 mW/+5 V	5.12
TLV5617A	10	2.5/12	2	Vref	2.1 mW/+2.7,+5 V	3.41
TLV5606	10	3/9	1	Vref	0.9 mW/+2.7,+5 V	1.77
TLV5604	10	3/9	4	Vref	3.3 mW/+2.7,+5 V	4.79
TLV5625	8	2.5	2	Vref	2.1 mW/+2.7,+5 V	1.74
TLV5623	8	3	1	Vref	0.9 mW/+2.7,+5 V	1.25
TLV5626	8	1/3	2	+2,4	5.1 mW/+2.7,+5 V	2.22
TLV5629	8	1/3	8	Vref	15 mW/+2.7, +5 V	2.98
TLV5632	8	1/3	8	+2,4	18 mW/+2.7, +5 V	3.19
TLV5624	8	1/3.5	1	+2,4	4.5 mW/+2.7,+5 V	1.65
TLC5618A	12	2.5	2	Vref	3 mW/+5 V	4.74

*For a complete list of data converter development tools see "Design Resources" on our web site at **dataconverter.ti.com** or consult the 3Q 2003 Data Converter Selection Guide.*
+ Prices are quoted per unit in U.S. dollars at 1 KU quantities. Prices represent year 2003 suggested resale pricing.
*Download FREE Data Converter Plug-In for TI Code Composer Studio™ at **www.ti.com/sc/dcplug-in***

DSP CODECS FOR THE C5000™ DSP PLATFORM

Model	Codec Channels	Sampling Rate (kSPS)	SNR (dB)	DSP Interface	Host Interface	Analog Outputs (Ohms)	Core Power Supply (Digital/Analog) (V)	Logic I/O (V)	Power Dissipation (w/o Speaker) (mW)	Price 1 KU ($U.S.)+
TLV320AIC10	1	22	84	Frame, Pulse FS	S^2C	600 (2)	3 to 5.5	3 to 5.5	39	2.12
TLV320AIC11	1	22	84	Frame, Pulse FS	S^2C	600 (2)	3 to 5.5	1.1 to 5.5	39	2.12
TLV320AIC12	1	26	88	Pulse FS SMARTDM	I^2C, S^2C	600 (1), 16 (2)	1.8/2.7 to 3.6	2.7 to 3.6	10	2.75
TLV320AIC13	1	26	88	Pulse FS SMARTDM	I^2C, S^2C	600 (1), 16 (2)	1.8/2.7 to 3.6	1.1 to 3.6	10	2.95
TLV320AIC14	1	26	88	Pulse FS SMARTDM	I^2C, S^2C	600 (1)	1.8/2.7 to 3.6	2.7 to 3.6	10	2.35
TLV320AIC15	1	26	88	Pulse FS SMARTDM	I^2C, S^2C	600 (1)	1.8/2.7 to 3.6	1.1 to 3.6	10	2.71
TLV320AIC20	2	26	87	Pulse FS SMARTDM	I^2C, S^2C	600 (1), 150 (2), 8 (1)	1.8/2.7 to 3.6	2.7 to 3.6	20	3.51
TLV320AIC21	2	26	87	Pulse FS SMARTDM	I^2C, S^2C	600 (1), 150 (2), 8 (1)	1.8/2.7 to 3.6	1.1 to 3.6	20	3.71
TLV320AIC23	2	96	100/90	I^2S, L/R justified, DSP	I^2C, SPI	32, 16, 8,	3.3/3.3/1.5 to 3.6	2.7 to 3.6	23 to 65	2.85
TLV320DAC23	2	96	100/90	I^2S, L/R justified, DSP	I^2C, SPI	32, 16, 8,	3.3/3.3/1.5 to 3.6	2.7 to 3.6	18	1.90
TLC320AIC24	2	26	87	Pulse FS SMARTDM	I^2C, S^2C	600 (1), 150 (2)	1.8/2.7 to 3.6	2.7 to 3.6	20	3.40
TLC320AIC25	2	26	87	Pulse FS SMARTDM	I^2C, S^2C	600 (1), 150 (2)	1.8/2.7 to 3.6	1.1 to 3.6	20	3.60
AFE1230	1	1700	–	Serial	–	–	5	3.1 to 5.0	750	14.57

*For a complete list of data converter evaluation modules, please see our web site at **www.ti.com/sc/evms***

SUGGESTED POWER MANAGEMENT SOLUTIONS FOR THE C5000 DSP PLATFORM FOR PORTABLE AND NON-PORTABLE APPLICATIONS

Output Current	<50 mA	100 mA	250 mA	500 mA	750 mA	1 A	2 A	4 A
Dual Plug-In Module	–	–	–	–	–	PT6930	PT6930	PT6940
Plug-In Module	–	–	PT5520	PT5520	PT5520	PT5520	PT5500	PT5400
Step-Down Converter (w/FETs)	TPS62200	TPS62200	TPS62200	TPS62000	TPS62050	TPS62040	TPS54310	TPS54610
Step-Down Controller	TPS43000	TPS43000	TPS43000	TPS43000	TPS43000	TPS43000	TPS43000	TPS43000
Step-Up Converter (w/FETs)	TPS61100/20	TPS61100/20	TPS61100/20	–	–	–	–	–
Step-Up Controller	UCC39421	UCC39421	UCC39421	UCC39421	UCC39421	UCC39421	UCC39421	UCC39421
Dual LDO[1]	TPS70702	TPS70702	TPS70702	TPS70102	TPS767D301	TPS767D301	TPS70302	–
Low Dropout Regulator (LDO)	TPS72201	TPS72101	TPS79401	TPS79501	TPS77701	TPS72501	TPS75201	TPS75601

Supervised Voltage	1.5 V	1.6 V	1.8 V	2.5 V	3.3 V
Dual SVS[2]	TPS3110K33	TPS3110K33	TPS3305-18	TPS3305-25	N/A
Supply Voltage Supervisor (SVS)	TPS3123G15	TPS3106E16	TPS3128E18	TPS3823-25	TPS3823-33

Note 1: Current shown for powering DSP core. I/O current capability for the Dual LDO is rated approximately 50% of core current. Note 2: Other supervised voltage is 3.3 V. Adjustable output voltage part numbers shown. Fixed voltages also available.
*See **power.ti.com** for a complete product offering.*

To order free Data Converter, Codec or Power Management samples, visit analog.ti.com

TMS320C28x™ DSP GENERATION, FIXED POINT

Most Control-Optimized DSPs

Specifications

- 32-bit fixed-point C28x™ DSP core
- 150-MIPS operation
- 1.9-volt core and 3.3-volt peripherals

Applications

- Lighting
- Optical networking (ONET)
- Power supplies
- Industrial automation
- Consumer goods

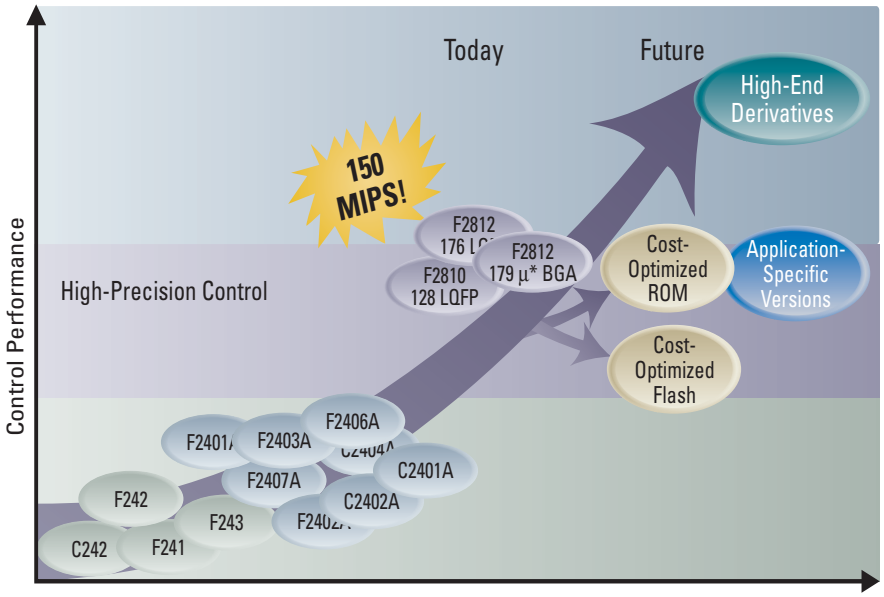
Features

- Ultra-fast 20–40 ns service time to any interrupts
- Powerful 20 Mbit/s data logging debug capability
- 32-/64-bit saturation, single-cycle read-modify-write instructions, and 64-/32-bit and 32-/32-bit modulus division
- High-performance ADC
- Enhanced tool suites with C and C++ support
- Unique real-time debugging capabilities
- 32 × 32-bit single-cycle fixed-point MAC
- Dual 16 × 16-bit single-cycle fixed-point MACs
- Supported by 16-bit instructions for improved code efficiency
- Compatible with TMS320C24x™ DSP and TMS320C2xLP™ source code

Peripherals

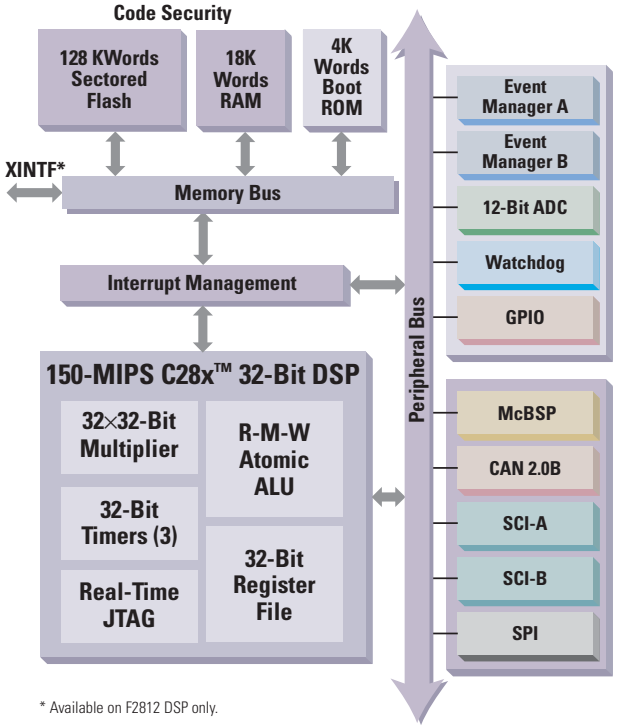
- 128 Kwords sectored Flash
- 12-bit A/D, 12.5 MSPS throughput with 80-ns minimum conversion time
- Up to two event managers
- Up to two serial communication interface modules
- SPI
- Enhanced CAN module
- McBSP module
- Boot ROM
- Code security for on-chip Flash

TMS320C2000™ DSP Platform Roadmap



The TMS320C2000 DSP platform provides an optimized DSP solution for digital control systems and motor-control applications including AC induction, DC brushless, permanent magnet synchronous and switched reluctance.

TMS320F2810/2812 DSP Block Diagram



* Available on F2812 DSP only.

The F2810 and F2812 DSPs are the industry's first 32-bit control DSPs with on-board Flash memory and performance up to 150 MIPS.

TMS320C28x™ DSP GENERATION PRODUCT SPECIFICATION GUIDE

Device	MIPS	Boot ROM† (words)	RAM† (16-bit words)	Flash† (16-bit words)	Timers	Comp/ PWM	CAP/ QEP	# PWM Channels	A/D* Chs/ Conversion Time (ns)°	EMIF	WD Timer	McBSP	SPI	SCI	CAN	I/O Pins	Core Voltage (V)	Packaging	1 KU ($U.S.)+
TMS320**F2810**-150PBKA°	150	4K	18K	64K	7	16	6/2	16	16 ch/80	–	Y	Y	Y	Y	Y	56	1.9	128 LQFP	17.71
TMS320**F2812**-150GHHA°	150	4K	18K	128K	7	16	6/2	16	16 ch/80	Y	Y	Y	Y	Y	Y	56	1.9	179 BGA‡	20.07
TMS320**F2812**-150PGFA°	150	4K	18K	128K	7	16	6/2	16	16 ch/80	Y	Y	Y	Y	Y	Y	56	1.9	176 LQFP	20.07

+ Prices are quoted per unit in U.S. dollars at 1 KU quantities. Prices represent year 2003 suggested resale pricing.
† 1 word = 2 Bytes
Note: Enhanced plastic and Military DSP versions are available for selected DSPs.
° 12-bit
‡ MicroStar BGA™ package
**Dual Sample/Hold.*

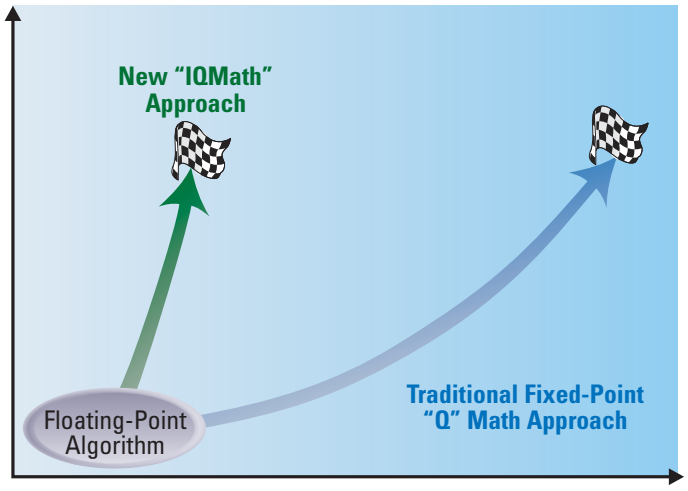
The IQMath Math Approach

Control algorithms typically start life in a floating-point format. The conversion of such algorithms to run on a fixed-point machine is a laborious and time-consuming task ... until now!

The 32-bit math capabilities of the C28x™ DSP core enable a new C/C++ approach which makes this task easier and much faster. Optimized to take advantage of the C28x DSP architecture, IQMath is a mathematical approach and a set of supporting libraries that enable the following:

- Reduced implementation/porting/debugging time of math algorithms in C/C++
- Increased numerical resolution of algorithms from 16 bits to 32/64 bits (near floating-point)

In other words, IQMath enables you to code in floating point on a cost-effective fixed-point machine. For more information on IQMath, visit **www.ti.com/iqmath**



For the most updated information on TMS320C2000 DSPs, visit www.ti.com/dmc

TMS320C24x™ DSP GENERATION, FIXED POINT

Most Control-Optimized DSPs

Specifications

- Up to 40-MIPS operation
- Three power-down modes
- Code-compatible control-optimized DSPs
- JTAG scan-based emulation
- 3.3-V and 5-V designs

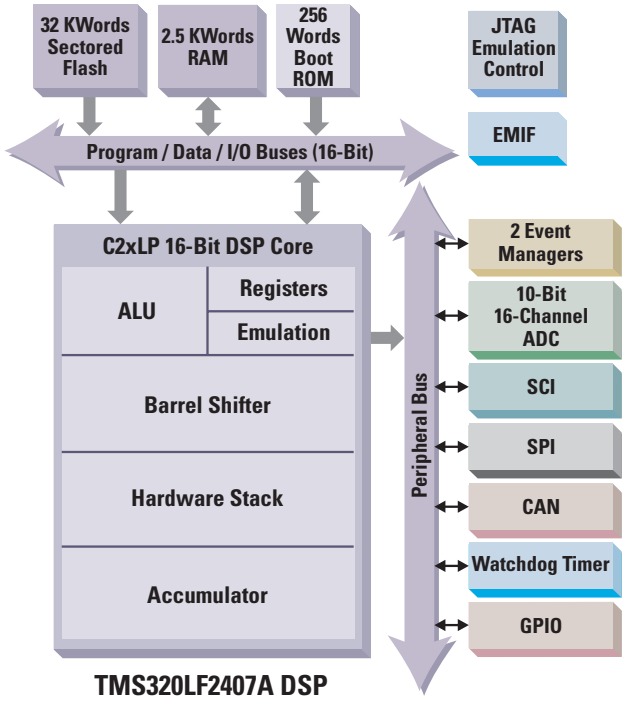
Applications

- Appliances
- Compressors
- Industrial automation
- Uninterruptible power supply (UPS) systems
- Automotive braking and steering systems
- Electric metering
- Printers and copiers
- Hand-held power tools
- Electronic cooling systems
- Intelligent sensors
- Tunable lasers
- Consumer goods
  - Fuel pumps
  - Industrial frequency inverter
  - Remote monitoring
  - ID tag readers

Features

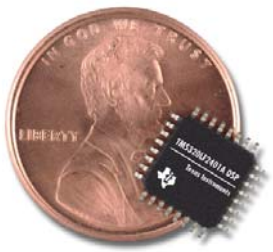
- 375-ns (minimum conversion time) analog-to-digital (A/D) converter
- Deadband logic
- Dual 10-bit A/D converters
- Up to four 16-bit general-purpose timers
- Watchdog timer module
- Up to 16 PWM channels
- Up to 41 GPIO pins
- Five external interrupts
- Up to two event managers
- Up to 32K words on-chip sectored Flash
- Controller Area Network (CAN) interface module
- Serial communications interface (SCI)
- Serial peripheral interface (SPI)
- Up to six capture units (four with QEP)
- Boot ROM (LF240xA devices)
- Code security for on-chip Flash/ROM (Lx240xA devices)

TMS320LF2407A DSP Block Diagram



For high-performance industrial applications, the Flash-based LF2407A DSP includes peripherals such as a Controller Area Network (CAN) module to enable control of multiple motors by a single DSP.

TMS320LF2401A DSP: For Space-Constrained Designs



The TMS320LF2401A DSP packs a lot of power in an unbelievably small package. In only 49 mm², the TMS320LF2401A DSP provides 40 MIPS of processing power, a lightning-fast ADC with 500-ns conversion time, 8K of sectored Flash with code security, plus much more.

TMS320C24x™ DSP GENERATION PRODUCT SPECIFICATION GUIDE

Device	RAM† (16-bit words)	ROM† (16-bit words)	Flash† (16-bit words)	Boot† ROM (words)	EMIF	General-Purpose Timers	Watchdog Timer	PWM Channels	SPI	SCI	CAN	A/D Channels** Conversion Time (µs)	I/O Pins	Voltage (V)	MIPS	Packaging	1 KU ($U.S.)+
TMS320**LF2407A**PGEA°	2.5K	–	32K	256	Yes	4	Y	16	Y	Y	Y	16 ch 0.5	41	3.3	40	144 LQFP	9.39
TMS320**LF2406A**PZA°	2.5K	–	32K	256	–	4	Y	16	Y	Y	Y	16 ch 0.5	41	3.3	40	100 LQFP	8.86
TMS320**LF2403A**PAGA°	1K	–	16K	256	–	2	Y	8	Y	Y	Y	8 ch 0.5	21	3.3	40	64 LQFP	8.73
TMS320**LF2402A**PAGA°	1K	–	8K	256	–	2	Y	8	–	Y	–	8 ch 0.5	21	3.3	40	64 PQFP	7.88
TMS320**LF2401A**VFA°	1K	–	8K	256	–	2	Y	7	–	Y	–	5 ch 0.5	13	3.3	40	32 LQFP	5.00
TMS320**LC2406A**PZA‡°	2.5K	32K	–	–	–	4	Y	16	Y	Y	Y	16 ch 0.375	41	3.3	40	100 LQFP	5.47‡
TMS320**LC2404A**PZA‡°	1.5K	16K	–	–	–	4	Y	16	Y	Y	–	16 ch 0.375	41	3.3	40	100 LQFP	4.90‡
TMS320**LC2402A**PGA‡°	544	6K	–	–	–	2	Y	8	–	Y	–	8 ch 0.425	21	3.3	40	64 PQFP	2.95‡
TMS320**LC2401A**VFA‡°	1K	8K	–	–	–	2	Y	7	–	Y	–	5 ch 0.5	13	3.3	40	32 LQFP	2.95‡
TMS320**F243**PGEA°	544	–	8K	–	Yes	2	Y	8	Y	Y	Y	8 ch 0.9	32	5	20	144 LQFP	13.99
TMS320**F241**PGA°	544	–	8K	–	–	2	Y	8	Y	Y	–	8 ch 0.9	26	5	20	64 PQFP	12.37
TMS320**F241**FNA°	544	–	8K	–	–	2	Y	8	Y	Y	–	8 ch 0.9	26	5	20	38 PLCC	12.37
TMS320**C242**PGA*°	544	4K	–	–	–	2	Y	8	–	Y	–	8 ch 0.9	26	5	20	64 PQFP	3.69‡
TMS320**C242**FNA*°	544	4K	–	–	–	2	Y	8	–	Y	–	8 ch 0.9	26	5	20	38 PLCC	3.69‡
TMS320**F240**PQA°	544	–	16K	–	Yes	3	Y	12	Y	Y	–	16 ch 6.1	28	5	20	132 PQFP	16.21

+ Prices are quoted per unit in U.S. dollars at 1 KU quantities. Prices represent year 2003 suggested resale pricing.
‡ Minimum volume for LC240xA devices is 10 KU with NRE of $9,000.
Standard lead times are 5 weeks for Flash parts and 12 weeks for ROM-coded parts.
Note: Enhanced plastic and Military DSP versions are available for selected DSPs.
° Available in Industrial temperature range (A = –40 to 85°C) or Automotive temperature range (S = –40 to 125°C) (with 10% price adder).
† 1 word = 2 Bytes
** Pricing based on 5 KU minimum requirements due to factory ROM code.*
*** 10-bit*

For the most updated information on TMS320C2000 DSPs, visit www.ti.com/dmc

TMS320C2000™ DSP PLATFORM TOOLS, SOFTWARE AND SUPPORT

C2000™ DSP PLATFORM HARDWARE DEVELOPMENT TOOLS

Description	Part #	$U.S.+
DEVELOPMENT BOARDS		
LF2407A eZdsp™ Starter Kit (DSK)°	TMDSEZD2407 (U.S. part number) TMDSEZD2407-0E (European part number)	295
LF2401A eZdsp Starter Kit°	TMDSEZD2401 (U.S. part number) TMDSEZD2401-0E (European part number)	295
F2812 eZdsp™ Starter Kit (DSK) Includes parallel port cable, User's Guide, Code Composer Studio™ (CCStudio) IDE for eZdsp, power supply	TMDXEZD2812 (U.S. part number) TMDXEZD2812-0E (European part number)	295
F2812 eZdsp Starter Kit (DSP in socket) Includes parallel port cable, User's Guide, CCStudio IDE for eZdsp, power supply	TMDXEZS2812 (U.S. part number) TMDXEZS2812-0E (European part number)	449
F2812 Development Bundle Includes eZdsp (DSP in socket), CCStudio v 2.2, XDS510PP-Plus	TMDXEVP2812 (U.S. part number) TMDXEVP2812-0E (European part number)	1,995
F2812 Development Bundle Includes eZdsp (DSP in socket), CCStudio v 2.2, XDS510 USB Emulator	TMDXEVU2812 (U.S. part number) TMDXEVU2812-0E (European part number)	2,295
EVALUATION MODULES		
LF2407A Evaluation Module (EVM), CCStudio v 2.2, XDS510PP-Plus Emulator§	TMDS3P701016A (U.S. part number) TMDS3P701016AE (European part number)	1,995
JTAG EMULATORS		
XDS560™ PCI-Based High-Performance JTAG Emulator	TMDXEMU560	3,995
XDS510PP-Plus Parallel Port Pod w/ JTAG Cable for Windows	TMDSEMUPP (U.S. part number) TMDSEMUPP-0E (European part number)	1,500
XDS510™ USB-Based Emulator for Windows	TMDSEMUUSB	1,995

+ Prices are quoted in U.S. dollars and represent year 2003 suggested resale pricing. *New tools are listed in red.*
*Alternative Development Tools are available from third parties such as Spectrum Digital (**www.spectrumdigital.com**), Technosoft (**www.technosoft.ch**) and Softronics (**www.softronx.com**).*
§ Includes Code Composer Studio integrated development environment (IDE), code generation tools with C compiler/assembler/linker, target board and device drivers.
° Includes board-specific Code Composer IDE, code-generation tools, on-board JTAG emulation, target board and target-specific device driver.
Please see the features supported by platform matrix on page 68 for more details.

