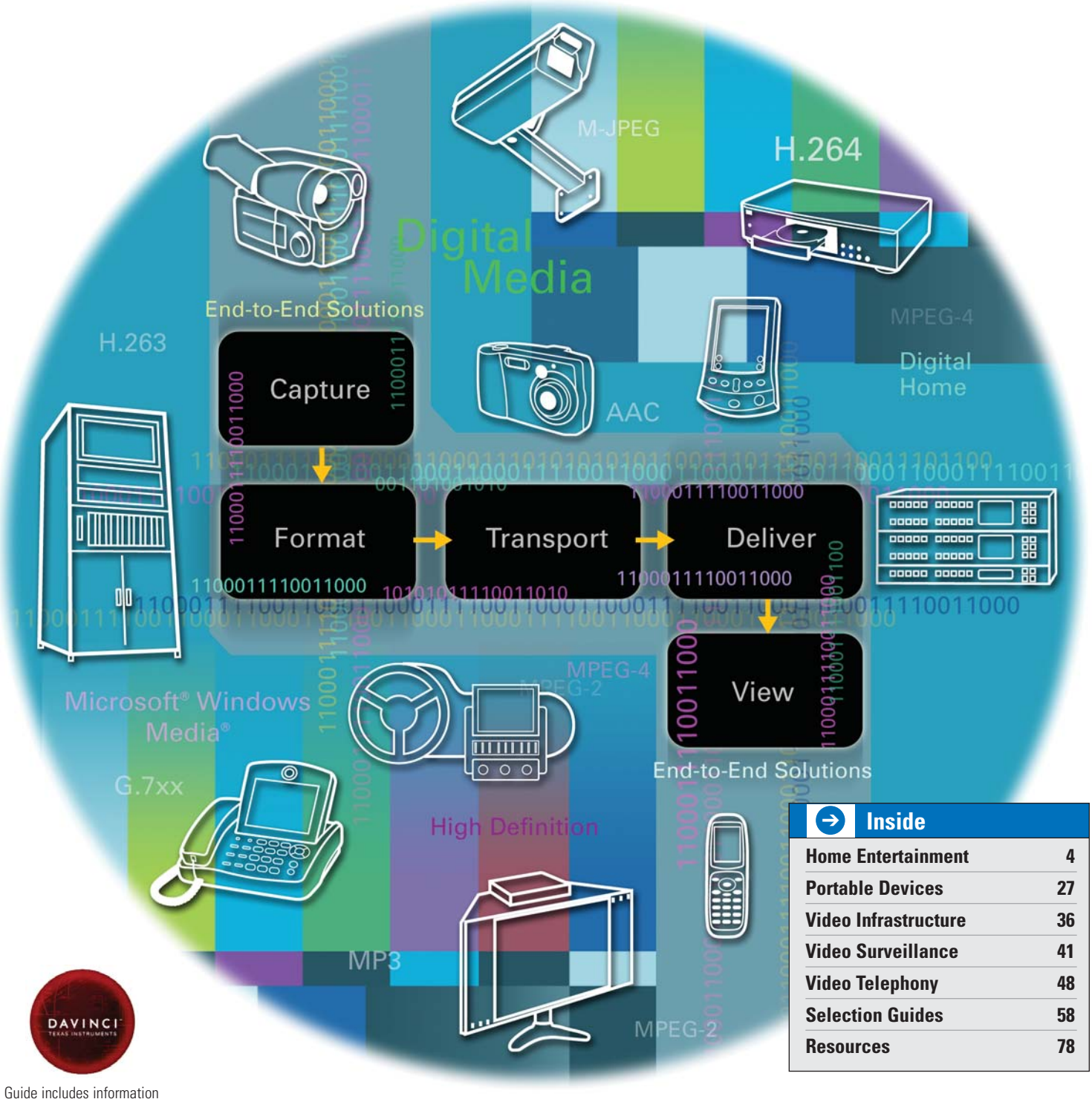
Video and Imaging Solutions Guide

Amplifiers, Audio/Video CODECs, Clock Distribution Circuits, Data Converters, DaVinci™ Technology, DLP® Picture Technology, Digital Media Processors, Digital Signal Processors, Interface, Logic, MSP430 Ultra-Low-Power Microcontrollers, Phase Lock Loops, Power Management