C2000™ DSP PLATFORM SOFTWARE DEVELOPMENT TOOLS

Description	Part #	$U.S.+
C2000™ DSP Code Composer Studio Development Tools Bundled with Annual Software Subscription Supports C24x™ and C28x™ DSP products	TMDSCCS2000-1	495°
C2000 Code Composer Studio Development Tools Annual S/W Subscription	TMDSSUB2000	495
Essential Guide to Getting Started with DSP CD-ROM Includes C2000™ Code Composer Studio 90-Day Free Evaluation Tools‡	SPRC119 **(www.dspvillage.ti.com/freetools)**	**Free**
TMS320C2000 DSP Flash Programming Utilities	C24XSOFTWARE	**Free**
ADDITIONAL TOOLS		
F240/F241/F243/LF240x Flash Programming Utilities*		**Free**

+ Prices are quoted in U.S. dollars and represent year 2003 suggested resale pricing. *° Promotional offer valid for limited time only.*
** These tools are downloadable at **www.ti.com/algostanddevkit***
*Alternative Development Tools are available from third parties such as Spectrum Digital (**www.spectrumdigital.com**), Technosoft (**www.technosoft.ch**) and Softronics (**www.softronx.com**).*
Please see the features supported by platform matrix on page 68 for more details.

TMS320C24x™ DSP LITERATURE AND RELATED TECHNICAL DOCUMENTATION

Data Sheets	Web Search Literature #
TMS320F2810 DSP Data Sheet	SPRS174
TMS320F2812 DSP Data Sheet	SPRS174
TMS320C242 DSP Data Sheet	SPRS063
TMS320F243/F241 DSP Data Sheet	SPRS064
TMS320LF2407/LF2406/LF2402 DSP Data Sheet	SPRS094
TMS320LF2407A/LF2406A/LF2403A/LF2402A/LC2406A/ LC2404A/LC2402A DSP Data Sheet	SPRS145
TMS320LF2401A DSP Data Sheet	SPRS161
Hardware Reference Guides	
TMS320F/C24x DSP Controllers Reference Guide: CPU and Instruction Set	SPRU160

Hardware Reference Guides (Cont'd)	Web Search Literature #
TMS320F/C240 DSP Controllers Reference Guide: Peripheral Library and Specific Devices	SPRU161
TMS320F243/F241/C242 DSP Controllers Reference Guide: System and Peripherals	SPRU276
TMS320F20x/F24x DSP Embedded Flash Memory Technical Reference	SPRU282
TMS320LF/LC240xA DSP Controllers Reference Guide: System and Peripherals	SPRU357
Product Bulletin	**Web Search Literature #**
TMS320F2810 and TMS320F2812 32-Bit Fixed-Point with Flash DSPs Product Bulletin	SPRT242

Check the TI web site for a complete listing of technical documentation including application notes.

TMS320C2000™ DSP PLATFORM TOOLS DOCUMENTATION

Hardware Reference Guide	Web Search Literature #
TMS320F240 DSP Controllers Evaluation Module Technical Reference Guide	SPRU248
TMS320F28x DSP Analog-to-Digital Converter (ADC) Peripheral Reference Guide	SPRU060
TMS320F28x DSP Event Manager (EV) Peripheral Reference Guide	SPRU065
TMS320C28x DSP CPU and Instruction Set Reference Guide	SPRU430
TMS320F28x DSP Boot ROM Peripheral Reference Guide	SPRU095
TMS320F28x DSP Control and Interrupts Peripheral Reference Guide	SPRU078
TMS320F28x DSP Enhanced Controller Area Network (eCAN) Peripheral Reference Guide	SPRU074
TMS320F28x DSP External Interface (XINTF) Peripheral Ref Guide	SPRU067
TMS320F28x DSP Serial Peripheral Reference Guide	SPRU059
TMS320F28x DSP Multi-channel Buffered Serial Port (McBSP) Peripheral Reference Guide	SPRU061
TMS320F28x DSP Serial Communications Interface (SCI) Peripheral Reference Guide	SPRU051

Hardware Reference Guide	Web Search Literature #
TMS320F28x DSP Peripherals Reference Guide	SPRU566
Software Reference Guides	**Web Search Literature #**
TMS320C28x DSP Assembly Language Tools User's Guide	SPRU513
TMS320C28x DSP Optimizing C/C++ Compiler User's Guide	SPRU514
Code Composer Studio Getting Started Guide	SPRU509
TMS320™ DSP Algorithm Standard Rules and Guidelines	SPRU352
TMS320 DSP Algorithm Standard API Reference	SPRU360
TMS320 DSP Algorithm Standard Demonstration Application	SPRU361
TMS320 DSP Algorithm Standard Developer's Guide	SPRU424
TMS320C28x DSP Instruction Set Simulator Technical Overview	SPRU608
TMS320C28x DSP/BIOS™ Application Programming Interface (API) Reference Guide	SPRU625
Product Bulletins	
TMS320F2812 eZdsp DSP Starter Kit (DSK) Product Bulletin	SPRT243
XDS560™ Emulator Product Bulletin	SPRB148

Check the TI web site for a complete listing of technical documentation including application notes.

TMS320C2000™ DSP SIGNAL PROCESSING LIBRARIES

Signal Processing Libraries	Web Search Literature #
C28x™ ACI3 3: Simulated Indirect FOC of ACI Motor	SPRC077
C28x ACI3 4: Real Direct FOC of ACI Motor	SPRC079
C28x ACI3 4: Simulated Direct FOC of ACI Motor	SPRC078
C28x DSP Digital Motor Control Library	SPRC080
C28x DSP Fast Fourier Transform (FFT) Library	SPRC081
C28x DSP Filter Library	SPRC082
C28x DSP Fixed-Point Math Library	SPRC085
C28x DSP IQMath Library	SPRC087
C28x DSP Signal Generator Library	SPRC083
C28x DSP Software Test Bench (STB) Library	SPRC084
C28x DSP Peripheral Examples in C	SPRC097
C28x ACI3 1: Scalar Control of a 3-Phase AC Induction Motor	SPRC130
C28x ACI3 4: Sensorless Vector Control of a 3-Phase AC Induction Motor	SPRC078
C28x PMSM3 1: Sensored Vector Control of a 3-Phase Permanent Magnet Motor	SPRC129
C28x PMSM3 2: Sensorless Vector Control of a 3-Phase Permanent Magnet Motor	SPRC128

Signal Processing Libraries (Cont'd)	Web Search Literature
C24x™ ACI1 1: Single-Phase ACI Motor Control Using Constant V/Hz	SPRC110
C24x ACI3 1: Three-Phase ACI Motor Control with Constant V/Hz	SPRC106
C24x ACI3 2: 3-Phase Sensorless MRAS Control w/ Constant V/Hz	SPRC104
C24x ACI3 3: Three-Phase Sensored Field-Oriented Control (FOC)	SPRC111
C24x BLDC3 1: Three-Phase Sensored Trapezoidal Control	SPRC112
C24x BLDC3 2: Three-Phase Sensorless Trapezoidal Control	SPRC108
C24x DSP Digital Motor Control Library	SPRC105
C24x PMSM3 1: Three-Phase Sensored Field-Oriented Control	SPRC107
C24x PMSM3 2: Three-Phase Sensorless Field-Oriented Control	SPRC109
C24x DSP Fast Fourier Transform (FFT) Library	SPRC069
C24x DSP Filter Library	SPRC072
C24x DSP Fixed-Point Math Library	SPRC068
C24x DSP Signal Generator Library	SPRC071
C24x DSP Software Test Bench (STB) Library	SPRC070

C2000™ DSP PLATFORM PRODUCT SUPPORT

C2000 DSP Application Notes	**www.ti.com/c2000appnotes**
C2000 DSP Application Software	**www.ti.com/c2000appsw**
C2000 DSP Signal Processing Libraries	**www.ti.com/c2000dsplib**
C2000 DSP Platform Developer's Kits	**www.ti.com/c2000devkit**

For the most updated information on TMS320C2000 DSPs, visit www.ti.com/dmc

INTERFACE, DSP CODECS AND POWER MANAGEMENT PRODUCTS FOR THE TMS320C2000™ DSP PLATFORM

TI DSP and TI High-Performance Analog Products Provide Leading-Edge Signal Processing Solutions

Our products offer a range of interface options and are also available in supply voltages ranging from 2.7 V to 15 V.

Power Management Products

Low Dropout Regulators (LDOs)

- Broad portfolio designed to support low and medium current requirements
- Small SOT23 packaging available
- Feature-rich products available offering Reset, Power Good pin and ultra-low quiescent current

Switching Regulators

- DC/DC controllers for high flexibility and excellent value
- SWIFT™ DC/DC converters for simple design and fewer components

Supply Voltage Supervisors (SVS)

- Designed to protect the DSP and maintain data integrity
- Small packaging saves PCB space

Plug-In Power Solutions

- Complete power solution
- EMI and reliability tested

3.3-V AND 5.0-V CAN TRANSCEIVERS FOR THE TMS320C2000 DSP PLATFORM

Part Number	Description
SN65HVD230	3.3-V CAN transceiver with 370 μA standby power mode and integrated slope control
SN65HVD231	3.3-V CAN transceiver with 40 nA sleep mode and integrated slope control
SN65HVD232	3.3-V CAN transceiver
SN65HVD233	3.3-V CAN transceiver with ±36 bus-fault protection, 200 μA standby mode, integrated slope control and loop-back functionality
SN65HVD234	3.3-V CAN transceiver with ±36 bus-fault protection, 50 nA sleep mode and integrated slope control
SN65HVD235	3.3-V CAN transceiver with ±36 bus-fault protection, 200 μA standby mode, integrated slope control and auto-baud loop-back functionality
SN65HVD251	5-V CAN transceiver with ±36-V bus fault protection; improved drop-in replacement to PCA82C250/251

DSP CODECS FOR THE C2000™ DSP PLATFORM

Device	Band Pass Filter (3 dB) Hz	Low Pass Filter (3 dB) (Hz)	Sampling Rate (kHz) (Max)	Sin x/x Correction	Analog Supply Voltage (V)	Digital Supply Voltage (V)	Power Dissipation (mW)	Parallel or Serial	No. of Inputs
14-Bit									
TLC320AC01	Up to 10.8k	10.8k	25	Yes	+5	±5	100	Serial	2
TLC320AC02	Up to 10.8k	10.8k	25	Yes	+5	±5	100	Serial	2
16-Bit									
TLC320AD50*	Up to 9.92k	9.92k	22.05	No	+5	+5/+3.3	120	Serial	2
TLC320AD545	Up to 4.96k	4.96k	11.025	No	+5/+3.3	+5/+3.3	120	Serial	1

** Evaluation modules available*
*For a complete list of data converter evaluation modules, please see our web site at **www.ti.com/sc/evms***

SUGGESTED POWER MANAGEMENT PRODUCTS FOR THE C2000 DSP PLATFORM FOR NON-PORTABLE APPLICATIONS

Output Current	<50 mA	100 mA	250 mA	500 mA	750 mA	1 A	2 A	4 A
Dual Plug-In Module	–	–	–	–	–	PT6930	PT6930	PT6940
Plug-In Module –	–	PT5520	PT5520	PT5520	PT5520	PT5500	PT5400	
DC/DC Converter (w/ FETs)	TPS62200	TPS62200	TPS62200	TPS62000	TPS62050	TPS62040	TPS54310	TPS54610
DC/DC Controller	TPS40000	TPS40000	TPS40000	TPS40000	TPS40000	TPS40000	TPS40000	TPS40000
Dual LDO[1]	TPS70751	TPS70751	TPS70751	TPS70151	TPS767D318	TPS767D318	TPS70351	–
Low Dropout Regulator (LDO)	TPS72201	TPS72101	TPS79401	TPS79501	TPS77701	TPS72501	TPS75201	TPS75601

Supervised Voltage		1.8 V		3.3 V				
Dual SVS[2]		TPS3305-18		N/A				
Supply Voltage Supervisor (SVS)		TPS3128E18		TPS3823-33				

Note 1: Current shown for powering DSP core. I/O current capability for the Dual LDO is rated approximately 50% of core current.
Note 2: Other supervised voltage is 3.3 V.
Adjustable output voltage part numbers shown. Fixed voltages shown on the respective datasheets.
*See **power.ti.com** for a complete product offering.*

TMS320C3x™ DSP GENERATION, FLOATING POINT

First-Generation Floating Point

Specifications

- Performance up to 150 MFLOPS
- Highly-efficient C language engine
- Large address space: 16 Mwords
- Fast memory management with on-chip DMA

Applications

- Digital audio
- Laser printers, copiers, scanners
- Bar-code scanners
- Videoconferencing
- Industrial automation and robotics
- Voice/facsimile
- Servo and motor control

Features

High Performance Register-Based, Pipelined CPU:

- Parallel multiply and arithmetic/logical operations on integer or floating-point numbers in a single cycle
- Eight extended-precision registers

Powerful Instruction Set:

- Single-cycle instruction execution
- System control and numeric operation

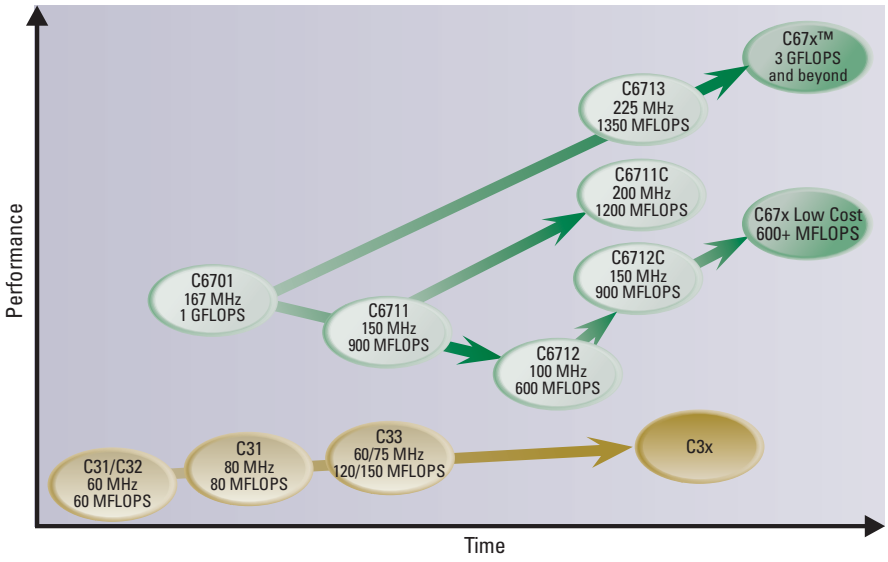
Integrated Peripherals:

- DMA controller for concurrent I/O and CPU operation
- Timers
- Serial port(s)

Memory

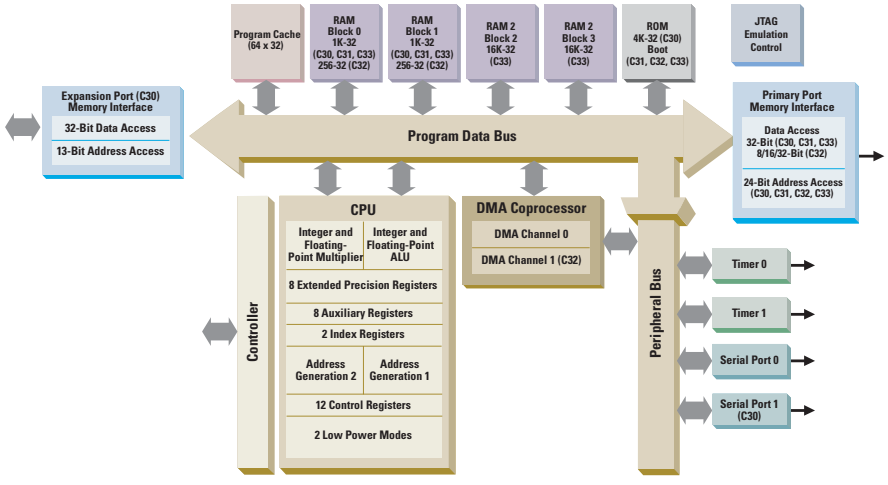
- Extensive internal busing and parallelism for rapid data-movement capability

TMS320™ DSP Floating-Point Roadmap



This range of price and performance options enable our clients to choose the processor that best meets their specific application needs.

TMS320C3x DSP Platform Block Diagram



TMS320C3x DSPs offer extensive internal busing and up to 150-MFLOPS performance.

For the most updated information on TMS320C3x DSPs, visit www.ti.com/c3x

TMS320C3x™ DSP PLATFORM PRODUCT SPECIFICATION GUIDE

Device	RAM ×32	ROM ×32	DAT/PRO (ADDR)	SER	Address Space	DMA	Timers	Cycle (ns)	MFLOPS	Packaging	1 KU ($U.S.)+
TMS320**VC33**PGE150	34K	#	16M	1	16M×32	1	2	13	150	144 TQFP	14.09
TMS320**VC33**PGEA120§	34K	#	16M	1	16M×32	1	2	17	120	144 TQFP	12.91
TMS320**VC33**PGE120	34K	#	16M	1	16M×32	1	2	17	120	144 TQFP	11.74
TMS320**C32**PCM60	512	#	16M	1	16M×32^	2	2	33	60	144 PQFP	19.20
TMS320**C32**PCMA50§	512	#	16M	1	16M×32^	2	2	40	50	144 PQFP	19.20
TMS320**C32**PCM50	512	#	16M	1	16M×32^	2	2	40	50	144 PQFP	17.45
TMS320**C32**PCM40	512	#	16M	1	16M×32^	2	2	50	40	144 PQFP	9.95
TMS320**C31**PQL80	2K	#	16M	1	16M×32	1	2	25	80	132 PQFP	40.40
TMS320**C31**PQL60	2K	#	16M	1	16M×32	1	2	33	60	132 PQFP	36.72
TMS320**C31**PQL50	2K	#	16M	1	16M×32	1	2	40	50	132 PQFP	33.39
TMS320**C31**PQA50§	2K	#	16M	1	16M×32	1	2	40	50	132 PQFP	36.73
TMS320**C31**PQL40	2K	#	16M	1	16M×32	1	2	50	40	132 PQFP	30.35
TMS320**LC31**PQL40	2K	#	16M	1	16M×32	1	2	50	40	132 PQFP	30.35
TMS320**C30**GEL50	2K	4K	16M	2	16M×32	1	2	40	50	181 PGA	225.35
TMS320**C30**GEL40	2K	4K	16M	2	16M×32	1	2	50	40	181 PGA	195.96
TMS320**C30**GEL	2K	4K	16M	2	16M×32	1	2	60	33	181 PGA	170.40

 # = Supports bootloader
^ 16M × 8/16/32 configurable
§ Extended temperature offering. Please consult the applicable DSP data sheet for timing and temperature range information.
+ Prices are quoted per unit in U.S. dollars at 1 KU quantities. Prices represent year 2003 suggested resale pricing.
Note: Enhanced plastic and Military DSP versions are available for selected DSPs.

C3x™ DSP PLATFORM HARDWARE DEVELOPMENT TOOLS

Description	Part #	$U.S.+
DSP STARTER KIT (DSK)		
VC33 eZdsp™ Starter Kit	TMDS3P761381	495
JTAG EMULATORS		
XDS510-PP Plus – Parallel Port Emulator (VC33 supported)	TMDSEMUPP (U.S. part number) TMDSEMUPP-0E (European part number)	1,500

+ Prices are quoted in U.S. dollars and represent year 2003 suggested resale pricing.
** Includes C3x/C4x™ Code Composer™ v4.1 Development tools, code-generation tools, only usable with VC33 eZdsp driver.*
Please see the features supported by platform matrix on page 68 for more details.

C3x DSP PLATFORM SOFTWARE DEVELOPMENT TOOLS

Description	Part #	$U.S.+
INTEGRATED DEVELOPMENT ENVIRONMENT		
C3x/C4x Code Composer IDE, code generation tools, XDS510™ drivers and simulator†	TMDS3240130	1,495
C3x Code Composer IDE Free Evaluation Tools	C3XFREETOOL	Free
CODE GENERATION TOOLS		
C3x/C4x PC-DOS,OS/2 C Compiler/Assembler/Linker§	TMDS3243855-02	750

+ Prices are quoted in U.S. dollars and represent year 2003 suggested resale pricing.
** Includes code generation tools (Assembly language).*
§ Includes code generation tools C Compiler/Assembler/Linker and code generation tools (Assembly language).
† Includes Code Composer integrated development environment (IDE), code generation tools C Compiler/Assembler/Linker XDS510 device drivers (emulation software) and simulator.
Please see the features supported by platform matrix on page 68 for more details.

C3x DSP PLATFORM TOOLS DOCUMENTATION

Hardware Reference Guides	Web Search Literature #
TMS320C3x DSK User's Guide	SPRU163
TMS320C3x Emulator Installation Guide	SPRU122
TMS320C3x Evaluation Module Installation Guide	SPRU120
TMS320C3x Workstation Emulator Installation Guide	SPRU130
Software Reference Guides	
TMS320C3x Peripheral Control Library User's Guide	SPRU086
TMS320C3x C Source Debugger User's Guide	SPRU053

Software Reference Guides (Cont'd)	Web Search Literature #
TMS320C3x/C4x™ Optimizing C Compiler User's Guide	SPRU034
Floating-Point Assembly Language Tools User's Guide	SPRU035
Code Composer™ User's Guide	SPRU296
TMS320C3x Simulator Getting Started Guide	SPRU123
Getting Started Guide for the TMS320™ Code Generation Tools	SPRU119

Check the TI web site for a complete listing of technical documentation including application notes.

TMS320C3x™ DSP LITERATURE AND RELATED TECHNICAL DOCUMENTATION

Data Sheets	Web Search Literature #
TMS320C30 Data Sheet	SPRS032
TMS320C31 Data Sheet	SPRS035
TMS320C32 Data Sheet	SPRS027
TMS320VC33 Data Sheet	SPRS087

Technical Brief	Web Search Literature #
TMS320C31 Embedded Control Technical Brief	SPRU083
Hardware User's Guide	
TMS320C3x User's Guide	SPRU031
Applications Guide	
TMS320C3x Applications Guide	SPRU194

Check the TI web site for a complete listing of technical documentation including application notes.