2Q 2006



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DAVINCI™ TEXAS INSTRUMENTS

Guide includes information on DaVinci™ Technology

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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

Product Information Centers

Americas

Phone	+1(972) 644-5580	Fax	+1(972) 927-6377
Internet/E-mail	support.ti.com/sc/pic/americas.htm		

Europe, Middle East, and Africa

Phone			
Belgium (English)	+32 (0) 27 45 54 32	Netherlands (English)	+31 (0) 546 87 95 45
Finland (English)	+358 (0) 9 25173948	Russia	+7 (0) 95 363 4824
France	+33 (0) 1 30 70 11 64	Spain	+34 902 35 40 28
Germany	+49 (0) 8161 80 33 11	Sweden (English)	+46 (0) 8587 555 22
Israel (English)	180 949 0107	United Kingdom	+44 (0) 1604 66 33 99
Italy	800 79 11 37		
Fax	+(49) (0) 8161 80 2045		
Internet	support.ti.com/sc/pic/euro.htm		

Japan

Fax			
International	+81-3-3344-5317	Domestic	0120-81-0036
Internet/E-mail			
International	support.ti.com/sc/pic/japan.htm		
Domestic	www.tij.co.jp/pic		

Asia

Phone			
International	+886-2-23786800		
Domestic	Toll-Free Number		Toll-Free Number
Australia	1-800-999-084	Malaysia	1-800-80-3973
China	800-820-8682	New Zealand	0800-446-934
Hong Kong	800-96-5941	Philippines	1-800-765-7404
India	+91-80-51381665 (Toll)	Singapore	800-886-1028
Indonesia	001-803-8861-1006	Taiwan	0800-006800
Korea	080-551-2804	Thailand	001-800-886-0010
Fax	+886-2-2378-6808	E-mail	tiasia@ti.com
Internet	support.ti.com/sc/pic/asia.htm		ti-china@ti.com