C3x™ DSP PLATFORM PRODUCT SUPPORT

TMS320C30 DSP Application Notes	**www.ti.com/c30appnotes**
TMS320C31 DSP Application Notes	**www.ti.com/c31appnotes**
TMS320C32 DSP Application Notes	**www.ti.com/c32appnotes**
TMS320C33 DSP Application Notes	**www.ti.com/c33appnotes**

For the most updated information on TMS320C3x DSPs, visit www.ti.com/c3x

DSP CODECS AND POWER MANAGEMENT PRODUCTS FOR THE TMS320C3x™ DSP PLATFORM

TI DSP and TI High-Performance Analog Products Provide Leading-Edge Signal Processing Solutions

Our products offer a range of interface options and are also available in supply voltages ranging from 2.7 V to 15 V.

Power Management Products

Low Dropout Regulators (LDOs)

- Broad portfolio designed to support lower current requirements
- Small SOT23 packaging available
- Feature-rich products available offering Reset, Power Good pin and ultra-low quiescent current

Switching Regulators

- DC/DC controllers for high flexibility and excellent value
- SWIFT™ DC/DC converters for simple design and fewer components

Supply Voltage Supervisors (SVS)

- Designed to protect the DSP and maintain data integrity
- Dual SVSs designed to monitor both C3x™ core and I/O voltage rails
- Small packaging saves PCB space

Plug-In Power Solutions

- Complete power solution
- EMI and reliability tested

DSP CODECS FOR THE TMS320C3x DSP PLATFORM

Device	Band Pass Filter (3 dB) Hz	Low Pass Filter (3 dB) (Hz)	Sampling Rate (kHz) (Max)	Sin x/x Correction	Analog Supply Voltage (V)	Digital Supply Voltage (V)	Power Dissipation (mW)	Parallel or Serial	No. of Inputs
14-Bit									
TLC320AC01	Up to 10.8k	10.8k	25	Yes	+5	±5	100	Serial	2
TLC320AC02	Up to 10.8k	10.8k	25	Yes	+5	±5	100	Serial	2
16-Bit									
TLC320AD50*	Up to 9.92k	9.92k	22.05	No	+5	+5/+3.3	120	Serial	2
TLC320AD545	Up to 4.96k	4.96k	11.025	No	+5/+3.3	+5/+3.3	120	Serial	1

** Evaluation modules available*
*For a complete list of data converter evaluation modules, please see our web site at **www.ti.com/sc/evms***

SUGGESTED POWER MANAGEMENT PRODUCTS FOR THE TMS320C3x DSPs FOR NON-PORTABLE APPLICATIONS

Output Current	<50 mA	100 mA	250 mA	500 mA	750 mA	1 A	2 A	4 A
Dual Plug-In Module	–	–	–	–	–	PT6930	PT6930	PT6940
Plug-In Module –	–	PT5520	PT5520	PT5520	PT5520	PT5500	PT5400	
DC/DC Converter (w/ FETs)	TPS62200	TPS62200	TPS62200	TPS62000	TPS62050	TPS62040	TPS54310	TPS54610
DC/DC Controller	TPS43000	TPS43000	TPS43000	TPS43000	TPS43000	TPS43000	TPS43000	TPS43000
Dual LDO[1]	TPS70751	TPS70751	TPS70751	TPS70151	TPS767D318	TPS767D318	TPS70351	–
Low Dropout Regulator (LDO)	TPS72201	TPS72101	TPS79401	TPS79501	TPS77701	TPS72501	TPS75201	TPS75601

Supervised Voltage		1.8 V		3.3 V				
Dual SVS[2]		TPS3305-18		N/A				
Supply Voltage Supervisor (SVS)		TPS3128E18		TPS3823-33				

Note 1: Current shown for powering DSP core. I/O current capability for the Dual LDO is rated approximately 50% of core current.
Note 2: Other supervised voltage is 3.3 V.
Adjustable output voltage part numbers shown. Fixed voltages shown on the respective datasheets.
*See **power.ti.com** for a complete product offering.*

FIFO PRODUCTS FOR ALL TMS320™ DSP PLATFORMS

TI DSP-Sync™ FIFO Products

- Industry's fastest 3.3-V FIFOs fully optimize DSP performance in high-bandwidth telecom and internetworking applications by eliminating data bottlenecks

TMS320C6000™ DSP Applications

- Network security cameras
- Wireless LAN
- Streaming video servers
- Remote Access Servers (RAS)
- Wireless basestations
- Digital Subscriber Lines (xDSL)
- Medical and industrial imaging
- Multi-channel telephony
- Gigabit Ethernet routers
- ATM switches
- SONET/ATM multiplexers
- Broadband video transcoders

TMS320C5000™ DSP Applications

- Digital still cameras
- Digital audio players
- Digital media processing
- Networking
- Industrial controls
- Voice recognition
- Biometrics
- Automotive
- Enhanced gaming

TMS320C3x™ DSP Applications

- Videoconferencing
- Copiers, scanners and printers
- Digital audio
- Industrial controls, automation and robotics
- Voice/Facsimile

Features and Benefits

- Provide DSP glueless interface to TI's TMS320™ DSPs
- Allow both first-word and standard fall-through timing
- Offer fully programmable flags

TI DSP-SYNC FIFOs FOR ALL TMS320 DSP PLATFORMS

Device	Description	Package	Supply Voltage (V)	Max Clock Freq (MHz)	Access Time (ns)	1 KU ($U.S.)[+]
SN74V215	512 × 18, Sync FIFO	64 TQFP	3.3	133	5	5.67
SN74V225	1K × 18, Sync FIFO	64 TQFP	3.3	133	5	6.36
SN74V235	2K × 18, Sync FIFO	64 TQFP	3.3	133	5	7.18
SN74V245	4K × 18, Sync FIFO	64 TQFP	3.3	133	5	7.87
SN74V263	8K × 18/16K × 9, Sync FIFO	80 TQFP 100 BGA	3.3	166	4.5	20.26
SN74V273	16K × 18/32K × 9, Sync FIFO	80 TQFP 100 BGA	3.3	166	4.5	22.00
SN74V283	32K × 18/64K × 9, Sync FIFO	80 TQFP 100 BGA	3.3	166	4.5	23.74
SN74V293	64K × 18/128K × 9, Sync FIFO	80 TQFP 100 BGA	3.3	166	4.5	25.48
SN74V3640	1K × 36, Sync FIFO	128 TQFP	3.3	166	4.5	16.79
SN74V3650	2K × 36, Sync FIFO	128 TQFP	3.3	166	4.5	18.53
SN74V3660	4K × 36, Sync FIFO	128 TQFP	3.3	166	4.5	20.26
SN74V3670	8K × 36, Sync FIFO	128 TQFP	3.3	166	4.5	22.00
SN74V3680	16K × 36, Sync FIFO	128 TQFP	3.3	166	4.5	23.74
SN74V3690	32K × 36, Sync FIFO	128 TQFP	3.3	166	4.5	25.48

*[+] Prices are quoted in U.S. dollars and represent year 2003 suggested resale pricing for the fastest available device. For a complete list of TI FIFO devices, please see our web site at **www.ti.com/sc/fifo***

For the most updated information on TI FIFOs, visit www.ti.com/sc/fifo

DIGITAL LOGIC PRODUCTS FOR ALL TMS320™ DSP PLATFORMS

Bus Interface Products

- The LVC and ALVC families offer V_{CC} fully specified to match the needs of the TMS320™ family: 3.3 V, 2.5 V and 1.8 V
- Broad range of surface mount packaging options from SOIC to BGA
- Propagation delays of 3 ns and below
- Bus hold on data inputs decreases system component count by eliminating the need for external pull-up/pull-down resistors

Little Logic

- Ability to place a single gate in critical locations provides for simplified routing and board space savings
- Single gates also provide easy state change for control inputs
- The NanoStar package provides the industry's smallest logic package

Level Translation

- Interface between a 3.3-V DSP and 5-V I/O modules
- Interface to 5-V CMOS-level devices which cannot be operated reliably from 3.3-V outputs
- Interface 5-V memory modules that must be connected to 3.3-V components

Bus Switches

- Support easy bus communication between devices (i.e., memory and DSP)
- Near-zero propagation delay enables highest system speed – $t_{pd(MAX)}$ = 0.25 ns for CBTLV
- Applications include: 5-V to 3-V translators, hot card insertion, portable equipment and wireless

I/O Expansion

- I^2C-to-parallel port expander
- Compatible with most processors and microcontrollers

BUS INTERFACE FOR TMS320 DSPs

Device	Description	Supply Voltage	$t_{pd\ max}$ (ns)	Package (Number of Pins)
SN74ALVC16244A	16-bit buffer/driver with 3-state outputs	3.3 V	3	TSSOP, SSOP(48)/VFBGA(56)
SN74ALVCH16244	16-bit buffer/driver with 3-state outputs	3.3 V	3	TSSOP, TVSOP, SSOP(48)/VFBGA(56)
SN74ALVCH16245	16-bit bus transceiver with 3-state outputs	3.3 V	3	TSSOP, TVSOP, SSOP(48)/VFBGA(56)
SN74ALVCH16373	16-bit transparent D-type latch with 3-state outputs	3.3 V	3.6	TSSOP, SSOP(48)/VFBGA(56)
SN74ALVCH16374	16-bit edge-triggered D-type flip-flop with 3-state outputs	3.3 V	4.2	TSSOP, SSOP(48)/VFBGA(56)
SN74ALVC16835	18-bit Universal Bus driver with 3-state outputs	3.3 V	3.6	TSSOP, TVSOP, SSOP, VFBGA(56)
SN74ALVCH16835	18-bit Universal Bus driver with 3-state outputs	3.3 V	3.6	TSSOP, TVSOP, SSOP, VFBGA(56)
SN74ALVCH162244	16-bit buffer/driver with 3-state outputs	3.3 V	4.2	TSSOP, SSOP(48)
SN74ALVCH162374	16-bit edge-triggered D-type flip-flop with 3-state outputs	3.3 V	4.6	TSSOP, SSOP(48)
SN74ALVC162835	18-bit Universal Bus driver with 3-state outputs	3.3 V	4.2	TSSOP, TVSOP, SSOP(56)
SN74ALVCH162835	18-bit Universal Bus driver with 3-state outputs	3.3 V	4.2	TSSOP, TVSOP, SSOP(56)
SN74LVC16244A	16-bit buffer/driver with 3-state outputs	3.3 V	4.1	TSSOP, TVSOP, SSOP(48)/VFBGA(56)
SN74LVCH16244A	16-bit buffer/driver with 3-state outputs	3.3 V	4.1	TSSOP, TVSOP, SSOP(48)/VFBGA(56)
SN74LVC16245A	16-bit bus transceiver with 3-state outputs	3.3 V	4	TSSOP, TVSOP, SSOP(48)/VFBGA(56)
SN74LVCH16245A	16-bit bus transceiver with 3-state outputs	3.3 V	4	TSSOP, TVSOP, SSOP(48)/VFBGA(56)
SN74LVC16373A	16-bit transparent D-type latch with 3-state outputs	3.3 V	4.2	TSSOP, TVSOP, SSOP(48)/VFBGA(56)
SN74LVCH16373A	16-bit transparent D-type latch with 3-state outputs	3.3 V	4.2	TSSOP, TVSOP, SSOP(48)/VFBGA(56)
SN74LVC16374A	16-bit edge-triggered D-type flip-flop with 3-state outputs	3.3 V	4.5	TSSOP, TVSOP, SSOP(48)/VFBGA(56)
SN74LVCH16374A	16-bit edge-triggered D-type flip-flop with 3-state outputs	3.3 V	4.5	TSSOP, TVSOP, SSOP(48)/VFBGA(56)

LITTLE LOGIC FOR TMS320 DSPs

Device	Description	Supply Voltage	$t_{pd\ max}$ (ns)	Package (Number of Pins)
SN74LVC1G00	Single 2-input positive-NAND gate	3.3 V	4.7	SOT, DSBGA(5)
SN74LVC1G04	Single inverter	3.3 V	4.2	SOT, DSBGA(5)
SN74LVC1G07	Single buffer/driver with open-drain output	3.3 V	4.2	SOT, DSBGA(5)
SN74LVC1G08	Single 2-input positive-AND gate	3.3 V	4.5	SOT, DSBGA(5)
SN74LVC1G14	Single Schmitt-Trigger inverter	3.3 V	5.5	SOT, DSBGA(5)
SN74LVC1G32	Single 2-input positive-OR gate	3.3 V	4.5	SOT, DSBGA(5)
SN74LVC1G79	Single positive-edge-triggered D-type flip-flop	3.3 V	5.2	SOT, DSBGA(5)
SN74LVC1G125	Single bus buffer gate with 3-state outputs	3.3 V	4.5	SOT(5), DSBGA(5)
SN74AUC1G00	Single 2-input positive-NAND gate	1.8	2.5	SOT, DSBGA(5)
SN74AUC1G04	Single inverter gate	1.8	2.5	SOT, DSBGA(5)
SN74AUC1G07	Single buffer/driver with open-drain output	1.8	2.5	SOT, DSBGA(5)
SN74AUC1G08	Single 2-input positive-AND gate	1.8	2.5	SOT, DSBGA(5)
SN74AUC1G14	Single Schmitt-Trigger inverter	1.8	2.8	SOT, DSBGA(5)
SN74AUC1G32	Single 2-input positive-OR gate	1.8	2.5	SOT, DSBGA(5)
SN74AUC1G79	Single positive-edge-triggered D-type flip-flop	1.8	1.9	SOT, DSBGA(5)
SN74AUC1G125	Single bus buffer gate with 3-state output	1.8	2.5	SOT(5), DSBGA(5)

LEVEL TRANSLATION FOR TMS320 DSPs

Device	Description	Supply Voltage	$t_{pd\ max}$ (ns)	Package (Number of Pins)
SN74AVCB164245	16-bit dual-supply bus transceiver w/ config. translation and 3-state outputs	Various	4.3	TSSOP, TVSOP(48)/VFBGA(56)
SN74AVCBH164245	16-bit dual-supply bus Xcvr w/ config. voltage translation and 3-state outputs	Various	4.3	TSSOP, TVSOP(48)/VFBGA(56)
SN74TVC3306	Dual-voltage clamp	Various	4	SOT(8)

BUS SWITCHES FOR TMS320 DSPs

Device	Description	Supply Voltage	$t_{pd\ max}$ (ns)	Package (Number of Pins)
SN74CBTLV16211	Low-voltage 24-bit FET bus switch	3.3 V	0.25	TSSOP, TVSOP, SSOP, VFBGA (56)
SN74CBTLV16212	Low-voltage 24-bit FET bus-exchange switch	3.3 V	0.25	TSSOP, TVSOP, SSOP, VFBGA (56)

I/O EXPANSION FOR TMS320 DSPs

Device	Description	Supply Voltage	$t_{pd\ max}$ (ns)	Package (Number of Pins)
PCF8574	Remote 8-bit I/O expander for I^2C bus	3.3 V	NA	PDIP, SOIC (16) / TSSOP (20)
PCF8574A	Remote 8-bit I/O expander for I^2C bus	3.3 V	NA	PDIP, SOIC (16) / TSSOP (20)

eXpressDSP™ SOFTWARE AND DEVELOPMENT TOOLS

Complete, Open, Real-Time Software Environment for TI DSPs

Standardization and software reuse move DSP development to a new level

... from traditional DSP programming

- Limited modularity and reusability
- Experts only
- Create your own software
- Tedious algorithm integration
- Lengthy development

... to mainstream reuse and standardization

- Standards enabled for modular, reusable multi-function applications
- Developers of all experience levels
- Integrate your own software
- Catalog of interoperable software
- Focus on adding value/differentiation
- Faster time-to-market

Features and Benefits

- Includes:
  - Powerful, integrated development tools (Code Composer Studio™ Development Tools)
  - Scalable real-time kernel (DSP/BIOS™)
  - eXpressDSP-compliant algorithms (written to the TMS320™ DSP Algorithm Standard)
  - Reusable modular software and support from TI's DSP Third Party Network
- Available on TMS320C6000™, TMS320C5000™ and TMS320C2000™ DSP platforms
- Advanced data visualization and real-time analysis
- Powerful code generation tools
- Open plug-in architecture
- Tools and standards to simplify application development, accelerate time-to-market and enhance product robustness and innovation

WHAT ARE eXpressDSP SOFTWARE AND DEVELOPMENT TOOLS?

TI's real-time eXpressDSP Software and Development Tools provide a complete and open DSP software environment to simplify and streamline the DSP product development process. It provides access to a large number of reusable software components, host tooling (Code Composer Studio™ Development Tools) and target-side content (eXpressDSP-compliant algorithms and DSP/BIOS™ kernel) to reduce development time. For information on eXpressDSP Software and Development Tools, visit **www.ti.com/tools**

eXpressDSP Software and Development Tools

Code Composer Studio Development Tools

- Includes tools for editing, debugging, compiling, code profiling and more
- Free evaluation tools available
- Team-based development
- Fast simulators provide deeper visibility for quick and precise problem resolution
- Analysis Tool Kit boosts performance and simplifies tedious guess work with new utilities
- Enhanced Pipeline Analysis tool provides detailed pipeline visibility

XDS560™ Emulator

- PCI-based emulator supporting high-speed RTDX™
- Speeds time-to-market with real-time data transfer rates of over 2 MBytes/second
- Increases productivity with faster start up for larger applications
- Quickly finds and fixes intermittent real-time problems
- Upward compatible with XDS510™ emulators

eXpressDSP Software

eXpressDSP DSP/BIOS Kernel

- No run-time royalty
- Integrated with Code Composer Studio Development Tools
- Includes preemptive multitasking scheduler and real-time analysis

eXpressDSP-Compliant Algorithms

- Available for a myriad of applications
- Written to the TMS320™ DSP Algorithm Standard

eXpressDSP Reference Frameworks

- Get started today–out-of-the-box framework software
- Adaptable to your needs–100 percent C-source code
- Pick version just right for you–available for different applications
- Reduces cost–royalty-free run-time licensing (RF1 and RF3)
- Saves time–eliminates design, build and test of low-level parts of DSP solution

TI DSP Third Party Network

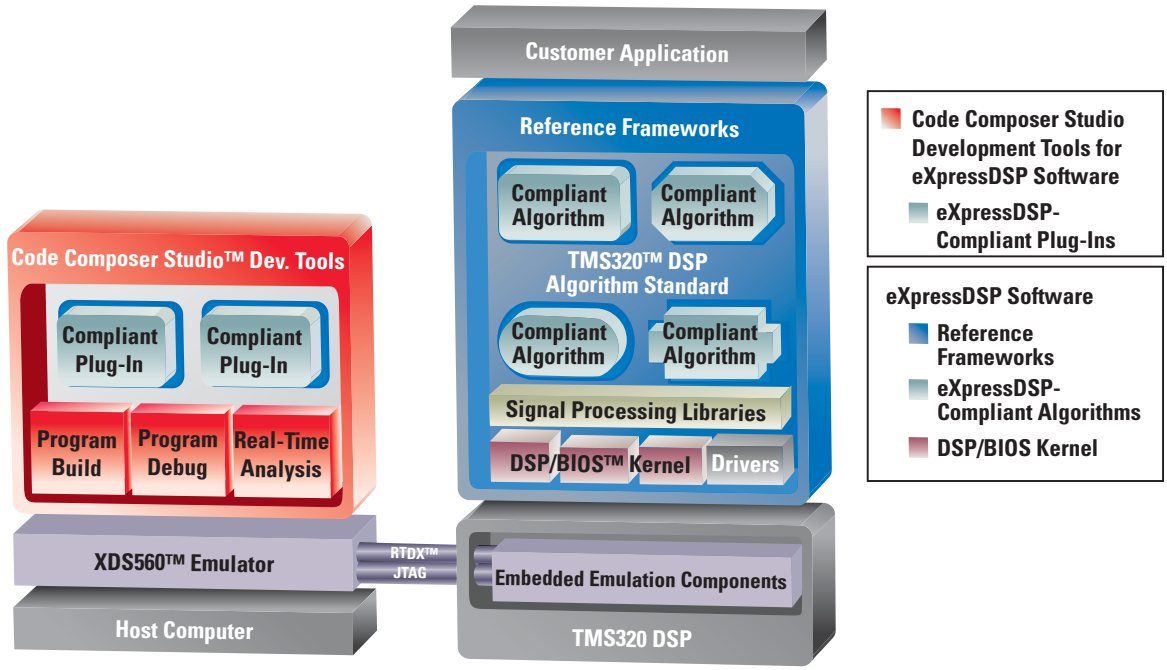
- Hundreds of companies producing thousands of products
- Many eXpressDSP-compliant algorithms and plug-ins available today

eXpressDSP Software and Development Tools are designed to cut development time by up to 50 percent and increase the modularity and reuse of applications.

For the most updated information on eXpressDSP Dev. Tools, visit www.ti.com/software

eXpressDSP™ SOFTWARE AND DEVELOPMENT TOOLS (CONT'D)

eXpressDSP Software and Development Tools Block Diagram



eXpressDSP Software Development Tools for faster programming and easier integration.

eXpressDSP REFERENCE FRAMEWORKS

Getting Started Software for DSP-Based Application Development Increases Productivity and Speeds Time-to-Market with Differentiated Products

Accelerating the software development process for designers of DSP-based applications, TI produces and supports a series of DSP software Reference Frameworks (RF). The design-ready RFs are getting-started solutions for designers in the early stages of application development, featuring easy-to-use source code that is common to many applications. With TI's RFs, much of the initial low-level design decisions have been eliminated allowing developers more time to focus on the code that truly differentiates products. Designers can choose the specific RF that best meets their system needs and then populate the RF with algorithms from either the 650+ eXpressDSP-compliant algorithms or their own algorithms, creating specific applications for a range of end-equipments such as broadband, voice, video imaging, biometrics and wireless infrastructure. For more information, visit: **www.ti.com/rfinfo**

SELECT THE REFERENCE FRAMEWORK THAT BEST WORKS FOR YOU

Design Parameter	Compact	Flexible	Extensive
Absolute minimum footprint	✔	○	○
Static configuration	✔	✔	✔
Static memory management	✔	✔	✔
Single-rate operation	✔	✔	✔
Number of channels	1 to 3	1 to 10+	1 to 100+
Number of eXpressDSP algorithms	1 to 3	1 to 10+	1 to 100+
Dynamic memory allocation	○	✔	✔
Multi-rate operation	○	✔	✔
Implements control functionality	○	✔	✔
Thread preemption	○	✔	✔
Blocking	○	○	✔
Total memory footprint (less algorithms)	3.5 kW (C54x™)	12 kW (C55x™)	17 kW (C55x)
Part number	RF1	RF3	RF5

CODE COMPOSER STUDIO™ DEVELOPMENT TOOLS FOR eXpressDSP™ SOFTWARE

Integrated Development Environment

Code Composer Studio Development Tools Simplify DSP Development

Code Composer Studio software is a fully integrated development environment (IDE) supporting Texas Instruments industry-leading TMS320C6000™, TMS320C5000™ and TMS320C2000™ DSP platforms. Code Composer Studio IDE is a key component of eXpressDSP Software and Development Tools that slashes development and integration time for DSP software.

Features and Benefits

- A development environment that tightly integrates all tools into a single easy-to-use application
- Real-time analysis tools for monitoring program interactions without halting the processor
- Support for TI's high-performance C64x™ and low-power C55x™ DSPs
- Leading C compiler in the industry
- A scalable real-time kernel (DSP/BIOS™ kernel)
- Profile-Based Compiler (C6000™ DSP) for optimizing code size and performance
- Visual Linker for graphically arranging program code and data in memory
- Data visualization for viewing signals in multiple graphical formats
- Open plug-in architecture allows you to integrate specialized third-party tools
- Real-time bi-directional application data visibility through RTDX™ technology
- Real-time JTAG scan-based emulation for TI DSPs with the XDS560™ and XDS510™ emulators
- Easily manage large multi-user, multi-site and multi-processor projects
- Fast simulators provide deeper visibility for quick and precise problem resolution
- Analysis Tool Kit boosts performance and simplifies tedious guess work with new utilities
- Enhanced Pipeline Analysis tool provides detailed pipeline visibility

CODE COMPOSER STUDIO DEVELOPMENT TOOLS OVERVIEW

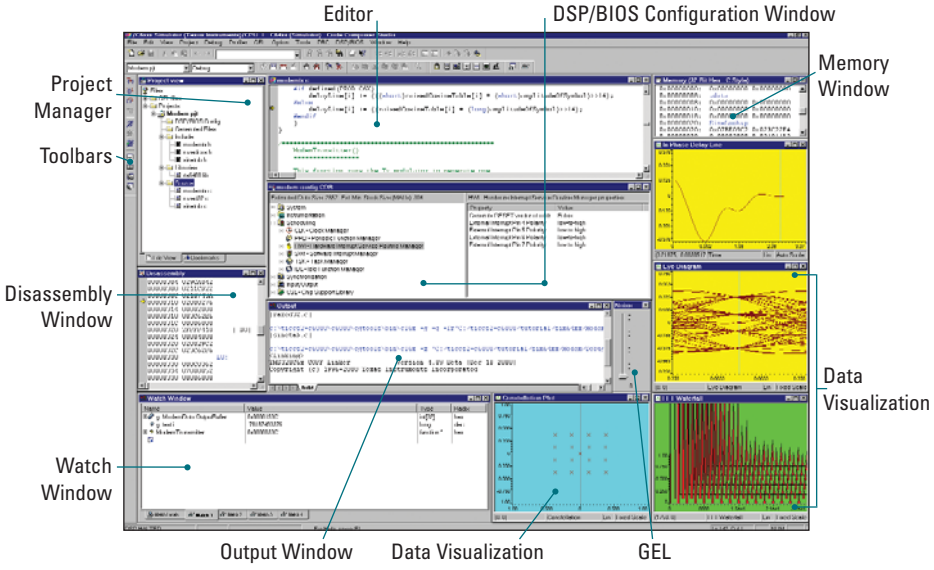
Code Composer Studio IDE includes the features necessary to take you through each step of the application development flow. All of the features are provided in an integrated product allowing developers to focus their energy on innovation. Code Composer Studio IDE has an open architecture that allows TI and third parties to extend the IDE's functionality by seamlessly plugging-in additional specialized tools. Such familiar tools and interfaces allow users to get started faster than ever before and add functionality to their application thanks to sophisticated productivity tools.

Code Composer Studio full-function evaluation tools are available for a free 90-day evaluation. To order your CD-ROM, visit: **www.ti.com/freetools**

Industry-Leading C/C++ Compiler

Unlike other compilers that rely on public domain (GNU) technology, TI's Code Composer Studio compiler takes advantage of limited registers and makes tight DSP-specific loops. With more than 10 years experience and several patents, the robust and reliable compiler and optimizer technologies allow developers to spend less time hand-coding and more time concentrating on delivering new applications.

Code Composer Studio tools include the only compiler that optimizes code at the program level, which is often critical to performance. The compiler also contains many DSP-specific optimizations, such as software pipelining, conversion/predicate execution, memory address cloning, and memory address dependence elimination.



Code Composer Studio Development Tools feature all tools used in the development cycle working tightly together. Edit, build, debug and visualize.

For the most updated information on Code Composer Studio IDE, visit www.ti.com/ccstudio

CODE COMPOSER STUDIO™ DEVELOPMENT TOOLS FOR eXpressDSP™ SOFTWARE (CONT'D)

A Unique Profile-Based Compiler

Now you have the ability to choose the optimum trade-off between code size and performance. TI's Profile-Based Compiler (PBC), available today for the C6000™ DSP platform, allows you to graphically select the size and speed of your application to meet your system needs.

Visual Linker

The Visual Linker dramatically simplifies linking, reduces time-to-market, decreases application size, and helps boost performance. Utilizing a Windows™ Explorer-like interface, the Visual Linker provides the ability to drag-and-drop program components into multiple and different memory types and areas, choose from a library of standard device memory maps, uncover opportunities for optimization using immediate visual feedback on memory allocation, and reduce application size with fine-grained automatic elimination of unused code and data.

Debug Within the IDE

Code Composer Studio IDE's integrated debugger has DSP-specific capabilities and advanced breakpoints to simplify development. Conditional or hardware breakpoints are based on full C expressions, local variables or CPU register symbols. A General Extension Language (GEL) script file can be executed when a particular breakpoint hits. Global breakpoints are also available for multiprocessor systems. Developers can debug code quickly by selectively stepping into, over, or out of C functions or assembly subroutines. A ProbePoint™, unique to Code Composer Studio Development Tools, is a sophisticated form of a breakpoint. It allows developers to define a point in the algorithm where oscilloscope-type functions can be performed. Unlike a breakpoint, program execution resumes after hitting a ProbePoint and performs the connected activity (e.g., inject or extract signal data, observe signals, execute GEL script).

Multi-Target Debug

Code Composer Studio IDE supports the development of complex systems with multiple boards or multiple processors on a single target board. Code Composer Studio's Parallel Debug Manager (PDM) provides synchronized control over multiple processors configured in single or multiple scan chains. It can be used to launch individual parent windows to control each processor. The Parallel Debug Manager can be used to broadcast commands to different groups of CPUs in the JTAG scan path. A global breakpoint command on one processor can halt other processors when this breakpoint is encountered. The Parallel Debug Manager lets developers open up separate debug windows for any CPU on any board in the system.

Real-Time Data Exchange (RTDX™)

Once algorithms are integrated into applications, the real-time behavior of the system must be observed. Code Composer Studio Development Tools allows the developer to visualize or debug an application while it runs in real time. Real-Time Data Exchange provides significant benefits over alternative methods of system debugging.

RTDX gives developers the industry's first DSP system that provides real-time, continuous visibility into the way target applications operate in the real world. RTDX allows developers to transfer data between the host computer and DSP devices without stopping their target application. This shortens development time by giving developers a much more realistic

CODE COMPOSER STUDIO DEVELOPMENT TOOLS FEATURES SUPPORTED BY PLATFORM

	Code Composer Studio Development Tools																Analysis Toolkit**		
DSP	Integrated Development Environment	C/C++ and Assembly	DSP/BIOS™	XDAIS™	Reference Frameworks**	RTDX	Fast Simulators*	Simulators	Update Advisor	Chip Support Libraries*	Parallel Debug Manager (Multiple Processor Debug)	Pipeline Analysis	Profile-Based Compiler	Scripting**	Flashburn**	Power Analyzer**	Dynamic Loader**	Multi-Event Profiler	Code Coverage	Cache Analysis
TMS320C54x™	X	X	X	X	X	X		X	X	X	X			X	X	X	X			
TMS320C55x™	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X
TMS320C62x™	X	X	X	X	X	X	X	X	X	X	X		X	X	X		X	X	X	X
TMS320C67x™	X	X	X	X	X	X	X	X	X	X	X		X	X	X		X	X	X	X
TMS320C64x™	X	X	X	X	X	X	X	X	X	X	X		X	X	X		X	X	X	X
TMS320C24x™	X	X°		X		X‡			X		X									
TMS320C28x™	X	X	X	X		X		X	X		X	X								
OMAP™	X	X	X†	X		X		X	X	X	X			X		X	X			

** Available on selected devices within the DSP platform.*
*** Available on the Update Advisor for users with active CCStudio subscription.*
° Supports C only.
† Available only on DSP CPU.
‡ Real-time monitor.

CODE COMPOSER STUDIO™ DEVELOPMENT TOOLS FOR eXpressDSP™ SOFTWARE (CONT'D)

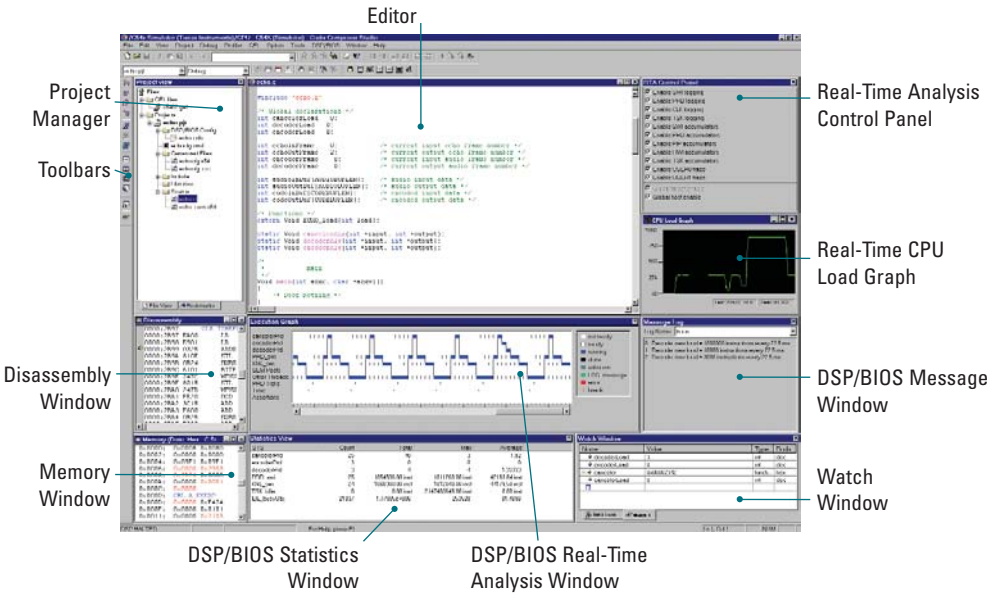
representation of the way their systems operate. RTDX™ allows designers to continually monitor their systems and gain real-time insight into their running applications.

Interactive Profiling

Code Composer Studio IDE's interactive profiler makes it easy to quickly measure code performance and ensure the efficient use of the DSP target's resources during debug and development sessions. The profiler allows developers to easily profile all C/C++ functions in their application for instruction cycles or other events such as cache misses/hits, pipeline stalls and branches. Profile ranges can be used to concentrate efforts on high-usage areas of code during optimization, helping developers produce finely-tuned code. Profiling is available for ranges of Assembly, C++ or C code in any combination. To increase productivity, all profiling facilities are available throughout the development cycle.

Real-Time Analysis

Using the real-time analysis capabilities of Code Composer Studio Development Tools, a developer can probe, trace and monitor a DSP application while it runs. These utilities are based on a real-time link and awareness between the Code Composer Studio Development Tools host environment and the target. Even after the program has been halted, information already captured through the real-time analysis tools can provide invaluable insight into the sequence of events that led up to the current point of execution. Real-time analysis tools are used later in the development cycle when transitioning from the debug phase to the runtime phase. They show subtle problems arising from time-dependent interaction of program components. Real-time analysis tools are the software counterpart of the hardware logic analyzer.



DSP/BIOS™ configuration and real-time analysis tools are included and are fully integrated with Code Composer Studio IDE.

For the most updated information on Code Composer Studio IDE, visit www.ti.com/ccstudio

DSP/BIOS™ KERNEL FOR eXpressDSP™ SOFTWARE

Scalable Real-Time Kernel

DSP/BIOS Kernel Shortens Development Time

DSP/BIOS kernel is a scalable real-time kernel, designed for the TMS320C28x™ DSP generation, TMS320C5000™ and TMS320C6000™ DSP platforms with preemptive multi-threading, hardware abstraction, real-time analysis and system configuration tools.

Features and Benefits

- Quickly design multifunction applications
- Understand your application's real-time behavior
- No need to develop scheduling software
- Simpler device configuration and programming
- Port applications quickly to new devices
- Preemptive multitasking scheduler
- Multiple scheduling and communication mechanisms
- Fast, deterministic performance
- Very small memory footprint
- Configurable functionality
- Graphical configuration
- Static and dynamic task creation
- Integrated real-time analysis tools
  - CPU load
  - Max/Average execution times
  - Task execution trace
  - Kernel object browser

DSP/BIOS KERNEL OVERVIEW

DSP/BIOS kernel simplifies the development of today's multifunction DSP applications. Complex applications that are easily organized into separate threads are scheduled in real-time according to their priority. New functionality can be easily added without affecting the response time of critical real-time functions. DSP/BIOS kernel also provides a set of interthread communication mechanisms that enable synchronization between threads if desired.

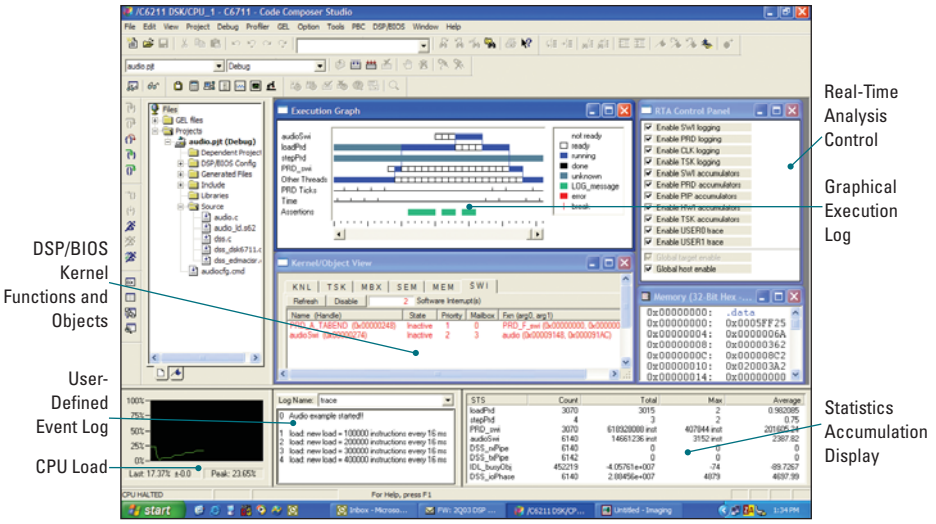
To aid debugging of complex applications, DSP/BIOS kernel includes host-to-target communication and real-time instrumentation services that are integrated with graphical real-time analysis displays on the development host. DSP programmers can instrument their applications to be probed, traced and monitored as they execute in real-time. Alternatively, programs that take advantage of the multi-threading capabilities of the DSP/BIOS kernel are implicitly instrumented; i.e., programs without any explicit calls to the DSP/BIOS kernel APIs can be traced in real-time.

DSP/BIOS kernel includes a chip support library that simplifies configuration and programming of the DSP on-chip peripherals such as the DMA channels, serial ports, host interface ports, caches and external memory interfaces. DSP/BIOS kernel enables you to configure the peripheral control registers either through a graphical tool or through a higher-level programmatic interface. Both methods eliminate the need to know exactly which bits to set in a specific register.

DSP/BIOS kernel is integrated within the Code Composer Studio™ Development Tools, requires no run-time license fees, and is fully supported by Texas Instruments.

DSP/BIOS kernel gives you a solid foundation to support substantial, sophisticated programs with a robust, industry-proven software kernel that has been used in thousands of designs.

For more information, visit **www.ti.com/dspbios**



Find and fix real-time problems without any runtime license fees.

DSP/BIOS™ DRIVER DEVELOPMENT KIT

The DSP/BIOS Driver Development Kit (DDK) is designed to simplify development of device drivers for a broad spectrum of DSP applications, ranging from consumer electronics to telecommunications infrastructure.

The DDK includes drivers for peripherals present on TI's TMS320™ family of DSPs and their associated evaluation boards. To achieve this goal, the DDK provides:

- Fully functional device drivers for numerous TMS320 DSP peripherals
- Documented driver model that standardizes the methodology for developing drivers
- Reusable driver modules that eliminate development of all driver code from scratch

DDK DRIVER SUPPORT FOR THE TMS320™ DSP PLATFORMS

Driver	Description
McBSP	McBSP-DMA driver for use with codecs, TDM and data converters. Supports multiple McBSPs. The McBSP driver is highly versatile and applicable to applications ranging from MP3 decode to codecs in VOIP switches.
McASP	McASP-DMA driver for use with audio codecs. Highly configurable with support for 1-N serializers and TDM modes. The McASP driver is especially appropriate for use in professional audio applications that need to process multiple channels of high-quality audio using I²S.
Video Port	Video Port-DMA driver for use with video encoders, decoders and RAMDACs. The driver addresses the needs of applications such as video servers and security cameras that must process multiple video streams.
UART	Common UART driver code with low-level hardware interface. Supports 16550 UART out of the box. UART drivers may be used for client-side telephony communications or provide general-purpose I/O, such as a command console.
Software UART	Simulates the same UART functionality described above using a DSP's on-chip McBSP and DMA peripherals.
PCI	DSP-side PCI driver that allows bus mastering with support for multiple channels and high-/low-priority queuing. The PCI driver can be used in applications such as wireless basestations that require the DSP to communicate with a microprocessor or custom ASIC.
USB	DSP-side USB client driver that supports up to eight endpoints. The USB driver enables consumer electronics devices such as a digital camera to easily connect to a Windows™ PC to upload pictures.
Multimedia Card	MMC driver that is compatible with file system module. The multimedia card and file system are specially useful in digital camera or portable music players where pictures or songs need to be stored for subsequent retrieval.

Many drivers supported through the DDK are available now.

The DDK complements the Chip Support Library (CSL), which is provided for each TMS320 DSP. The CSL provides low-level hardware abstractions of DSP peripheral registers, initialization functions and resource management. The DDK drivers use the CSL for peripheral initialization and control. For relatively simple peripherals such as timers, real-time clocks and cache, the CSL also provides higher-level programming interfaces. The DDK provides drivers for sophisticated peripherals that perform real-time data movement.

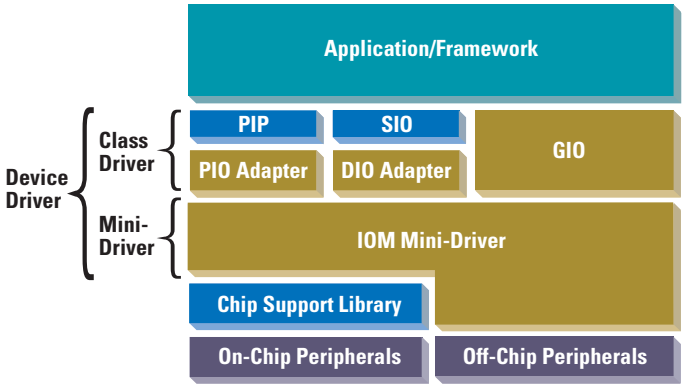
For more information, visit **www.ti.com/driverdevkit**

DEVICE DRIVER AVAILABILITY ACROSS THE TMS320 DSP PLATFORMS

Device Driver	C64x™	C67x™	C55x™	C54x™
McBSP Codec	Yes	Yes	Yes	Yes
Software UART	Yes	Yes	Yes	Yes
McASP	Yes	Yes	–	–
Video Port	Yes	–	–	–
UART	–	–	Yes	Yes
PCI	Yes	–	–	–
HPI	Yes	Yes	Yes	Yes
USB	–	–	Yes	–
Multimedia Card	–	–	Yes	–
Ethernet MAC	Yes	–	–	–

Black signifies available today, and red indicates planned or in development. Please contact TI for updated availability.

DSP/BIOS™ Driver Model



The DDK defines a two-level driver model and additional application-level APIs that simplify development of device drivers.

For the most updated information on the DSP/BIOS DDK, visit www.ti.com/ddk

TMS320™ DSP ALGORITHM STANDARD FOR eXpressDSP™ SOFTWARE

Standards for Application Interoperability

Features and Benefits

- Allows mixing of interoperable components
- Lowers support and development costs by eliminating custom coding
- Reduces system integration time
- Enables creativity and innovation
- Choose from hundreds of compliant algorithms available today
- Rules for C2000™, C5000™ and C6000™ DSP platforms
- Tools included to help create compliant algorithms, test for compliant algorithms, and optimize algorithms for compact systems.

Mandatory Rules

- The standard consists of the following:
  - 46 basic "common sense" rules for all algorithms
  - IALG APIs – Abstracts DSP memory management away from algorithms
  - IDMA2 APIs – Abstracts DSP DMA management away from algorithms
  - Instruction Set Architecture (ISA) rules for DSPs
  - Naming conventions to reduce name space pollution

Optional Guidelines

- Several guidelines to help system integrators
- Methods for extending baseline APIs for added functionality – allowing for differentiation

eXpressDSP™ Compliance

- Hundreds of algorithms tested to comply to the TMS320™ DSP Algorithm Standard

TMS320 DSP ALGORITHM STANDARD OVERVIEW

The standard is a set of coding conventions for algorithm writers that reduces time-consuming system integration for anyone trying to put algorithms into their system. This is achieved by defining common programming rules and guidelines with a set of programming interfaces that are consistently used by algorithms across a wide variety of applications.

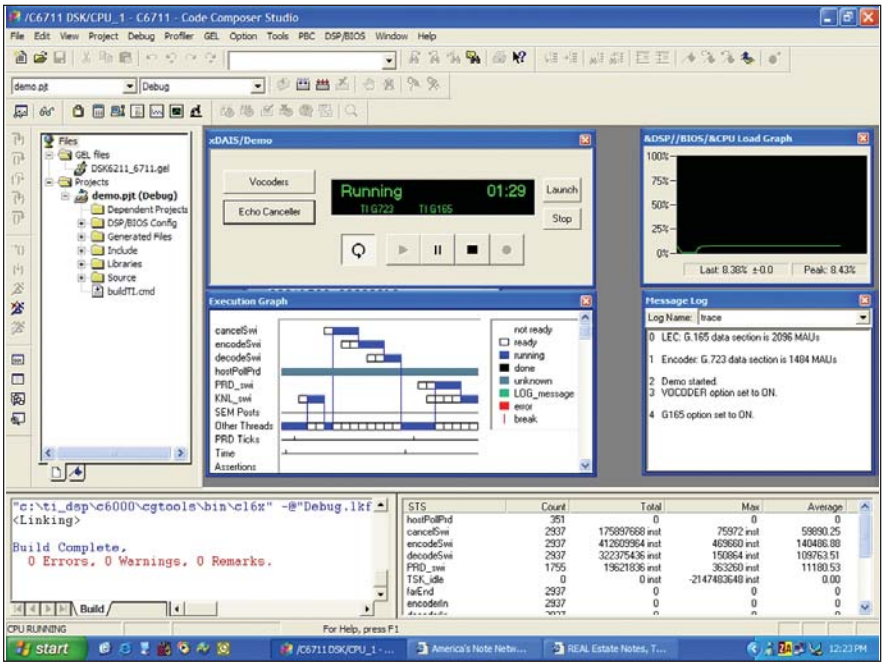
TMS320 DSP Algorithm Standard Developer's Kit

The TMS320 DSP Algorithm Standard Developer's Kit provides all of the information necessary to enable application developers and system integrators to understand and utilize algorithms that are compliant to the standard. Information and tools are also provided for generation of new algorithms that are compliant to the standard.