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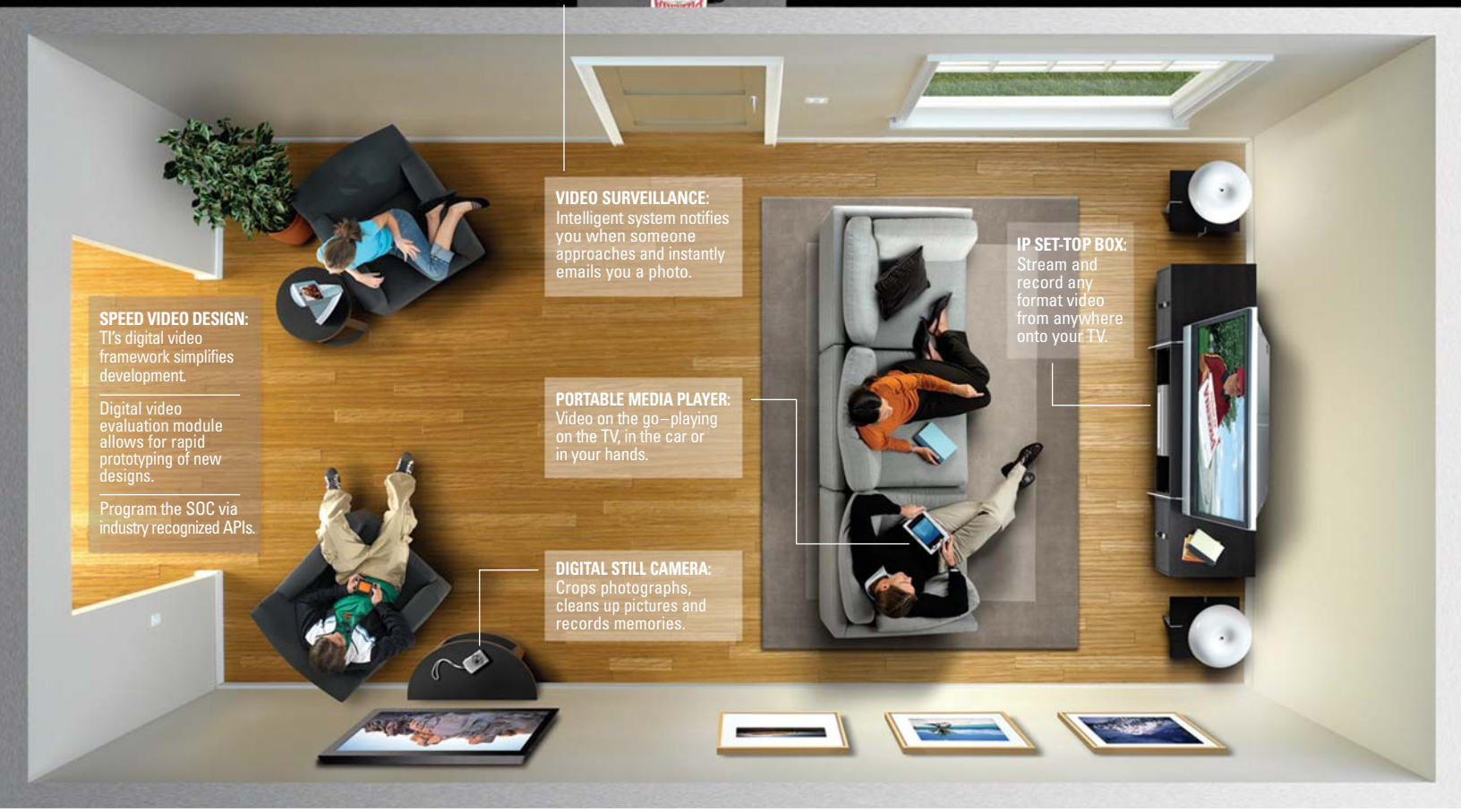
DAVINCI™
TEXAS INSTRUMENTS

PROCESSORS | SOFTWARE | TOOLS | SUPPORT

Now that DaVinci products are here, your digital video innovations are everywhere.

That's the DaVinci Effect.

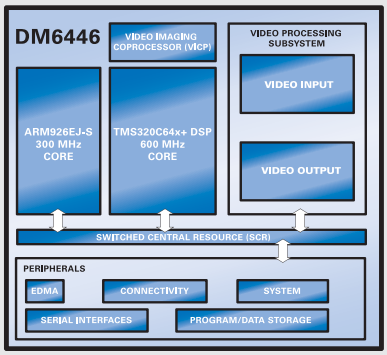


DaVinci™ Technology makes astounding creativity possible in digital video devices for the hand, home and car. The DaVinci platform includes digital signal processor (DSP) based SoCs, multimedia codecs, application programming interfaces, application frameworks and development tools, all of which are optimized to enable innovation for digital video systems. DaVinci products will save OEMs months of development time and will lower overall system costs to inspire digital video innovation. So what are you waiting for? You bring the possibilities. DaVinci will help make them real.

What is DaVinci?

Processors: Digital Video SoCs:

- TMS320DM6446 – Video encode/decode
- TMS320DM6443 – Video decode



Performance Benchmarks:

STANDALONE CODECS	DM6446	DM6443
MPEG-2 MP ML Decode	1080i+ (60 fields /30 frames)	720p+
MPEG-2 MP ML Encode	D1+	n/a
MPEG-4 SP Decode	720p+	720p+
MPEG-4 SP Encode	720p+	n/a
VC1/WMV 9 Decode	720p+	720p+
VC1/WMV 9 Encode	D1+	n/a
H.264 (Baseline) Decode	D1+	D1+
H.264 (Baseline) Encode	D1+	n/a
H.264 (Main Profile) Decode	D1+	D1+