The TMS320 DSP Algorithm Standard Developer's Kit has everything needed to get started. It contains:

- The TMS320 DSP Algorithm Standard Specification
- Application notes for both producers and users of algorithms
- Example code that builds on evaluation modules (EVMs) and DSP starter kits (DSKs)
- Tools to help with creation of standard header files
- Demo that illustrates the simplicity of algorithm integration
- Support for C6000™, C5000™ and C2000™ DSP platforms

For more information about the TMS320 DSP Algorithm Standard Developer's Kit, visit **www.ti.com/algostanddevkit**



The TMS320 DSP Algorithm Standard Developer's Kit demo shows how easily eXpressDSP-compliant algorithms interoperate.

XDS560™ EMULATOR

PCI-Based Emulator Supporting RTDX™ Data Link

Features and Benefits

- **Real-time visibility speeds time-to-market –** High-speed RTDX™ with real-time data transfer rates of more than 2 MBytes/second
- **Increase productivity through faster start up for larger applications –** Code download speeds of up to more than half a MByte/second
- **Quickly find and fix intermittent real-time problems –** Real-time, non-intrusive breakpoint and action point capabilities via Advanced Event Triggering
- **Preserve existing emulation investment –** Upward compatible with XDS510™ Emulators

JTAG EMULATOR WITH HIGH-SPEED REAL-TIME DATA EXCHANGE (RTDX): XDS560™ PCI-BUS EMULATOR

The XDS560 PCI-Bus Emulator provides an unparalleled level of real-time visibility into executing applications to assist developers in debugging and monitoring real-time systems. High-speed RTDX bandwidth enables visibility into a new range of high-bandwidth applications, as well as multi-channel or multiprocessing versions of lower-bandwidth applications. The XDS560 Emulator can achieve code download speeds of up to more than half a megabyte per second (500 KBytes per second), as much as 8 times faster than XDS510™-class technology, for better loading times of larger applications, speeding development. The XDS560 Emulator also enables Advanced Event Triggering to define and evaluate complex sequences of events before halting the CPU, or taking another action, including:

XDS560 Emulator with highly flexible cable and credit card-sized pod is available in the eStore.

- Setting hardware breakpoints and watchpoints,
- Counting many kinds of events, and
- Detecting very precise debugging sequences

The XDS560 Emulator is fully upward compatible with TI's existing XDS510 Emulator. XDS510-class Emulator customers can move from the XDS510 to using the XDS560 with very little apparent change, using the same target boards with the existing 14-pin JTAG connectors. The XDS560 features are a superset of the XDS510, but include all of the same XDS510-class functions that TI developers expect, with significantly improved performance.

The XDS560 Emulator's PCI bus is a widely available, high-performance interface with the bandwidth to support high-speed RTDX data rates. It includes a longer and highly flexible 5-1/2 foot (1.5+ m) host-target cable suitable for use from 5 V down to 0.5 V to support TI's low-voltage device roadmap. The XDS560 Emulator is based on TI's TMS320C6202 DSP, for additional processing power to help drive the improved performance. It is well suited for space-constrained environments, as the cable can reach into tight places between rack-mounted target boards, and the cable/pod assembly is so light it can even hang from the 14-pin JTAG connector without straining it.

For more information on the XDS560 Emulator, visit **www.ti.com/emulator**

XDS560-class JTAG Emulator products are also available from many TI third parties featuring different communication interfaces such as Ethernet and USB, as well as other features. See the TI DSP Village Third Party on-line catalog and search for "XDS560."

For the most updated information on the XDS560 Emulator, visit www.ti.com/emulator

TI DSP THIRD PARTY NETWORK

Providing DSP Solutions

A Wide Variety of DSP Solutions

Utilize the TI Third Party Network for:

- **Reduced time-to-market –** Time-consuming programming and trouble-shooting tasks can be eliminated by utilizing proven hardware, software, algorithms and libraries from third parties.
- **Lower costs –** Don't spend time and money recreating something that has already been produced. Third parties allow you to dedicate your resources to producing value-added, application-specific products.
- **Additional expertise –** Third-party companies provide consulting services, training, integration, contract engineering, research and development and much more. They are an extra resource for project assistance.
- **Complete solutions –** Third-party companies offer complete solutions for quickly solving application problems. Many solutions incorporate TI's data converters and power management devices.

eXpressDSP™-Compliant Third-Party Products

Texas Instruments in conjunction with its industry-leading DSP Third Party Network offer an array of eXpressDSP-compliant algorithms designed to reduce system integration time and lower support and development costs by eliminating custom coding tasks. Third parties also provide eXpressDSP-compliant plug-in tools to reduce development time. For a complete listing of algorithms and plug-ins, visit **www.ti.com/algorithms**

DSP THIRD PARTY NETWORK OVERVIEW

Over 600 independent third parties provide a vital link between TI silicon and the final application by providing additional hardware, algorithms and libraries, software tools and consulting services. Products/services include:

- eXpressDSP™-compliant algorithms and libraries for a variety of applications such as voice, audio, video, imaging, telecommunications, speech, biometrics, encryption, motor control, as well as others.
- Hardware includes emulators, device programmers and development boards. Development systems include logic analyzers, TIM modules, data acquisition boards, multiprocessing OEM boards and add-on cards.
- Software tools include simulators, debuggers and software development utilities such as filters, signal analyzers, C-code generators and eXpressDSP-compliant plug-ins for Code Composer Studio™ Development Tools.
- Consulting services include turnkey designs, hardware and software integration, training, research and development.

Third Party Product Catalog on TI's Web Site

Information regarding the vast array of products available from TI's Third Party Network, check out: **www.ti.com/thirdpartycatalog**. Extensive information can be found through searchable listings of worldwide TI third parties. Search the hundreds of listings by company, device supported, keyword, product name or product category.

Third Party Network Logo Indicates TMS320™ DSP-Based Solution

Registered TI Third Party Network members use a distinctive Third Party Network logo on various printed and electronic collateral. Look for the logo to identify companies that are ready to provide a TMS320 DSP-based solution.

eXpressDSP-Compliant Logo Indicates TMS320 DSP Algorithm Standard Compliance

Third Party Network members use the eXpressDSP compliance logo in various communications. Logo identifies companies that are ready to provide products that have passed the standards for application interoperability and reuse.

DSP Solutions to Reduce Development Time

Imaging and Audio
- Compression software
- Research and development support
- Hardware and reference designs
- Enhancement libraries
- Print head control software

Getting Started with DSP
- On-site customized training
- Contract engineering design resources
- Subsystem development
- Software experts in applications: embedded control, set-top box, optical networking, digital radio, telematics, biometrics

Comprehensive Development Support
- DSP boards, starter kits and add-ons
- Customized debuggers
- Targeted development platforms
- Real-time emulation
- Consulting services
- Simulation models

Communications
- Modem and DSL software
- Encryption software
- Voice and fax software
- Wireless software
- Real-time operating systems (RTOS)
- Hardware and reference designs
- Consultants

THIRD PARTIES PROVIDING eXpressDSP™-COMPLIANT ALGORITHMS

WHAT ARE eXpressDSP-COMPLIANT ALGORITHMS?

eXpressDSP-compliant algorithms adhere to the rules set forth in TI's TMS320™ DSP Algorithm Standard. Each algorithm is passed through a rigorous automated test before receiving the right to be described as compliant. Pages 53–58 list currently available compliant algorithms and plug-ins from TI third parties.

TI's extensive Third Party Network includes companies that develop eXpressDSP-compliant algorithms based on the TMS320 DSP Algorithm Standard. These algorithm developers provide both proprietary solutions and software that adheres to organizational standards for an array of applications. Our third parties offer eXpressDSP-compliant solutions for Audio, Digital Motor Control (DMC), Encryption, Fax, GSM, Protocol Stacks, Speech, Telephony, Voiceband (VB) Modems, Video & Imaging, Vocoders and Wireless applications across the TMS320C2000™, TMS320C5000™ and TMS320C6000™ DSP platforms.

For more information on compliant algorithms offered by our TI DSP Third Parties, please access the on-line TI DSP Third Party Catalog at **www.ti.com/algorithms**. You can also send an email to **3pquery@list.ti.com** to inquire about any eXpressDSP-compliant algorithms you may be interested in.

		TI DSP Device			Application											
Third Party		C2000™	C5000™	C6000™	Audio	DMC	Encryption	Fax	GSM	Protocol Stacks	Speech	Telephony	VB Modems	Video & Imaging	Vocoders	Wireless
A DSP House	www.adsphouse.com			X								X				
Acoustic Technologies, Inc.	www.acoustictech.com	X		X												
Adaptive Digital Technologies, Inc.	www.adt-inc.com		X									X			X	
Algo Vision Systems GmbH	www.algovision.com			X										X		
Advanced Recognition Technologies, Inc.	www.artcomp.com		X								X					
Alango	www.alango.com/		X		X											
Aliph Com	www.aliph.com		X		X											
Alliance Technologies Group, Inc. (ATG)	www.atgroupinc.com		X	X												X
ATEME	www.ateme.fr		X	X	X									X		
Bayer DSP	www.dsp-bayer.com		X						X	X		X				
Blip-X	www.blip-x.com		X	X										X		
Clarity, LLC	www.clarityco.com		X								X					
Commetrex Corp.	www.commetrex.com		X	X				X				X			X	
COMSIS	www.comsis.fr			X								X			X	
Consystant Design Technologies, Inc.	www.consystant.com			X										X		
Creative DSP Solutions, Inc.	www.creativedsp.com		X		X											
CuTe Solutions	www.cutesolinc.com/			X	X											
Cybernetics Infotech	www.cybit.com		X												X	
D2 Technologies Inc.	www.d2tech.com		X									X			X	
D+R Electronica B.V.	www.d-r.nl			X	X											
DACS Software Pvt. Ltd.	www.dacsindia.com		X									X				
Danlaw Technologies India, Ltd.	www.danlawtechnologies.com	X		X										X		
Deltacom Electronics	www.dce.bg		X						X							
Digilab2000 s.r.l.	www.digilab2000.it			X										X		
Dilithium Networks	www.dilithiumnetworks.com		X	X									X			
DResearch	www.dresearch.de			X										X		
DSP Global, Inc.	www.dspglobal.com		X									X				
DSP Techniques	www.dsptechniques.com	X		X												
DSP Wizard	www.dspwizard.com		X												X	
DSPecialists GmbH	www.dspecialists.de		X	X	X											
e-Infochips Inc.	www.einfochips.com			X	X											
easytools s.l.	www.easytools.es		X				X									
EI CREBOUW	www.eicrebouw.fr		X									X			X	
Electronic Design Associates, Inc.	www.useda.com		X		X											
Emuzed, Inc.	www.emuzed.com		X	X					X					X		
Encore Software Ltd.	www.ncoretech.com		X	X											X	
Enounce Inc.	www.enounce.com		X		X											
eSecurium	www.esecurium.com		X				X									
Ethentica by Security First Corp.	www.ethentica.com		X											X		
Eyematic Interfaces, Inc.	www.eyematic.com			X										X		
Floreat	www.floreatinc.com		X												X	
Fonix Corp.	www.fonix.com		X								X					
Fraunhofer IIS	www.iis.fhg.de			X	X											
GAO Research Inc.	www.gaoresearch.com	X					X				X	X		X		

For the most updated information on eXpressDSP-compliant algos, visit www.ti.com/algorithms

Third Party		TI DSP Device			Application											
		C2000™	C5000™	C6000™	Audio	DMC	Encryption	Fax	GSM	Protocol Stacks	Speech	Telephony	VB Modems	Video & Imaging	Vocoders	Wireless
GDA Technologies, Inc.	www.gdatech.com		X	X										X		
Global IP Sound AB	www.globalipsound.com	X												X		
Heinrich-Hertz Institut GmbH	www.hhi.de			X										X		
HelloSoft, Inc.	www.hellosoft.com		X						X			X			X	
Hyperception	www.hyperception.com	X	X								X			X		
IdenCom	www.idencom.com/			X										X		
IdentAlink	www.identalink.de/			X										X		
ILLICO	www.illico.com		X	X				X					X			
Image Power, Inc.	www.imagepower.com	X	X										X			
Imagine Technology, LLC	www.imaginetechnology.net	X	X	X		X					X	X		X		
Indesign, LLC	www.indesign-llc.com	X		X												
Ingenient Technologies, Inc.	www.ingenient.com			X										X	X	
Ittiam Systems Private Limited	www.ittiam.com		X	X	X						X			X	X	
LME – Microelectronics Lab of CEFET-PR	www.lme.cpdtt.cefetpr.br	X												X		
Lucent Technologies	www.lucent.com		X								X				X	
Mango DSP, Ltd.	www.mangodsp.com			X										X		
Mecoso Technology, Inc.	www.mecoso.com			X										X		
MESi	www.mesi.net		X					X				X	X			
MIKET DSP Solutions	mikets@telus.net		X									X				
Motorola (BlueWave Systems)	www.bluews.com			X								X			X	
MTI s.r.l.	www.mtionline.it		X								X				X	
Netbricks	www.netbricks.net/		X									X				
NeuroDynamics, Ltd.	www.neurodynamics.com	X											X			
NeuVoice	www.neuvoice.com		X								X					
Noise Cancellation Technology (NCT Group, Inc.)	www.nctclearspeech.com/		X							X						
NTRU Cryptosystems, Inc.	www.ntru.com		X				X									
Octiv Inc.	www.octiv.com		X		X											
On2 Technologies	www.on2.com			X										X		
Phillips Speech Processing	www.speech.be.phillips.com	X								X						
Pivot Signal Processing, Ltd.	www.pivot-dsp.com			X								X			X	
Planning Systems, Inc.	www.plansys.com		X								X					
Prodys S.L.	www.prodys.net			X										X		
RadiSys Corp.	www.radisys.com			X								X			X	
RoadComm, Inc.	www.road-com.com		X								X					
Romsey DSP	www.romseydsp.com		X												X	
Sasken Communication Technologies Ltd.	www.sasken.com		X											X		
Sensaura	www.scipher.com		X		X											
SIAL Ltd.	www.dsp.sut.ru/sial/		X	X					X			X			X	
Siemens AG Austria	www.pse.siemens.at		X		X											
Signals + Software Ltd.	www.signalsandsoftware.com	X	X					X			X	X		X		
SignalWorks	www.signalworks.com		X		X											
Signion Systems Pvt. Ltd.	www.signion.com		X				X									X
SigNumerix, Inc.	www.signumerix.com		X									X	X			
Snapshield Ltd.	www.snapshield.com		X	X			X									
Softier Ltd.	www.softier.com/			X					X					X		
Sound ID	www.soundid.com		X		X											
Spatializer Audio Laboratories, Inc.	www.spatializer.com		X		X											
Spectral Design	www.spectral-design.com		X	X												
Spectrum Signal Processing, Inc.	www.spectrumsignal.com		X								X					
Speech Technology Center	www.speechpro.com		X								X					
SPIRIT CORP.	www.spiritDSP.com		X		X			X			X	X	X		X	
SRS Labs, Inc.	www.srslabs.com		X	X	X											
Stocker Ing. Buero	friedrich.h.stocker@t-online.de	X		X												
Streambox, Inc.	www.streambox.com			X										X		
Surf Communication Solutions Ltd.	www.surf-com.com			X				X					X		X	
Syspac Ltda.	www.syspac.com.br		X									X			X	
Tata Elxsi Limited	www.tataelxsi.com			X	X											
Technosoft	www.technosoft.ch/	X				X										
Tecteon Plc	www.tecteon.com/			X								X				
Telisma SA	www.telisma.com		X								X					
Troy Group, Inc.	www.troygroup.com		X													X
Two Pi	www.two-pi.com/		X		X											
UB Video, Inc.	www.ubvideo.com		X	X										X		
UFMG–Universidade Federal de Minas Gerais	www.cpdee.ufmg.br	X				X										
Verance Corp.	www.verance.com		X				X									
Wavemakers Inc.	www.wavemakers.com	X								X						
Windmill Innovations	www.windmill-innovations.com		X	X						X						
Wipro Ltd.	www.wipro.com		X												X	
Z Tecnologia Communicacao Ltda.	www.ztec.com.br		X										X			
Zandiant Technologies, Inc.	www.zandiant.com		X		X											

eXpressDSP™-COMPLIANT THIRD-PARTY ALGORITHMS

AUDIO

Compliant Algorithm	Generation	Third-Party Vendor
3D Stereo	C54x	Spatializer Audio Labs
3D Stereo	C55x	Spatializer Audio Labs
AAC Decoder	C54x	Imagine Technology
AAC Decoder	C62x	Imagine Technology
AAC Encoder	C62x	Imagine Technology
AAC Encoder	C62x	Tata Elxsi
Acoustic Echo Canceller	C54x	Creative DSP Solutions
Acoustic Echo Canceller	C54x	Imagine Technology
Acoustic Echo Canceller	C54x	Indesign
Acoustic Echo Canceller	C55x	Creative DSP Solutions
Acoustic Echo Canceller	C55x	Imagine Technology
Acoustic Echo Canceller	C64x	Imagine Technology
Adaptive Noise Canceller	C54x	DSPecialists GmbH
Adaptive Noise Canceller	C55x	Stocker Ing. Buero
ASF-M	C54x	NCT Group
ATM-SAR Software Solution (AAL2 Support)	C64x	e-Infochips
ATM-SAR Software Solution (AAL5 support)	C64x	e-Infochips
Audio Watermarking	C54x	Sensaura
Center Blend for ProLogic II (32 Bit)	C54x	Zandiant Technologies
Chorus	C67x	Spectral Design
Chorus Effect	C55x	Electronic Design Associates
Circle Surround II	C67x	SRS Labs
Compressor	C67x	DSPecialists GmbH
Dialog	C55x	SRS Labs
Echo Effect	C55x	Electronic Design Associates
Equalizer	C67x	DSPecialists GmbH
FEX_C5	C54x	Conversay
Flange Sound Effect	C55x	Electronic Design Associates
Flanger	C67x	DSPecialists GmbH
Full Duplex Echo Cancellation	C54x	SignalWorks
Full Spectrum Dynamic Compression	C54x	SoundID
Function Generator	C67x	DSPecialists GmbH
G.723.1/GSM-AMR Transcoder	C62x	Dilithium Networks
GSM-AMR/G.723.1 Transcoder	C62x	Dilithium Networks
Headphones	C54x	Spatializer Audio Labs
Headphones	C55x	Spatializer Audio Labs
Mixer	C67x	DSPecialists GmbH
Mono Eq 4 Band	C67x	D+R Electronika B.V.
MP3 Decoder	C54x	SPIRIT CORP.
MP3 Decoder	C54x	Ittiam Systems
MP3 Decoder	C67x	Tata Elxsi
MP3 Decoder Gold	C54x	CuTe Solutions
MP3 Decoder Silver	C54x	CuTe Solutions
MP3 Encoder	C54x	Imagine Technology
MP3 Encoder	C54x	CuTe Solutions
MP3 Encoder	C55x	Imagine Technology
MP3 Encoder	C55x	CuTe Solution
MP3 Encoder	C62x	CuTe Solution
MP3 Encoder	C62x	Imagine Technology
MP3 Encoder	C62x	CuTe Solution
MPEG2 AAC Encoder	C67x	Fraunhofer IIS
MPEG2 L3 Decoder	C54x	Imagine Technology
MPEG2 L3 Decoder	C55x	Imagine Technology
MPEG2 L3 Decoder	C62x	Imagine Technology
MPEG2/4 AAC Decoder	C64x	ATEME
MPEG2/4 AAC Decoder	C64x	Ittiam Systems
MPEG2/4 AAC Encoder	C64x	ATEME
MPEG2/4 AAC Encoder	C64x	Ittiam Systems
MPEG4 AAC LC Decoder	C54x	Imagine Technology
MPEG4 AAC LC Decoder	C55x	Imagine Technology
MPEG4 AAC LC Encoder	C62x	Imagine Technology

AUDIO (CONTINUED)

Compliant Algorithm	Generation	Third-Party Vendor
MPEG4 AAC LC Encoder	C64x	Imagine Technology
MPEG4 Decoder	C55x	Imagine Technology
Noise Reduction	C54x	Creative DSP Solutions
Noise Reduction	C55x	Creative DSP Solutions
Noise Reduction, Low Frequency	C54x	Alango
Octimax	C54x	Octiv
Octivox	C54x	Octiv
Pathfinder Noise Suppression	C55x	Aliph Com
Phase Corrected Equalization	C55x	Spatializer Audio Labs
Reverb	C67x	DSPecialists GmbH
Reverb Effect	C55x	Electronic Design Associates
Sample Rate Conversion	C54x	Siemens AG Austria
SEQ – Speaker Equalization	C55x	DSP Techniques
Speech Compressor for Hearing Aid	C54x	Two Pi
Time-Scale Tailor	C54x	Enounce
VI.B.E.	C54x	Spatializer Audio Labs
VI.B.E.	C55x	Spatializer Audio Labs
VIP – Voice Intelligibility	C54x	SRS Labs
VIP – Voice Intelligibility	C55x	SRS Labs
Volume Control (32 Bit)	C54x	Zandiant Technologies
WMA Decoder	C54x	Imagine Technology
WMA Decoder	C55x	CuTe Solution
WOW – Voice	C54x	SRS Labs
WOW – Voice	C55x	SRS Labs

DIGITAL MOTOR CONTROL (DMC)

Compliant Algorithm	Generation	Third-Party Vendor
Position Control	C24x	Technosoft
RMS Signal Measurement	C24x	RACOM Microelectronics
Speed Control	C24x	Technosoft
Torque Control for BLDC	C24x	Technosoft
Torque Control for IMVC	C24x	Technosoft
Torque Control for PMSM	C24x	Technosoft
Vector PWM for Neutral Point Clamped 3 Level Inverters	C24x	UFMG

ENCRYPTION

Compliant Algorithm	Generation	Third-Party Vendor
3-DES	C54x	Imagine Technology
3-DES	C54x	Snapshield
3-DES	C55x	Imagine Technology
3-DES	C55x	Snapshield
AES	C54x	Snapshield
AES	C55x	Snapshield
AES	C62x	Snapshield
AES	C64x	Snapshield
Assembly	C54x	Signion Systems
Audio Watermark Det. SDMI Screen	C54x	Verance Corp.
DES	C54x	Imagine Technology
DES	C54x	Snapshield
DES	C55x	Imagine Technology
DES CBC Mode	C54x	Snapshield
Diffie-Hellman	C54x	Snapshield
Diffie-Hellman	C55x	Snapshield
Diffie-Hellman	C62x	Snapshield
ELGAMAL	C54x	Snapshield
ELGAMAL	C62x	Snapshield
HMAC	C54x	Imagine Technology
HMAC-MD5	C54x	Snapshield
HMAC-SHA-1	C54x	Snapshield
IDEA Decryption	C54x	easytools
IDEA Encryption	C54x	easytools

For the most updated information on eXpressDSP-compliant algos, visit www.ti.com/algorithms

eXpressDSP™-COMPLIANT THIRD-PARTY ALGORITHMS (CONT'D)

ENCRYPTION (CONTINUED)

Compliant Algorithm	Generation	Third-Party Vendor
Kasumi Encryption	C67x	Pivot Signal Processing
MD5	C54x	Snapshield
MD5	C55x	Snapshield
MD5	C62x	Snapshield
MD5-V2.0	C62x	Snapshield
MMH-MAC	C62x	Snapshield
NTRU Mobile Security	C55x	NTRU Cryptosystems
RSA	C54x	Snapshield
RSA1024	C54x	eSecurium
SHA-1	C54x	Snapshield
SHA-1	C55x	Snapshield
SHA-1	C62x	Snapshield

FAX

Compliant Algorithm	Generation	Third-Party Vendor
FAX Bundle (V.17/V.21/V.27/V.29)	C54x	SPIRIT CORP.
FAX G3 Rev 1.0 (V.21/V.27V.29)	C54x	SPIRIT CORP.
T.38 Fax Relay over IP	C54x	SPIRIT CORP.
T.38 Fax Relay over IP	C62x	SURF Communication Solns.
V.17	C54x	SPIRIT CORP.
V.17 Receive	C54x	MESi
V.17 Receive	C62x	Commetrex
V.17 Receive	C62x	ILLICO
V.17 Transmit	C54x	ILLICO
V.17 Transmit	C54x	MESi
V.17 Transmit	C62x	Commetrex
V.21	C54x	SPIRIT CORP.
V.21 Receive	C54x	MESi
V.21 Receive	C62x	Commetrex
V.21 Transmit	C54x	ILLICO
V.21 Transmit	C54x	MESi
V.21 Transmit	C62x	Commetrex
V.27 Receive	C54x	ILLICO
V.27 Transmit	C54x	ILLICO
V.27/V.29 Receive	C62x	Commetrex
V.27/V.29 Transmit	C62x	Commetrex
V.27ter	C54x	SPIRIT CORP.
V.27ter Receive	C54x	MESi
V.27ter Transmit	C54x	MESi
V.29	C54x	SPIRIT CORP.
V.29 Receive	C54x	ILLICO
V.29 Receive	C54x	MESi
V.29 Transmit	C54x	ILLICO
V.29 Transmit	C54x	MESi
V.29 Transmit/Receive	C54x	GAO Research Inc.

GSM

Compliant Algorithm	Generation	Third-Party Vendor
GSM AMR Decoder	C55x	HelloSoft
GSM AMR Decoder	C55x	Emuzed
GSM AMR Encoder	C55x	Emuzed
GSM AMR Encoder	C55x	HelloSoft
GSM AMR Wideband Decoder	C55x	Emuzed
GSM AMR Wideband Encoder	C55x	Emuzed
GSM Enhanced Full-Rate Decoder	C54x	SIAL
GSM Enhanced Full-Rate Decoder	C62x	Signals + Software
GSM Enhanced Full-Rate Encoder	C54x	SIAL
GSM Enhanced Full-Rate Encoder	C62x	Signals + Software
GSM Full-Rate Decoder	C54x	Bayer DSP
GSM Full-Rate Decoder	C55x	Bayer DSP
GSM Full-Rate Decoder	C62x	Signals + Software
GSM Full-Rate Encoder	C54x	Bayer DSP
GSM Full-Rate Encoder	C55x	Bayer DSP
GSM Full-Rate Encoder	C62x	Signals + Software
Tetra Decoder	C54x	Deltacom Electronics

GSM (CONTINUED)

Compliant Algorithm	Generation	Third-Party Vendor
Tetra Encoder	C54x	Delatcom Electronics
WAV-GSM Voice Compression	C64x	Softier

PROTOCOL STACKS

Compliant Algorithm	Generation	Third-Party Vendor
HDLC Generator Level 2	C54x	Bayer DSP
HDLC Receiver	C55x	Bayer DSP
HDLC Receiver Level 2	C54x	Bayer DSP
HDLC Transmitter	C55x	Bayer DSP
Serial Communications Protocol	C54x	Windmill Innovations
Serial Communications Protocol	C55x	Windmill Innovations
Serial Communications Protocol	C67x	Windmill Innovations
TCP/IP Protocol Stack	C54x	Windmill Innovations
TCP/IP Protocol Stack for Ethernet	C62x	Windmill Innovations
TCP/IP Protocol Stack for Ethernet	C67x	Windmill Innovations

SPEECH

Compliant Algorithm	Generation	Third-Party Vendor
Adaptive Speech Filter (Enhancement)	C67x	NCT Group, Inc.
ASR Densifier	C54x	Telisma SA
Broadband Noise Cancellation	C54x	Speech Technology Center
Caller ID Text-to-Speech	C55x	Fonix
Clear Voice Capture Dual-Element Mic	C54x	Clarity
Clear Voice Capture Single-Element Mic	C54x	Clarity
Complementary Noise Suppression	C54x	Cortologic AG
Full Duplex / Noise Suppression / Barge-in for Voice Recognition	C54x	Lucent
Full Duplex / Noise Suppression	C55x	Lucent
Memo Recorder	C54x	Lucent
MPEG4 HVXC Speech Decoder	C54x	Ittiam Systems
MPEG4 HVXC Speech Encoder	C54x	Ittiam Systems
Real World Voice Recognition	C54x	NeuVoice
Real World Voice Recognition	C55x	NeuVoice
Referenced Noise Filter	C67x	NCT Group, Inc.
smARTspeak NG	C55x	Advanced Recognition Tech.
smARTspeak XG	C55x	Advanced Recognition Tech.
Sound Stretcher	C54x	Speech Technology Center
Speech Enhancement	C54x	SPIRIT CORP.
Text-to-Speech Synthesizer	C54x	Lucent
Text-to-Speech Synthesizer	C54x	RoadComm, Inc.
Text-to-Speech Synthesizer	C55x	Fonix
VoCon Speech Recognition Engine	C54x	Philips Speech Processing
Voice Activity Detector	C54x	MTI
Voice Command Recognition	C54x	Speech Technology Center
Voiceguard – Adapt	C54x	Planning Systems, Inc.
Voiceguard – Adapt	C55x	Planning Systems, Inc.
Voiceguard – HAB	C54x	Planning Systems, Inc.
Voiceguard – HAB	C55x	Planning Systems, Inc.
VoiceTrigger	C54x	Wavemakers
Voice Recognition	C55x	Advanced Recognition Tech.
Word Voice Recognition	C54x	Lucent

TELEPHONY

Compliant Algorithm	Generation	Third-Party Vendor
2100-Hz Tone Detector	C62x	Signals + Software
2100-Hz Tone Disabler	C62x	Tecteon Plc
Acoustic Echo Canceller	C54x	SPIRIT CORP.
Auto Gain Control/Voice Activity Det	C62x	RadiSys Corp.
Automatic Gain Control	C54x	Imagine Technology
Automatic Gain Control	C54x	SPIRIT CORP.
Automatic Gain Controller	C62x	Signals + Software
Automatic Gain Control	C64x	Imagine Technology
Call Progress Analysis	C54x	Commetrex
Call Progress Analysis	C62x	Commetrex
Call Progress Decoder	C54x	Imagine Technology

eXpressDSP™-COMPLIANT THIRD-PARTY ALGORITHMS (CONT'D)

TELEPHONY (CONTINUED)

Compliant Algorithm	Generation	Third-Party Vendor
Call Progress Detector	C54x	SigNumerix
Call Progress Detector	C54x	SPIRIT CORP.
Call Progress Generator	C54x	SPIRIT CORP.
Call Progress Monitor	C62x	RadiSys Corp.
Call Progress Tone Detector	C54x	Adaptive Digital Technologies
Caller ID	C54x	Imagine Technology
Caller ID	C54x	SPIRIT CORP.
Caller ID Demodulator	C54x	SigNumerix
Caller ID Detector	C54x	MESi
Caller ID Detector	C54x	SPIRIT CORP.
Caller ID Generator	C54x	MESi
Caller ID Generator	C54x	SPIRIT CORP.
Caller ID Receiver	C62x	Commetrex
Caller ID Transmitter	C54x	Commetrex
Caller ID Transmitter	C62x	Commetrex
Caller ID Type 2 CAS Detection	C54x	SigNumerix
Caller ID, Type 1 and 2	C54x	GAO Research Inc.
Comfort Noise Generator	C54x	SPIRIT CORP.
Comfort Noise Generator	C62x	RadiSys Corp.
CPE Alert Signal	C54x	D2 Technologies
CPT Detector	C54x	Bayer DSP
CPT Detector	C55x	Bayer DSP
CPT Generator	C54x	Bayer DSP
CPT Generator	C55x	Bayer DSP
DTMF	C54x	D2 Technologies
DTMF	C54x	SPIRIT CORP.
DTMF	C62x	Spectrum Signal Processing
DTMF	C64x	A DSP House
DTMF 5 ms	C55x	MIKET DSP Solutions
DTMF 10 ms	C55x	MIKET DSP Solutions
DTMF Detection Algorithm	C54x	Tata Consultancy Group
DTMF Detector	C54x	Adaptive Digital Technologies
DTMF Detector	C54x	Commetrex
DTMF Detector	C54x	Imagine Technology
DTMF Detector	C54x	MESi
DTMF Detector	C54x	Syspac Ltda
DTMF Detector	C62x	Commetrex
DTMF Detector	C62x	COMSIS
DTMF Detector / Suppressor	C62x	RadiSys Corp.
DTMF Encoder	C54x	Imagine Technology
DTMF Encoder	C54x	Syspac Ltda
DTMF Encoder/Decoder	C54x	Imagine Technology
DTMF Generator	C54x	Commetrex
DTMF Generator	C54x	MESi
DTMF Generator	C54x	SPIRIT CORP.
DTMF Generator	C62x	Commetrex
DTMF Receiver	C54x	Bayer DSP
DTMF Receiver	C54x	Signals + Software
DTMF Receiver	C54x	SIAL
DTMF Receiver	C54x	SigNumerix
DTMF Receiver	C54x	SPIRIT CORP.
DTMF Receiver	C55x	Bayer DSP
DTMF Receiver	C62x	Motorola Computer Group
DTMF Transmitter	C54x	Bayer DSP
DTMF Transmitter	C54x	Signals + Software
DTMF Transmitter	C55x	Bayer DSP
DTMF Transmitter	C62x	Motorola Computer Group
DTMF Transmitter	C62x	Signals + Software
Echo Cancellation, Multi-	C54x	D2 Technologies
Echo Canceller	C54x	Imagine Technology
Echo Canceller	C55x	Imagine Technology
Echo Canceller	C62x	Imagine Technology
Echo Canceller	C64x	Imagine Technology

TELEPHONY (CONTINUED)

Compliant Algorithm	Generation	Third-Party Vendor
Fast DTMF Detection	C54x	EI CREBOUW
Fax and Modem Tone Detect	C54x	D2 Technologies
Frequency Shift Key Rec	C54x	D2 Technologies
Frequency Shift Key Send	C54x	D2 Technologies
G.165	C54x	Bayer DSP
G.165	C54x	SPIRIT CORP.
G.165	C55x	Bayer DSP
G.165 Line Echo Cancellation	C54x	Danlaw Technologies
G.165 Line Echo Cancellation	C62x	RadiSys Corp.
G.167	C54x	Bayer DSP
G.167	C55x	Bayer DSP
G.167 Acoustic Echo Canceller	C54x	Danlaw Technologies
G.168	C54x	DACS Software
G.168	C54x	Imagine Technology
G.168	C54x	Netbricks
G.168	C55x	Imagine Technology
G.168	C62x	Imagine Technology
G.168	C64x	Imagine Technology
G.168 (Long Tail)	C54x	Adaptive Digital Technologies
G.168 (Long Tail)	C55x	Adaptive Digital Technologies
G.168 (Long Tail)	C64x	Adaptive Digital Technologies
G.168 (Short Tail)	C54x	Adaptive Digital Technologies
G.168 (Short Tail)	C55x	Adaptive Digital Technologies
G.726 ADPCM Speech Codec	C54x	Tata Consultancy Group
LEC-128-HelloVoice™ Line Echo	C55x	HelloSoft
Line Echo Canceller	C55x	HelloSoft
Line Echo Canceller	C55x	Lucent
Line Echo Canceller	C55x	MIKET DSP Solutions
Line Echo Canceller	C67x	Electronic Design Associates
MF (5 ms)	C55x	MIKET DSP Solutions
MF (10 ms)	C55x	MIKET DSP Solutions
MF R1 Detector	C54x	Adaptive Digital Technologies
MF R2 Forward Detector	C54x	Adaptive Digital Technologies
MF R2 Reverse Detector	C54x	Adaptive Digital Technologies
MF Line/Register Signaling	C62x	RadiSys Corp.
Multifrequency Tone Detect	C54x	D2 Technologies
Music On Hold	C54x	Bayer DSP
Noise Floor Estimation	C54x	D2 Technologies
Non-Linear Processing	C54x	D2 Technologies
SD100 Voice Activity Detector	C67x	Pivot Signal Processing
SoundClear Echo Cancel & Noise Red	C54x	Acoustic Technologies
SoundClear Echo Cancel & Noise Red	C55x	Acoustic Technologies
Telecom Filters	C54x	DSP Global
TMWRTW	C67x	Imagine Technology
Tone Detector	C54x	Commetrex
Tone Detector	C54x	MESi
Tone Detector	C62x	Commetrex
Tone Detector	C64x	Commetrex
Tone Disabler for LEC	C54x	SPIRIT CORP.
Tone Generation	C54x	SigNumerix
Tone Generator	C54x	Commetrex
Tone Generator	C54x	D2 Technologies
Tone Generator	C54x	MESi
Tone Generator	C62x	Commetrex
Tone Generator	C62x	RadiSys Corp.
Tone Generator (5 ms)	C55x	MIKET DSP Solutions
Tone Generator (10 ms)	C55x	MIKET DSP Solutions
Universal Tone Detection	C54x	D2 Technologies
Univ Multifrequency Tone Generator	C54x	SPIRIT CORP.
Univ Multifrequency Tone Generator	C55x	SPIRIT CORP.
Variable Rate Convl. CODEC w/ Soft Decision VITERBI Decoding	C54x	Imagine Technology
Voice Activity Detector	C62x	RadiSys Corp.

For the most updated information on eXpressDSP-compliant algos, visit www.ti.com/algorithms

eXpressDSP™-COMPLIANT THIRD-PARTY ALGORITHMS (CONT'D)

TELEPHONY (CONTINUED)

Compliant Algorithm	Generation	Third-Party Vendor
Voice Activity Detection	C54x	Imagine Technology
Voice Activity Detection	C54x	SPIRIT CORP.
Voice Activity Detection	C55x	Imagine Technology
Voice Activity Detection	C62x	Imagine Technology
Voice Activity Detection	C64x	Imagine Technology
Voice Activity Detector W	C54x	D2 Technologies
Voice Activity Detector	C62x	Signals + Software

VB MODEM

Compliant Algorithm	Generation	Third-Party Vendor
AGC	C54x	Imagine Technology
AGC/VAD	C54x	SigNumerix
BELL 103 Modem (demod)	C54x	MESi
BELL 103 Modem (mod)	C54x	MESi
BELL 202 Modem (demod)	C54x	MESi
BELL 202 Modem (mod)	C54x	MESi
Binary Phase Shift Key Modem	C54x	Imagine Technology
Binary Phase Shift Key Modem	C64x	Imagine Technology
DTMF Generator	C54x	Imagine Technology
G3MDP	C54x	SPIRIT CORP.
Soft Modem (Medium speed)	C54x	Netbricks
UPD Fax/Modem Pumps	C55x	SPIRIT CORP.
UPD Modem Pumps	C55x	SPIRIT CORP.
UDP V.23 Fax/Modem Pumps	C55x	SPIRIT CORP.
Univ Multifrequency Tone Detect	C54x	SPIRIT CORP.
Univ Multifrequency Tone Detect	C55x	SPIRIT CORP.
V.21 Receive	C54x	ILLICO
V.21 Transmit/Receive	C54x	GAO Research Inc.
V.22	C54x	Imagine Technology
V.22 bis Transmit/Receive	C54x	GAO Research Inc.
V.22 bis Transmit/Receive	C54x	MESi
V.22 bis Transmit/Receive	C54x	Z Tecnologia Communicacao
V.23 Receive	C54x	MESi
V.23 Transmit	C54x	MESi
V.23 Transmit/Receive	C54x	GAO Research Inc.
V.32 / V.32 bis / V.22 / V.22 bis	C54x	SPIRIT CORP.
V.32 bis	C54x	GAO Research Inc.
V.32 bis	C54x	MESi
V.32 bis	C54x	SPIRIT CORP.
V.32 Transmit/Receive	C54x	ILLICO
V.34 Data Pump	C54x	GAO Research Inc.
V.34/V.34+	C62x	SURF Communication Solns.
V.42	C54x	SPIRIT CORP.
V.42 bis	C54x	GAO Research Inc.
V.42 bis	C54x	SPIRIT CORP.
V.42 bis Decoder	C62x	Signals + Software
V.42 bis Encoder	C62x	Signals + Software
V.90	C62x	SURF Communication Solns.
V.90 Data Pump	C54x	GAO Research Inc.

VIDEO & IMAGING

Compliant Algorithm	Generation	Third-Party Vendor
ACTL2 (800-kbps Broadband Codec)	C62x	Streambox
BioKey	C62x	IdenCom
Biometrics Image Processing	C55x	Ethentica
Blip Stream Decoder	C55x	Blip-X
Blip Stream Decoder	C64x	Blip-X
Blip Stream Encoder	C55x	Blip-X
Blip Stream Encoder	C64x	Blip-X
DVB-T Time Synchronization	C62x	Digilab2000
FIDNEYE.L62	C62x	Eyematic Interfaces
Finger Print 1 to 1	C54x	NeuroDynamics
Fingerprint Recognition Pre	C62x	IdentAlink
Fingerprint Recognition Engine	C62x	IdentAlink
FIPREYE.L62	C62x	Eyematic Interfaces
H.261 Decoder	C62x	Algo Vision Systems GmbH

VIDEO & IMAGING (CONTINUED)

Compliant Algorithm	Generation	Third-Party Vendor
H.261 Decoder	C62x	UB Video
H.261 Encoder	C62x	Algo Vision Systems GmbH
H.261 Encoder	C62x	UB Video
H.263 Decoder	C62x	Dilithium Networks
H.263 Decoder	C62x	Mecoso Technology
H.263 Decoder Ver 1.0	C62x	UB Video
H.263 Decoder Ver 2.0	C62x	UB Video
H.263 Encoder	C55x	Emuzed
H.263 Encoder	C62x	Emuzed
H.263 Encoder	C62x	Mecoso Technology
H.263 Encoder	C64x	Emuzed
H.263 Encoder Ver 1.0	C62x	UB Video
H.263 Encoder Ver 2.0	C62x	UB Video
H.263 TDM to/from H.263 TCP/IP	C62x	Dilithium Networks
HAAR Compression Decoder	C67x	Consystant Design Technol.
HAAR Compression Encoder	C67x	Consystant Design Technol.
JPEG Codec	C54x	ATEME
JPEG Codec	C55x	ATEME
JPEG Codec	C62x	ATEME
JPEG Decoder	C54x	ATEME
JPEG Decoder	C55x	ATEME
JPEG Decoder	C55x	Emuzed
JPEG Decoder	C62x	ATEME
JPEG Decoder	C64x	ATEME
JPEG Encoder	C54x	ATEME
JPEG Encoder	C55x	ATEME
JPEG Encoder	C55x	Emuzed
JPEG Encoder	C62x	ATEME
JPEG Encoder	C62x	Mango DSP
JPEG Encoder	C64x	ATEME
JPEG2000 Decoder	C55x	Image Power
JPEG2000 Decoder	C62x	Image Power
JPEG2000 Encoder	C55x	Image Power
JPEG2000 Encoder	C62x	Image Power
MJPEG Codec	C54x	ATEME
MJPEG Codec	C55x	ATEME
MJPEG Codec	C62x	ATEME
MJPEG Decoder	C54x	ATEME
MJPEG Decoder	C55x	ATEME
MJPEG Decoder	C62x	ATEME
MJPEG Encoder	C54x	ATEME
MJPEG Encoder	C55x	ATEME
MJPEG Encoder	C62x	ATEME
MJPEG Encoder	C64x	Softier
MPEG1 Decoder	C62x	Mecoso Technology
MPEG1 Encoder	C62x	Mecoso Technology
MPEG2 Decoder	C62x	ATEME
MPEG2 Decoder	C64x	ATEME
MPEG4 Adv. Simple Profile Decoder	C62x	Ingenient Technologies
MPEG4 Adv. Simple Profile Encoder	C62x	Ingenient Technologies
MPEG4 Adv. Simple Profile Encoder	C64x	Prodys
MPEG4 ASP Level 4 Encoder	C64x	Prodys
MPEG4 Core Profile Encoder	C64x	Prodys
MPEG4 Decoder	C55x	Sasken Communication Tech.
MPEG4 Decoder	C55x	UB Video
MPEG4 Decoder	C62x	ATEME
MPEG4 Decoder	C62x	Dilithium Networks
MPEG4 Decoder	C62x	Mecoso Technology
MPEG4 Decoder	C64x	ATEME
MPEG4 Decoder	C67x	Heinrich-Hertz Institut GmbH
MPEG4 Encoder	C55x	UB Video
MPEG4 Encoder	C62x	Mecoso Technology
MPEG4 Encoder	C64x	Prodys
MPEG4 Simple Profile	C64x	Ittiam Systems
MPEG4 Simple Profile Decoder	C62x	Ingenient Technologies
MPEG4 Simple Profile Decoder	C62x	Prodys
MPEG4 Simple Profile Decoder	C64x	Ingenient Technologies

eXpressDSP™-COMPLIANT THIRD-PARTY ALGORITHMS (CONT'D)

VIDEO & IMAGING (CONTINUED)

Compliant Algorithm	Generation	Third-Party Vendor
MPEG4 Simple Profile Decoder	C64x	Prodys
MPEG4 Simple Profile Encoder	C62x	Ingenient Technologies
MPEG4 Simple Profile Encoder	C62x	Prodys
MPEG4 Simple Profile Encoder	C64x	Ingenient Technologies
MPEG4 Simple Profile Encoder	C62x	Prodys
MPEG4 Simple Profile Video Decoder	C55x	Emuzed
MPEG4 Simple Profile Video Decoder	C55x	GDA Technologies, Inc
MPEG4 Simple Profile Video Decoder	C62x	GDA Technologies, Inc.
MPEG4 Simple Profile Video Decoder	C62x	Prodys
MPEG4 Simple Profile Video Decoder	C64x	Prodys
MPEG4 Simple Profile Video Encoder	C55x	Emuzed
MPEG4 Simple Profile Video Encoder	C62x	Emuzed
MPEG4 Simple Profile Video Encoder	C64x	Emuzed
MPEG4 VSP Decoder	C64x	ATEME
OFDM Demodulator	C62x	Digilab2000
RMS Compression	C67x	Streambox
Speedwave Decoder	C67x	Dresearch
Speedwave Encoder	C67x	Dresearch
VP4 Decoder	C62x	On2 Technologies
VP4 Decoder	C64x	On2 Technologies

VOCODERS

Compliant Algorithm	Generation	Third-Party Vendor
1200-BPS Decoder	C54x	SPIRIT CORP.
1200-BPS Encoder	C54x	SPIRIT CORP.
1200-BPS Vocoder	C55x	SPIRIT CORP.
2400-BPS Decoder	C54x	SPIRIT CORP.
2400-BPS Encoder	C54x	SPIRIT CORP.
2400-BPS Vocoder	C55x	SPIRIT CORP.
4800-BPS Vocoder	C54x	SPIRIT CORP.
4800-BPS Vocoder	C55x	SPIRIT CORP.
6000-BPS Vocoder	C54x	SPIRIT CORP.
6000-BPS Vocoder	C55x	SPIRIT CORP.
End Point Detector	C54x	MTI
Enhanced G.711	C54x	Global IP Sound AB
ESAC4 Decoder	C55x	Cybernetics Infotech
ESAC4 Encoder	C55x	Cybernetics Infotech
ESAC7 Decoder	C55x	Cybernetics Infotech
ESAC7 Encoder	C55x	Cybernetics Infotech
Fax Tone Detector	C62x	Motorola Computer Group
G.165	C62x	SIAL
G.168	C62x	Signals + Software
G.711	C54x	Encore Software
G.711	C62x	Encore Software
G.711 Decoder	C54x	Commetrex
G.711 Decoder	C54x	Imagine Technology
G.711 Decoder	C54x	Signals + Software
G.711 Decoder	C55x	Imagine Technology
G.711 Decoder	C62x	Commetrex
G.711 Decoder	C62x	Ingenient Technologies
G.711 Decoder	C62x	Motorola Computer Group
G.711 Decoder	C62x	RadiSys Corp.
G.711 Decoder	C62x	Signals + Software
G.711 Decoder	C64x	Ittiam Systems
G.711 Encoder	C54x	Commetrex
G.711 Encoder	C54x	Imagine Technology
G.711 Encoder	C54x	Signals + Software
G.711 Encoder	C55x	Imagine Technology
G.711 Encoder	C62x	Commetrex
G.711 Encoder	C62x	Ingenient Technologies
G.711 Encoder	C62x	Motorola Computer Group
G.711 Encoder	C62x	RadiSys Corp.