+ denotes available processor headroom for analytics and/or other features

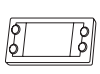
Tools: Validated Software and Hardware Development

- DVEVM (Digital Video Evaluation Module)
- MontaVista Development Tools
- Code Composer Studio IDE

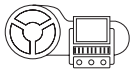
Software: Open, Optimized and Production Tested

- Platform Support Package
- MontaVista Linux Support Package
- Industry-recognized APIs
- Multimedia frameworks
- Platform-optimized, multimedia codecs:
  - H.264
  - MPEG4
  - H.263
  - MPEG2
  - JPEG
  - AAC+
  - AAC
  - WMA9
  - MP3
  - G.711
  - G.728
  - G.723.1
  - G.729ab
  - WMV9/ VC1

>>> For complete technical documentation or to get started with our Digital Video Evaluation Module, please visit **www.thedavincieffect.com**


Portable Media Player


IP Set Top Box


Automotive Infotainment


Digital Still Camera


Digital Video Innovations


Video Surveillance


Video Phone & Conferencing

Technology for Innovators™

Texas Instruments

Overview

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Overview

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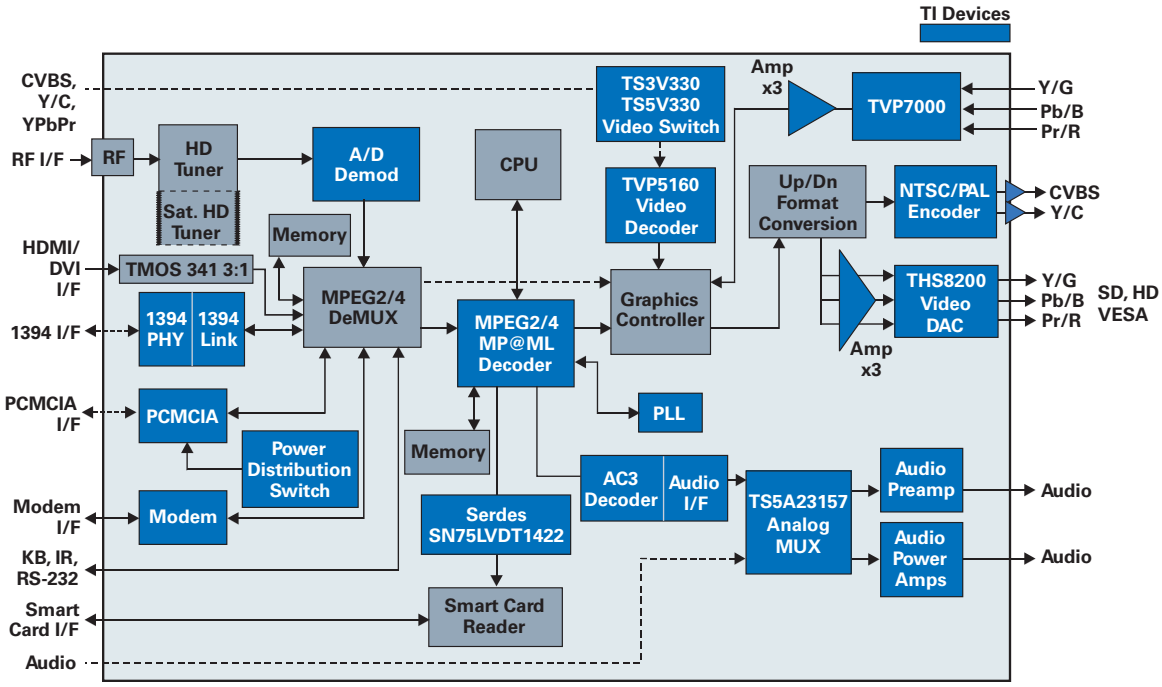
High-definition TV (HDTV) and standard-definition television (SDTV) are the two categories of display formats for digital television (DTV) transmissions, which are becoming the standard. New television sets will be either HDTV-capable or SDTV-capable, with receivers that can convert the signal to their native display format. There has been a surge in momentum in the DTV market as the world continues to accelerate the transition from analog to digital TV transmission.