VOCODERS (CONTINUED)

Compliant Algorithm	Generation	Third-Party Vendor
G.711 Encoder	C62x	Signals + Software
G.711 Encoder	C64x	Ittiam Systems
G.711 PLC	C54x	SPIRIT CORP.
G.722 Decoder	C62x	RadiSys Corp.
G.722 Decoder	C62x	Signals + Software
G.722 Decoder	C64x	Ittiam Systems
G.722 Encoder	C62x	RadiSys Corp.
G.722 Encoder	C62x	Signals + Software
G.722 Encoder	C64x	Ittiam Systems
G.722.1 Decoder	C54x	SIAL
G.722.1 Decoder	C55x	Romsey DSP
G.722.1 Decoder	C62x	COMSIS
G.722.1 Decoder	C64x	Ittiam Systems
G.722.1 Encoder	C54x	SIAL
G.722.1 Encoder	C55x	Romsey DSP
G.722.1 Encoder	C62x	COMSIS
G.722.1 Encoder	C64x	Ittiam Systems
G.722.2 Decoder	C62x	Pivot Signal Processing
G.723.1	C54x	Encore Software
G.723.1	C54x	GAO Research Inc.
G.723.1	C62x	Encore Software
G.723.1 Decoder	C54x	SPIRIT CORP.
G.723.1 Decoder	C55x	SPIRIT CORP
G.723.1 Decoder	C62x	RadiSys Corp.
G.723.1 Decoder	C62x	Signals + Software
G.723.1 Encoder	C54x	SPIRIT CORP.
G.723.1 Encoder	C55x	SPIRIT CORP.
G.723.1 Encoder	C62x	RadiSys Corp.
G.723.1 Encoder	C62x	Signals + Software
G.723.1 Encoder/Decoder	C54x	Adaptive Digital Technologies
G.723.1 Encoder/Decoder	C54x	GAO Research Inc.
G.723A Decoder	C54x	D2 Technologies
G.723A Encoder	C54x	D2 Technologies
G.726	C54x	Encore Software
G.726	C62x	DACS Software
G.726	C62x	Encore Software
G.726 A-Law ADPCM Decoder	C62x	RadiSys Corp.
G.726 A-Law ADPCM Encoder	C62x	RadiSys Corp.
G.726 Decoder	C54x	Commetrex
G.726 Decoder	C54x	D2 Technologies
G.726 Decoder	C54x	Hyperception
G.726 Decoder	C54x	Imagine Technology
G.726 Decoder	C54x	Signals + Software
G.726 Decoder	C54x	SPIRIT CORP.
G.726 Decoder	C55x	DSP Wizard
G.726 Decoder	C55x	SPIRIT CORP.
G.726 Decoder	C62x	Commetrex
G.726 Decoder	C62x	Hyperception
G.726 Decoder	C62x	Imagine Technology
G.726 Decoder	C62x	Ingenient Technologies
G.726 Decoder	C62x	Signals + Software
G.726 Decoder	C64x	Ittiam Systems
G.726 Decoder (Low MIPS)	C54x	Adaptive Digital Technologies
G.726 Encoder	C54x	Commetrex
G.726 Encoder	C54x	D2 Technologies
G.726 Encoder	C54x	Hyperception
G.726 Encoder	C54x	Imagine Technology
G.726 Encoder	C54x	LME
G.726 Encoder	C54x	Signals + Software
G.726 Encoder	C54x	SPIRIT CORP.
G.726 Encoder	C55x	DSP Wizard
G.726 Encoder	C55x	SPIRIT CORP.
G.726 Encoder	C62x	Commetrex

For the most updated information on eXpressDSP-compliant algos, visit www.ti.com/algorithms

eXpressDSP™-COMPLIANT THIRD-PARTY ALGORITHMS (CONT'D)

VOCODERS (CONTINUED)

Compliant Algorithm	Generation	Third-Party Vendor
G.726 Encoder	C62x	Hyperception
G.726 Encoder	C62x	Imagine Technology
G.726 Encoder	C62x	Ingenient Technologies
G.726 Encoder	C62x	Signals + Software
G.726 Encoder	C64x	Ittiam Systems
G.726 Encoder (Low MIPS)	C54x	Adaptive Digital Technologies
G.726 Encoder/Decoder (Low Memory)	C54x	Adaptive Digital Technologies
G.726 U-Law ADPCM Decoder	C62x	RadiSys Corp.
G.726 U-Law ADPCM Encoder	C62x	RadiSys Corp.
G.726/G.711	C55x	SPIRIT CORP.
G.728	C62x	Encore Software
G.728 Decoder	C54x	Signals + Software
G.728 Decoder	C62x	Signals + Software
G.728 Decoder	C64x	Ittiam Systems
G.728 Encoder	C54x	Signals + Software
G.728 Encoder	C62x	Signals + Software
G.728 Encoder	C64x	Ittiam Systems
G.729	C54x	Syspac Ltda
G.729	C55x	Wipro
G.729	C62x	Encore Software
G.729 Decoder	C54x	Signals + Software
G.729 Decoder	C54x	SPIRIT CORP.
G.729 Decoder	C55x	DSP Wizard
G.729 Decoder	C62x	RadiSys Corp.
G.729 Decoder	C62x	Signals + Software
G.729 Decoder	C62x	SIAL
G.729 Decoder	C62x	SURF Communication Solns.
G.729 Encoder	C54x	Signals + Software
G.729 Encoder	C54x	SPIRIT CORP.
G.729 Encoder	C55x	DSP Wizard
G.729 Encoder	C62x	RadiSys Corp.
G.729 Encoder	C62x	Signals + Software
G.729 Encoder	C62x	SIAL
G.729 Encoder	C62x	SURF Communication Solns.
G.729 Encoder/Decoder	C54x	Adaptive Digital Technologies
G.729A	C54x	Encore Software
G.729A Decoder	C54x	D2 Technologies
G.729A Decoder	C54x	Signals + Software
G.729A Decoder	C55x	DSP Wizard
G.729A Decoder	C62x	RadiSys Corp.
G.729A Decoder	C62x	Signals + Software
G.729A Encoder	C54x	Signals + Software
G.729A Encoder	C55x	DSP Wizard
G.729A Encoder	C62x	RadiSys Corp.
G.729A Encoder	C62x	Signals + Software
G.729A Encoder/Decoder	C54x	Adaptive Digital Technologies
G.729A Encoder/Decoder	C54x	GAO Research Inc.
G.729AB	C62x	CuTe Solution
G.729AB Codec	C54x	Danlaw Technologies
G.729AB Decoder	C54x	D2 Technologies
G.729AB Decoder	C54x	Floreat
G.729AB Decoder	C54x	HelloSoft
G.729AB Decoder	C54x	Signals + Software
G.729AB Decoder	C55x	DSP Wizard
G.729AB Decoder	C55x	HelloSoft
G.729AB Decoder	C62x	RadiSys Corp.

VOCODERS (CONTINUED)

Compliant Algorithm	Generation	Third-Party Vendor
G.729AB Decoder	C62x	Signals + Software
G.729AB Encoder	C54x	D2 Technologies
G.729AB Encoder	C54x	Floreat
G.729AB Encoder	C54x	HelloSoft
G.729AB Encoder	C54x	Signals + Software
G.729AB Encoder	C55x	DSP Wizard
G.729AB Encoder	C55x	HelloSoft
G.729AB Encoder	C62x	RadiSys Corp.
G.729AB Encoder	C62x	Signals + Software
G.729AB Encoder/Decoder	C54x	Adaptive Digital Technologies
G.729B Decoder	C54x	D2 Technologies
G.729B Decoder	C54x	Signals + Software
G.729B Decoder	C55x	DSP Wizard
G.729B Decoder	C62x	Signals + Software
G.729E Encoder	C54x	D2 Technologies
G.729B Encoder	C54x	Signals + Software
G.729B Encoder	C55x	DSP Wizard
G.729B Encoder	C62x	Signals + Software
G.729B Encoder/Decoder	C54x	Adaptive Digital Technologies
G.729E Decoder	C54x	D2 Technologies
G.729E Encoder	C54x	D2 Technologies
G723.1 Decoder	C62x	SURF Communication Solns.
G723.1 Encoder	C62x	SURF Communication Solns.
IPCM Wideband	C54x	Global IP Sound AB
LBR Music & Voice Codec	C54x	EI CREBOUW
Low-Rate Coder	C55x	Cybernetics Infotech
Low-Rate Decoder	C55x	Cybernetics Infotech
Low-Rate Encoder	C55x	Cybernetics Infotech
Voice Activity Detector	C54x	Imagine Technology
Voice Activity Detector	C62x	Imagine Technology
Voice Activity Detector	C64x	Imagine Technology

WIRELESS

Compliant Algorithm	Generation	Third-Party Vendor
16-Bit CRC-CCITT Standard	C54x	Troy Group
2.28-bps/ Hz PTCM Decoder	C54x	Signion Systems
32-Bit CRC-CCITT Standard	C54x	Troy Group
Convolutional Encoder	C62x	Alliance Technology Group (ATG)
Cyclic Redundancy Check	C54x	Alliance Technology Group (ATG)
Cyclic Redundancy Check	C62x	Alliance Technology Group (ATG)
Deinterleaver	C62x	Alliance Technology Group (ATG)
Demultiplexer	C62x	Alliance Technology Group (ATG)
FCS	C54x	Troy Group
Interleaver	C62x	Alliance Technology Group (ATG)
Multiplexer	C62x	Alliance Technology Group (ATG)
Turbo Encoder	C62x	Alliance Technology Group (ATG)
Viterbi Decoder	C62x	Alliance Technology Group (ATG)

View Updated eXpressDSP-Compliant Third Party Algorithm List

The eXpressDSP-compliant Third Party algorithm list is updated monthly highlighting the newest third-party algorithms. See the most recent list at **www.ti.com/compalgorithms**

eXpressDSP™-COMPLIANT THIRD-PARTY PLUG-INS

WHAT IS A PLUG-IN?

A plug-in is a software application that integrates with, customizes or extends the Code Composer Studio™ IDE with additional specialized functionality. Plug-ins provide a wide range of tools for every step of the development process to assist you to develop DSP applications quickly and effectively. This allows you to focus on developing features to differentiate your TI DSP-based product and release more robust products to market faster.

How plug-ins speed development

Using standard tools, the development cycle consists of four stages: application design, code & build, debug, and analyze & tune. Specialized plug-ins can be integrated into each step of the development flow to decrease the overall time to product deployment. By using third-party plug-ins during the application design and code & build stages, you can build your application fast. Plug-ins used during the debug and analyze & tune stages make your application perfect. Plug-ins also enable you to use familiar tools with TI DSPs. This reduces the learning curve and enables you to focus on innovation.

Some examples of plug-in types are seen on the right. For more information, visit **www.ti.com/plug-ins**

- **Application Generation** plug-ins generate C code or a complete application from a block diagram tool or generate a simple project skeleton for a development board.
- **External Text Editors** plug-ins enable developers to use an editor they already know.
- **Filter Design** plug-ins insert filter code, integrate modified filter parameters into projects and analyze digital filters.
- **Hardware Support** plug-ins assist with installation, setup, configuration and diagnostics of development boards.
- **System Simulation** plug-ins concurrently simulate both hardware and software portions of a system.
- **Code Analysis** plug-ins provide code coverage, automate code testing and analyze code structures and arrays.
- **Code Testing** plug-ins generate test stubs and system testing utilities.
- **Real-Time Analysis** plug-ins provide controls to TI's DSP/BIOS™ kernel or other third-party operating systems for dynamic execution profilers that can show developers exactly where they are spending their CPU cycles.
- **Real-Time Instrumentation** plug-ins visually analyze data from target using RTDX™.
- **Run-Time Error Analysis** plug-ins detect memory leaks, array index errors, function parameters, return errors and data errors.

eXpressDSP-COMPLIANT PLUG-INS AVAILABLE TODAY INCLUDE:

		Stage of the Development Cycle				TI DSP Platform		
Name	**Contact**	**Application Design**	**Code & Build**	**Debug**	**Analyze & Tune**	**C6000™**	**C5000™**	**C2000™**
Borland Corporation	**www.borland.com**							
CodeWright			X			X	X	
Elanix	**www.elanix.com**							
SystemView's Real-Time DSP Architect		X	X			X	X	
Hyperception, Inc.	**www.hyperception.com**							
eXpressDSP™ Component Wizard		X				X	X	X
Visual Application Builder		X	X		X	X	X	X
National Instruments	**www.ni.com**							
LabView DSP Test Integration Toolkit for TI DSP		X		X	X	X	X	X
Pentek, Inc.	**www.pentek.com**							
SwiftNet Debug Manager		X				X		
SwiftNet Project Manager		X				X		
Rational Software Corporation	**www.rational.com**							
Rational Test Real-Time Plug-In				X	X	X		
Technosoft	**www.technosoft.ch**							
Control Panel Global Variable Visualizer for Digital Motor Controllers (DMCs)					X			X
Graphical I/O Registers Viewer for DMCs					X			X
Data Logger Tool for DMCs					X			X
Reference Generator for Motion Reference for DMCs				X	X			X
The MathWorks, Inc.	**www.mathworks.com**							
Filter Design Toolbox		X	X			X	X	X
MATLAB® Link for Code Composer Studio (CCStudio) IDE			X	X	X	X	X	X
SIMULINK® Embedded Target for C6000™ DSP Platform		X	X	X	X	X		
Vector Software, Inc.	**www.vectors.com**							
VectorCAST for CCStudio				X		X	X	X
Visual Solutions Incorporated	**www.vissim.com**							
VisSim™-CCStudio Plug-In		X	X			X		X

X – supported

For the most updated information on eXpressDSP-compliant plug-ins, visit www.ti.com/plug-ins

DSP SUPPORT RESOURCES

Design Answers at Your Fingertips

TI DSP SUPPORT

Get to market easily and quickly by leveraging TI DSP support. Customers large and small can access fast and accurate support for their DSP applications. From your personal, on-line "24/7" DSP KnowledgeBase to technical documentation, TI offers the technical support you need when YOU need it. On-line training, webcasts, workshops and the TI Developer Conference provide an array of convenient support choices.

TI DSP Training Options

TI Developer Conference
February 18-20, 2004 • Houston, TX • Westin Galleria Hotel
Connecting Real People with Real Solutions

TI Developer Conference 2004, U.S. Series

Make your plans today to attend the TI Developer Conference, February 18–20, 2004 in Houston, Texas. Whether you are a novice or experienced designer, learn about the latest in signal processing design from industry experts through demonstrations, presentations, hands-on training, networking activities and more. Conference topics include:

Solution Tracks:

Audio	Security Video/Imaging
Control	Telecom

Hardware/Software/Tool Tracks:

New User	Experienced User

Partner Tracks:

University	Third Party

You can also interact with industry experts through the Ask the Experts program throughout the conference and get answers to your design questions and dilemmas. Register today to sign up for popular sessions before everyone else at **ww.ti.com/tidc04selgd**

TI Developer Conference 2003, European Series

In ONE day, in ONE place, find the Signal Processing solution YOU need for YOUR application.

Prague – November 11, 2003
Paris – November 13, 2003
Munich – November 18, 2003
Birmingham – November 20, 2003

To register, visit **www.ti.com/europe/devcon/**

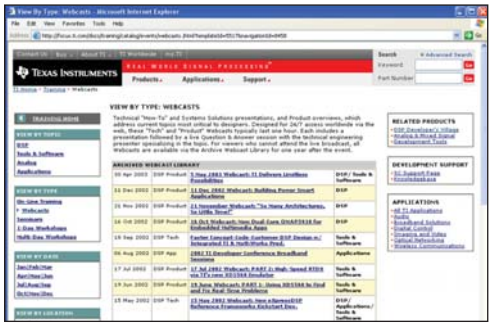
Free On-Line Training

Learn more about how to design your digital signal processing application with self-paced on-line training covering DSP applications, TMS320™ DSPs and easy-to-use software development tools. Dozens of courses such as "1 GHz DSP Overview" to "Reference Frameworks for eXpressDSP™ Software" are available today and run from 30 minutes to two hours each.

www.ti.com/onlinetraining

DSP Webcasts

TI conducts free DSP webcasts to address topics most critical to designers. A typical webcast includes a presentation followed by a question & answer session with the technical engineering presenter specializing in the topic. After the live event, DSP webcasts are available via the archive library.



www.ti.com/webcastarchive

DSP SUPPORT RESOURCES (CONT'D)

TI DSP On-Line KnowledgeBase

Available 24 hours a day, seven days a week, the TI DSP KnowledgeBase is the industry's most complete on-line resource for DSP questions and project development support. Featuring an easy-to-use, natural-language-based search capability, the DSP KnowledgeBase pulls information from hundreds of thousands of TI DSP content web pages, including technical documentation, giving customers immediate, relevant and focused answers to their search.

www.ti.com/kbasesg

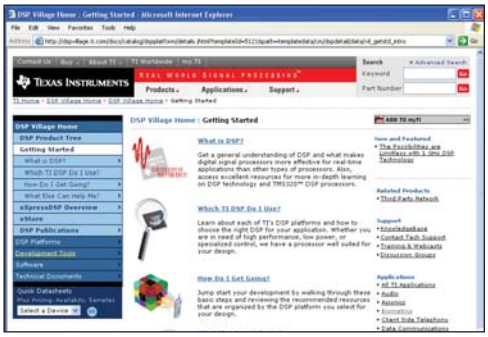
Technical Documentation

Find complete and easy-to-use data sheets, user's guides and application reports for every TI DSP platform and corresponding DSP software development tools. Easy navigation and search capabilities for more than 3,000 dedicated on-line DSP web pages and more than 100,000 pages of DSP technical documentation.

www.ti.com/techdocsg

Getting Started with TI DSP

TI's web-based "Getting Started" DSP support tool helps engineers get their designs from inspiration to implementation quickly and easily. Designers choosing to use TI DSPs in their real-time applications get easy-to-access introductory DSP content, thus decreasing the learning curve and speeding products to market. See page 2 for additional information.



www.ti.com/gettingstarted

The Essential Guide to Getting Started with DSP CD

This free CD contains links to a variety of getting started resources including documentation and the latest new product information. It also provides you a guided tour of the eXpressDSP™ Software and Development Tools and a 90-day free evaluation of the Code Composer Studio™ v2.2 Development Tools for the TMS320C5000™ and TMS320C6000™ DSP and OMAP™ platforms. Order your CD at

www.ti.com/getstartedcd

TI DSP Discussion Groups

Join the community of DSP users and share information about signal processing application design. Peer-to-peer discussion groups include *High Performance Digital Signal Processing, Power-Efficient Digital Signal Processing, Control-Optimized Digital Signal Processing* and for users new to DSP, *Getting Started with Digital Signal Processing* discussion groups.

www.ti.com/discussgroup

Publications

eTech Innovations eNewsletter

Receive the latest digital signal processing news from TI including: DSP silicon, software, systems applications and support information. Subscribe today for this free monthly eNewsletter to be delivered right to your inbox in html or text format.

www.ti.com/etechsubscribe

DSP Applications Journal

To support the design of specific DSP-based systems, view the on-line DSP Applications Journal with the latest application notes by platform and software.

www.ti.com/appsjournal

Embedded Edge On-Line Magazine

The *Embedded Edge* on-line magazine offers comprehensive solutions, tips, tricks and advice from people who have met and conquered some of the development problems developers face every day. Register today to receive information on news, products and services that will help make life as an embedded systems designer easier.

www.ti.com/embeddededge

TI Product Information Center (PIC)

Worldwide technical support staff are available to answer questions and troubleshoot problems. Contact the PIC by e-mail or directly by phone. See the worldwide contact information inside the front cover for the e-mail and phone number appropriate to your area.

www.ti.com/dspsupport

For the most updated information on DSP support resources, visit www.ti.com/dspsupport

DSP SUPPORT RESOURCES (CONT'D)

REAL WORLD ANSWERS – ASK THE EXPERTS

Save valuable design time and get the answers you need for your current design with the click of a mouse. Texas Instruments offers system-level expertise in a variety of application areas such as: control, telephony, security, video/imaging and more.

Visit **www.ti.com/realworldanswers** to find helpful information, frequently asked questions and technical documentation for your specific application. Or "Ask the Expert" and e-mail your design questions. An expert from TI will respond directly back to you.

Control

TI DSP embedded controllers can help you design power tools with more reliable sensorless control, white goods with higher energy-efficient motors or multi-phase industrial motors with higher resolution and precision. TI's TMS320C2000™ DSP platform provides the ultimate combination of MCU peripheral integration, C efficiency and ease-of-use with the performance of TI DSPs. See how TI DSP embedded controllers can provide your design with more features, better feedback and precision, and reduce costs.

Worldwide Control Solutions Manager

Answers to popular questions can be viewed at at **www.ti.com/controlanswers**. Or ask the control expert your question at **controlanswers@list.ti.com**.

Telephony

TI offers customized telephony products to allow you to get to market faster and easier when developing client side telephony, embedded modem, remote data collection, Internet connectivity, telephony coprocessing or voiceband processing applications. Using TI's single-source telephony solutions, designers can easily expand product capabilities and feature sets for telephony applications, as well as customize, adapt and scale the solution to suit particular requirements, allowing designers to focus on end-product differentiation.

Worldwide Telephony Solutions Manager

Answers to popular questions can be viewed at **www.ti.com/telephonyanswers**. Or ask the telephony expert your question at **telephonyanswers@list.ti.com**.