HDTV System Block Diagram



Featured Products

DLP® Technology Enables DLP® HDTVs and Projectors
DLP®

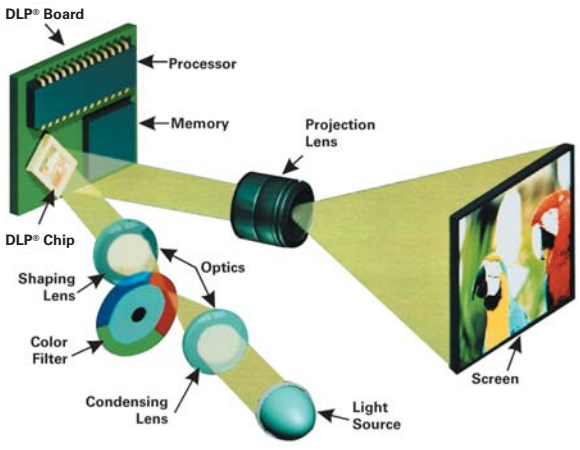
For more information go to: **www.dlp.com**

DLP® technology is a revolutionary display solution that uses an optical semiconductor to manipulate light digitally. It's also a proven and dependable technology preferred by leading electronics manufacturers worldwide, with nearly nine million systems shipped since 1996.

DLP technology is digitally accurate and has superior repeatability. DLP technology's advanced color processing technology provides vivid, accurate colors; and it is reflective, which means it uses light more efficiently than transmissive technologies. DLP technology enables the best image quality with very high contrast ratio. Over one million micromirrors make up the DLP Chip, each spaced less than one micron apart, resulting in a very high fill factor. Because the micromirrors on the DLP Chip switch on and off more than 5,000 times per second, the image is realistically accurate.

Key Features
- Because it's digital, DLP technology is precise, accurate and repeatable
- The accuracy of the DLP Chip and advanced color processing means vivid, accurate colors
- DLP technology is reflective, which means it uses light more efficiently than transmissive technologies
- Smaller gaps between mirrors boost contrast ratio and create seamless pictures
- One panel design means no blurring or fuzzy edges
- The fast switching time of DLP technology yields enhanced video performance

Applications
- Digital projectors
- Large-screen HDTVs
- Cinemas



One-chip DLP® projection system

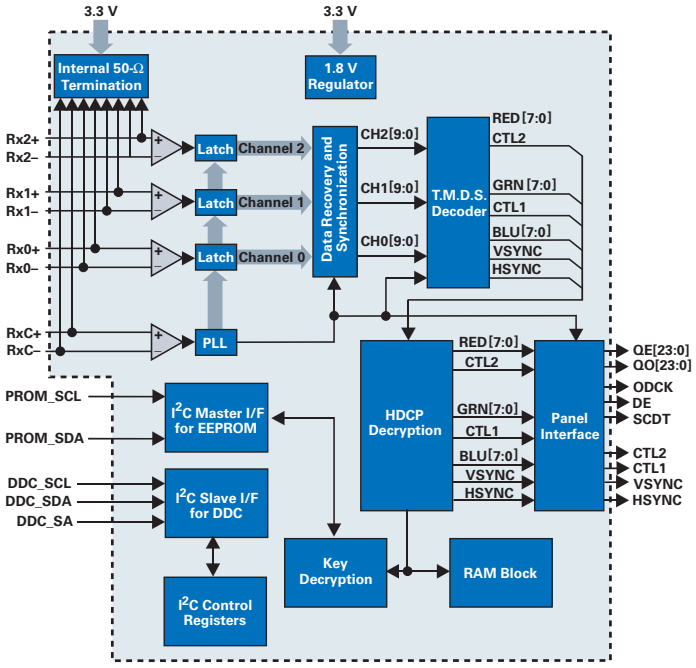
PanelBus™ HDCP Digital Receiver
TFP501, TFP503