Security

With unmatched systems expertise, TI delivers a broad product offering to the security industry, resulting in reduced costs of development and faster time-to-market for customers building security products incorporating biometrics and video surveillance. TI TMS320C6000™ DSPs are used to compress the image in a variety of capable formats, as well as offer the ability to use intelligent image analysis functions and different types of networking protocol support.

Worldwide Security Solutions Manager

Answers to popular questions can be viewed at **www.ti.com/securityanswers**. Or ask the security expert your question at **securityanswers@list.ti.com**.

Video & Imaging

From portable to plugged applications, TI offers DSP and analog solutions to fit your video, imaging or multimedia systems design application. TI can help accelerate your design with smarter image processing, more functionality and flexibility that differentiates your product in the marketplace.

DSP Video Applications Engineer

TI video and imaging silicon solutions include: TI's new TMS320DM64x™ digital media processors, TMS320C6000™, TMS320C5000™ and OMAP5910 DSPs. Plus software, developer kits, systems expertise and support are available to accommodate all your needs – no matter what imaging and/or video end equipment that is being developed.

Answers to popular questions can be viewed at **www.ti.com/videoimaginganswers**. Or ask the video/imaging expert your question at **videoimaginganswers@list.ti.com**.

TRAINING RESOURCES

On-Line Training, Webcast Library, One-Day Workshops, Multi-Day Workshops

ON-LINE TRAINING

Convenient on-line training courses are available at **www.ti.com/onlinetraining**

Signal Processing Applications

Networking

TMS320C6000™ TCP/IP Network Developer's Kit (NDK)

Telephony

Making Telephony Simple

Video and Imaging

C6000™ DSP Imaging Developer's Kit (IDK)
C6000 DSP Network Video Developer's Kit (NVDK)

DSP Silicon

General

1-GHz DSP Overview
An Intuitive Approach to DSP

TMS320C6000 DSP

720-MHz DSP Overview
C6000 DSP One-Day Workshop
C6000 DSP Compile Tools Overview
C6000 DSP Compile Tools Technical Details
TMS320C64x™ DSP Technical Details
TMS320C64x/TMS320C55x™ DSP Overview
TMS320C6411 DSP Overview
TMS320C6414, TMS320C6415 and TMS320C6416 DSPs Overview
TMS320C6712 DSP Overview
Optimize C Code on C6000 DSPs

TMS320C5000™ DSP

C5000™ DSP One-Day Workshop
TMS320C55x DSP Technical Details
TMS320C5510 DSP Technical Details
TMS320C5509 and TMS320C5502 DSP Overview
TMS320C5509 and TMS320C5502 DSP Technical Details
TMS320C5501/C5502 $5 Dual-MAC DSPs
TMS320C55x/TMS320C64x DSP Overview
TMS320C5470 and TMS320C5471 DSP Overview
TMS320C54x™ and TMS320C55x DSP Migration Tutorial
Communicating Over the C5000 DSP Host Port Interface

OMAP™ Processors and Software Development

OMAP5910 Processor Product Overview
Software Development for OMAP Processors: High-Level OS and Integrating DSP

TMS320C2000™ DSP

TMS320F2401A DSP Overview
TMS320F2810/F2812 DSP Overview
TMS320F2810/F2812 DSP Technical Details
Flash Programming for Your TMS320LF24x DSP System
Debugging TMS320C24x™ DSP Using Code Composer Studio™ IDE Real-Time Monitor

DSP Tools and Software

Code Composer Studio IDE

Code Composer Studio (CCStudio) v2.2 Overview
What's New in CCStudio v2.1
What's New in CCStudio v2.0
An Overview of Project Management System in CCStudio IDE v2.0
Profiling Your Code with Code Composer Studio™ v2.0
CCStudio Simulators for Software Development – I
CCStudio Simulators for Software Development – II
CCStudio 2.0 Debug Facilities
CCStudio 2.0 Tutorials
Migrating Existing CCStudio IDE v1.x Projects to v2.0

DSP/BIOS™ Kernel

DSP/BIOS Kernel Overview
DSP/BIOS One-Day Workshop
DSP/BIOS Kernel Fundamentals
DSP/BIOS Audio Demo
Developing a DSP/BIOS Application for ROM on the TMS320C5402 DSK

Emulation

XDS560™ Emulator: Advanced Event Triggering
XDS560 Emulator: Product Overview
High-Speed RTDX™

eXpressDSP™/Reference Frameworks

eXpressDSP Real-Time Software Technology Overview
Reference Frameworks for eXpressDSP Software
Analyzing Your Embedded Real-Time Application's Dynamic Behavior Using RTDX

TMS320™ DSP Algorithm Standard

TMS320 DSP Algorithm Standard
TMS320 Algorithm Standard – Make vs. Buy

Third-Party Courses

The Mathworks Developer's Kit for TI DSPs

For the most updated information on TI training resources, visit www.ti.com/training

TRAINING RESOURCES (CONT'D)

ON-LINE TRAINING (CONT'D)

Analog

Analog Electronic Design in a Day
Interface: Signaling Rate vs. Transfer Rate

Power Supplies

Magnetics Design for Switching Power Supplies
100- Watt, 400-kHz, High-Efficiency DC/DC Converter Design Review
Troubleshooting and Optimizing Power Supply Control

ONE-DAY WORKSHOPS

One-day workshops are designed to offer product or technology knowledge and more advanced information about a particular category of devices. These workshops include a significant "hands-on" section and are ideal introductions to get started with DSP. A list of available courses and schedule information can be found at **www.ti.com/1dayworkshops**

TMS320C6416/C6713 DSK One-Day Workshop

- Introduction to TMS320C6000™ DSPs and Code Composer Studio™ IDE
- C6000™ DSP peripherals
- Using the C6000 DSP system tools and software
- Optimizing C6000 DSP code

TMS320C5510 DSK One-Day Workshop

- TMS320C5000™ DSP overview
- TMS320C55x™ architecture and peripherals
- Introduction to Code Composer Studio IDE
- Using the C5510 DSP Starter Kit (DSK)
- Use the Chip Support Library to setup and program peripherals
- Analyze and use power-reduction techniques
- Evaluate methods to maximize performance
- Use DSP/BIOS™ kernel and RTA (real-time analysis tools) to build, analyze, and debug a system
- Run labs/demos using common real-time applications on hardware (C5510 DSK)

TMS320F2812 eZdsp™ One-Day Workshop

- Basic DSP controller implementation
- TMS320F2812 DSP architecture
- How to use PC-based development tools – F2812 eZdsp and Code Composer Studio 2.12 system design

Implementation of Video Streaming One-Day Workshop

- Imaging applications and video compression standards, steaming protocols overview MPEG-4 technology
- MPEG4 audio and video libraries
- Getting started for a new imaging design
- MPEG-4 audio/video streaming solution – real-time implementation

Digital Motor Control One-Day Workshop

- Overview of the synchronous and asynchronous machines
- Compares the Field oriented Control with the standard scalar control techniques
- Receive the latest technology and product updates to support your future design
- Learn how the use of DSP processors can lead to the most effective control of your motor

DSP/BIOS™ OS One-Day Workshop

- Key elements of a real-time DSP system
- Practical designing and problem solving in multi-threaded applications
- Minimizing overhead
- Real-time analysis and debug
- Real-time scheduling and resource management
- Host and target communications

TRAINING RESOURCES (CONT'D)

MULTI-DAY WORKSHOPS

Multi-day workshops are for engineers who need to sharpen their design and development skills. These workshops include significant "hands-on" labs emphasizing the demonstration and application of techniques and skills. TI workshops are highly beneficial in helping developers implement their DSP designs quickly. A list of available courses and schedule can be found at **www.ti.com/multidayworkshops**

TMS320C6000™ DSP Integration Workshop

- Use Code Composer Studio™ IDE
- Design a real-time double-buffered system
- TMS320C6711 Design Starter Kit (DSK)
- DSP/BIOS™ kernel
- Debugging with real-time analysis
- Set up peripherals using the Chip Support Library
- Discuss the McBSP serial ports multi-channel features
- Use the EDMA advanced features (auto-initialization, interrupt synchronization)
- C6000™ DSP system memory management
- C6000 DSP cache operation
- Design your DSP system to allow code/data overlays in memory
- Evaluate and use C6000 DSP boot loader
- Setting up a bootable image in Flash ROM
- Program the DSK on-board Flash memory

TMS320C6000 DSP Optimization Workshop

- C6000 DSP family CPU architecture
- C6000 DSP family CPU pipeline
- Building Code Composer Studio projects
- Exploring C6000 DSP compiler build-options
- Writing efficient C code
- Writing optimized standard and linear assembly code
- Mixing C and assembly language
- Software pipelining techniques
- Numerical issues with fixed point processors
- Basic C6000 DSP system memory management
- How caches work and optimizing their usage

OMAP™ Software Workshop

- Aspects of an OMAP solution
- Overview of the OMAP architecture
- Overview of the OMAP software environment DSP/BIOS Kernel bridge
- ARM "Gateway" coding techniques
- DSP "Node" coding techniques
- TMS320™ DSP Algorithm Standards concepts and authoring
- Advanced bridge programming concepts

TMS320C55x™ DSP Integration Workshop

- Use Code Composer Studio IDE
- Design a real-time double-buffered, channel sorted system
- TMS320C5510 Design Starter Kit (DSK)
- DSP/BIOS kernel
- Debugging with real-time analysis
- Set-up peripherals using the Chip Support Library
- Use some of the McBSP serial ports multi-channel features
- Use the DMA auto-initialization feature
- Use eXpressDSP™-compliant algorithms in an application
- Optimize code and memory for the C55x™ DSPs
- C55x DSP system memory management
- HEX500 system memory management
- Use C5510 DSP boot loader
- Program the DSK on-board Flash memory

TMS320C55x DSP Workshop

- Architecture (buses, registers, memory map)
- Peripherals (McBSP/DMA/EMIF/HPI/boot loader)
- Addressing (how to talk to program/data memory)
- Filtering (basic block FIR filter)
- Parallelism
- Advanced Instructions (LMS/FIRS/Viterbi, min/max)
- Mixing C and Assembly code
- Interrupts
- Power considerations (Idle domains, PLL, clocking)

TMS320C54x™ DSP Integration Workshop

- Utilize Code Composer Studio IDE
- Design a real-time double-buffered, channel sorted system
- TMS320VC5416 Design Starter Kit (DSK)
- DSP/BIOS kernel
- Debugging with real-time analysis
- Setup peripherals using the Chip Support Library
- Use some of the McBSP serial ports multi-channel features
- Use the DMA auto-initialization feature
- Use eXpressDSP-compliant algorithms in an application
- Optimize code and memory for the C54x™ DSP
- C54x DSP system memory management
- HEX500 system memory management
- Use VC5416 boot loader
- Program the DSK on-board Flash memory

TMS320C54x DSP Workshop

- System-level considerations
- Techniques for optimizing assembly and C code
- Coding algorithms to take advantage of the processor's architecture, buses and special hardware features
- Writing a program from start to finish
- Hardware interface issues

For the most updated information on TI training resources, visit www.ti.com/training

TRAINING RESOURCES (CONT'D)

MULTI-DAY WORKSHOPS (CONT'D)

TMS320C28x™ DSP Workshop

- Evaluate C28x™ DSP ability to meet your system requirements
- Compare/contrast C28x DSP to other solutions you have used or evaluated
- Use development tools to compile, optimize, assemble, link, debug and benchmark code
- Demonstrate a working knowledge of the C28x DSP functional modules
- Demonstrate a working knowledge of the basic operations for the C28x DSP
- Understand where to go to get more information
- Have a full working knowledge of your take home eZdsp™ board

TMS320C24x™ DSP Workshop

- C24x™ DSP architecture and instruction set
- Use of PC-based development tools
- Memory and I/O usage
- Algorithm development
- Basic DSP controller implementation
- Binary arithmetic, scaling, difference equations
- Hardware interface issues

DSP/BIOS™ Kernel One-Day Workshop

- Define a real-time system design and its software design challenges
- Apply software development tools in developing a system:
  - Generating and loading software for a specific target
  - Debugging software and visualizing data using breakpoints
  - Visualizing software performance and data during execution using DSP/BIOS kernel
- Integrate system and application software into a real-time design:
  - Interfacing to and configuring DSP/BIOS kernel
  - Synchronizing events and access to shared data structures using DSP/BIOS kernel
  - Communicating between processes and with peripheral devices using DSP/BIOS kernel
- Analyze and optimize software to meet real-time requirements
  - Analyzing real-time performance of software using DSP/BIOS kernel
  - Calculating and optimizing I/O buffering
  - Optimizing the use of program and data memory

Registration

To register for these workshops, please visit **www.ti.com/multidayworkshops**

TI DSP WEBCAST LIBRARY

The library contains a variety of webcasts ranging from technical "How-Tos" to systems solution presentations and product overviews, which address current topics most critical to designers. Designed for 24/7 access worldwide via the web, these webcasts typically last one hour. Each includes a presentation followed by a live Question & Answer session with the technical engineering presenter specializing in the topic. To access the library, visit **www.ti.com/webcasts**

DSP Webcasts

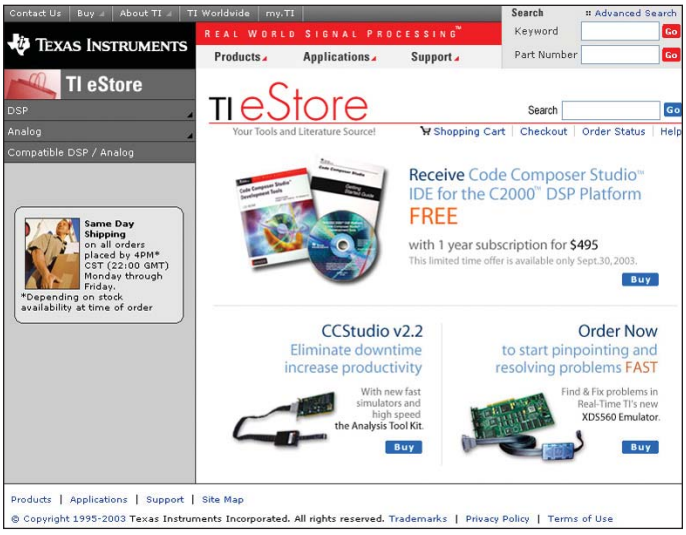
- Design and Implementation of Video Applications on TI DSP With Simulink®
- Considerations/Tradeoffs When Choosing a Floating-Point DSP
- The Possibilities are Limitless with 1-GHz DSP Technology from Texas Instruments
- Building Power Smart Applications
- So Many Architectures, So Little Time: Difficult Choices for Signal Processing
- New Dual-Core OMAP5910 Processor for Next-Generation Multimedia-Enhanced Applications
- Faster Concept-Code-Customer DSP Design With Integrated TI and The MathWorks Products
- 2002 TI Developer Conference Broadband Sessions Webcasts
- Easy Peripheral Programming with TI's Chip Support Library
- Don't Compromise–DSP Controllers Solve Embedded Control Design Challenges
- Debugging DSP Systems with TI JTAG Emulation
- Maximizing Data Transfer Efficiency with C5000™ DMA Controller
- Getting Started with Code Composer Studio IDE Version 2.0
- Utilizing the Two-Level Cache on the TMS320C62x™ / TMS320C67x™ / TMS320C64x™ DSPs in your DSP System
- Flash Programming for TMS320LF240x DSP Digital Control Systems
- Debug C24x™ DSP Digital Control Design with Real-Time Monitoring
- New C64x™ DSPs Revolutionize 3G Wireless
- Flexible System Interfacing with McBSP
- Manage Code Size vs. Code Speed Tradeoffs with Profile-Based Compiler
- Embedded Real-Time Applications Dynamic Behavior with RTDX
- Communicating Over the TMS320C5000™ Host Port Interface

INTRODUCING THE NEW TEXAS INSTRUMENTS eStore

Fast, Easy On-Line Store

Due to its popularity, TI's DSP Village eStore has been expanded to include a full suite of Analog development tools. Besides the latest DSP hardware, software and technical literature, the newly renamed TI eStore now also offers a complete line of Analog development boards, evaluation boards, daughter cards and designer kits. With all the necessary capabilities to browse and purchase, the eStore allows you to easily buy TI's most popular items.

Requiring an average of three days to arrive in the United States and seven days for international deliveries*, orders may be placed with American Express, MasterCard, Visa or Discover over a secure Internet connection. Customers may also use purchase orders by placing the order over the phone via the Product Information Center (PIC).



Key Features/Benefits

- Quick and easy on-line purchase of DSP and Analog products
- Same day shipping available on all orders placed by 4 PM CST (22:00 GMT) Monday through Friday*
- On-line order status tracking available for all orders placed via the Internet
- Easy payment via AMEX, Visa, Mastercard, Discover and purchase orders
- TI's most popular items including technical documentation, DSKs, EVMs, daughter cards, Code Composer Studio™ Development Tools and much more

To access the new TI eStore, visit **www.ti-estore.com**

**Dependent on stock availability at time of order.*

For the most updated information on the TI eStore, visit www.ti-estore.com

DSP DEVELOPMENT TOOLS FEATURE MATRIX

TI Part Number	Tool Description	Annual Subscription	Code Composer Studio IDE V2.xGUI	DSP/BIOS™ Real-Time Operating System/Kernel Services	TMS320™ DSP Algorithm Standard Developer's Kit	Code Generation Tools C/C++ Compiler/Assembler/Linker	XDS510 Device Drivers (Emulation software)	XDS560 Device Drivers (Emulation software)	RTDX™	Simulator	Target Board (Hardware)	Target-Specific Device Drivers	Emulator	Price $ U.S.
TMDSCCS6000-1	C6000™ DSP Code Composer Studio™ Development Tools	X	X	X	X	X	X	X	X	X				3,595
TMDSSUB6000	Annual Subscription for C6000 DSP Code Composer Studio	X												600
TMDSDSK6713	C6713 DSP Starter Kit (DSK)		X‡	X‡	X	X			X	X‡	X	X		395
TMDSDSK6416	C6416 DSP Starter Kit (DSK)		X‡	X‡	X	X			X	X‡	X	X		395
TMDSEVM6701-4	C67x™ DSP EVM Bundle		X	X	X	X	X	X	X	X	X	X		3,495
TMDSBRD6701	C67x DSP EVM Board										X			1,995
TMDXDMK642	TMS320DM642 Evaluation Module										X			1,995
TMDXDMK642	TMS320DM642 Digital Media Developer's Kit	X	X	X	X	X	X	X	X	X	X		X	6,495
TMDX3PNV6416S	C64x™ DSP Network Video Developer's Kit										X	X		4,495
NVDKCCS	C64x DSP Network Video Developer's Kit Bundle§		X	X	X	X	X	X	X	X	X	X		6,595
TMDSFDCFPC10	Fingerprint Authentication Development Tool													245
TMDSCCS5000-1	C5000™ DSP Code Composer Studio Development Tools	X	X	X	X	X	X	X	X	X				3,595
TMDSSUB5000	Annual Subscription for C5000 DSP Code Composer Studio	X												600
SPRC119	Essential Guide to Getting Started with DSP CD-ROM¶		L	L	X	L			L	L				Free
SPRC049	Code Composer Studio 90-Day Free Evaluation Tools for OMAP CD-ROM		L	L	X	L			L	L				Free
TMDSCCSOMAP-1	Code Composer Studio for OMAP™ Platform	X	X	X	X	X	X	X	X	X				5,400
TMDSSUBOMAP	Annual Subscription for OMAP Platform Code Composer Studio	X												900
TMDSDSK5416	C54x™ DSP Starter Kit (DSK)		X‡	X‡	X	X‡			X		X	X		395
TMDSDSK5510	C55x™ DSP Starter Kit (DSK)		X‡	X‡	X	X‡			X		X	X		395
INNOVATOREVMV1	Deluxe Innovator™ Development Kit for OMAP										X			2,995
TMDS3P701016A	LF2407A Evaluation Module (EVM)*		X			X				X	X	X	X	1,995
TMDSeZD2407	LF2407A eZdsp™ Starter Kit*		X			X					X	X		295
TMDSeZD2401	LF2401A eZdsp Starter Kit*		X			X					X	X		495
TMDXeZD2812	F2812 eZdsp Starter Kit*		X			X					X	X		295
TMDXeZS2812	F2812 eZdsp Starter Kit (DSP in Socket)		X			X					X	X		449
TMDXEVP2812	F2812 Development Bundle (Parallel Port)		X	X		X	X	X		X	X		X	1,995
TMDXEVU2812	F2812 Development Bundle (USB)		X	X		X	X	X		X	X		X	2,295
TMDSCCS2000-1	C2000™ DSP Code Composer Studio Development Tools	X	X	X		X	X	X		X				495¤
TMDSSUB2000	Annual Subscription for C2000 DSP Code Composer Studio	X												495
C3XFREETOOL	C3x™ DSP Code Composer Free Evaluation Tools		L♥			L				L				Free
TMDS3P761381	VC33 eZdsp Starter Kit		X			X					X	X		495
TMDS3240130	C3x/C4x™ DSP Code Composer		X♥			X	X			X				1,495
TMDS3243855-02	C3x/C4x DSP C Compiler/Assembler/Linker					X								750
TMDXEMU560	XDS560™ PCI-Bus High-Performance JTAG Emulator												X	3,995
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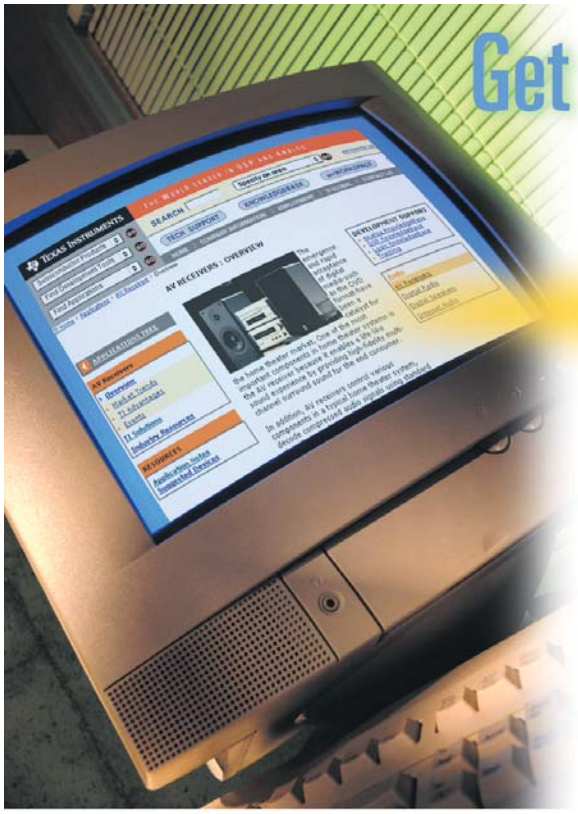
X = included L = Full featured – Limited to 90 days A = Application size is limited * Codeveloped with Spectrum Digital. ° TMS320C5000™ only, † TMS320C6000™ only. ♥ Ships with Code Composer™ 4.1x IDE.
‡ DSK must be connected for Code Composer Studio to run. § Available only in Texas Instruments eStore. ¤ Promotional offer valid for limited time only. ¶ Includes 90-day free evaluation tools.

NOTES:



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