Get datasheets at: **www.ti.com/TFP501** or **www.ti.com/TFP503**

The TFP501 and TFP503 are TI PanelBus flat panel display products, part of a comprehensive family of end-to-end DVI 1.0-compliant solutions. The TFP501/TFP503 support display resolutions up to UXGA, including the standard HDTV formats, in 24-bit true-color pixel format. The TFP501/TFP503 offer design flexibility to drive one or two pixels per clock, support TFT or DSTN panels and provide an option for time-staggered pixel outputs for reduced ground-bounce.

Key Features
- Supports UXGA resolution (output pixel rates up to 165 MHz)
- Digital visual interface (DVI) and high-bandwidth digital content protection (HDCP) specification compliant
- Encrypted external HDCP device key storage for exceptional security and ease of implementation
- True color, 24 bits/pixel, 48-bit dual-pixel output mode; 16.7/M colors at one or two pixels per clock
- 4× oversampling for reduced bit-error rates and better performance over longer cables
- Supports hot-plug detection
- Packaging: 100-pin TQFP PowerPAD™

Applications
- Desktop LCD monitors
- DLP® and LCD projectors
- Digital TVs



TFP501 block diagram

10/20-W Stereo Class-D Audio Amplifier
TPA3101D2, TPA3100D2

Get datasheets at: **www.ti.com/sc/device/TPA3100D2** or **www.ti.com/sc/device/TPA3101D2**

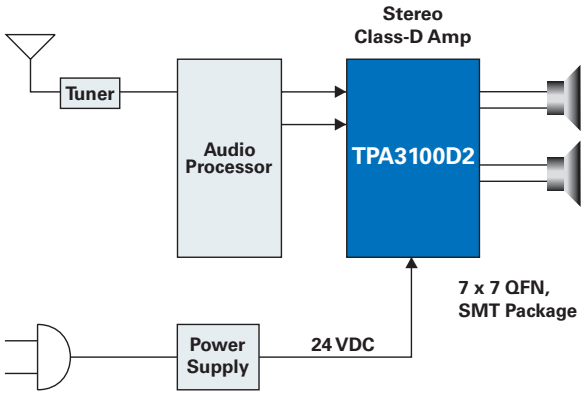
The TPA3100D2 and TPA3101D2 are efficient, Class-D audio power amplifiers designed for driving bridge-tied stereo speakers. The TPA3100D2 can drive stereo speakers as low as 4 Ω. The high efficiency of the TPA3100D2 (92%) eliminates the need for an external heat sink when music is played.

Key Features

- Efficient Class-D operation
- Wide 10- to 26-V supply voltage operation
- Four integrated gain settings
- Thermal and short-circuit protection
- Fault reporting

Applications

- CRTs
- DLP® TVs
- LCD TVs
- PDPs



TPA3100D2 typical application

Adjustable Digital Delay IC
TPA505x

Get datasheets at: **www.ti.com/sc/device/PARTnumber**
(Replace **PARTnumber** with **TPA5050**, **TPA5051** or **TPA5052**)

PREVIEW* The TPA505x series of devices provides a cost-effective, integrated lip-sync solution for TV and home theater applications. The TPA505x family provides up to 170 ms of delay per channel and comes in two stereo versions and one four-channel version. The ease of use and small footprint make this part ideal for flat-panel TV applications.

Key Features

- 16- to 32-bit I^2S input (f_S = 32 to 192 kHz)
- Up to 170 ms/ch delay (48 kHz)
  - I^2C delay-time control allows fine resolution (down to one sample resolution)
  - Fixed delay mode (5-ms steps from 20 to 170 ms)
- Cascadable for longer delay time
- Small footprint (4 × 4 QFN)
- 3- to 3.6-V operation

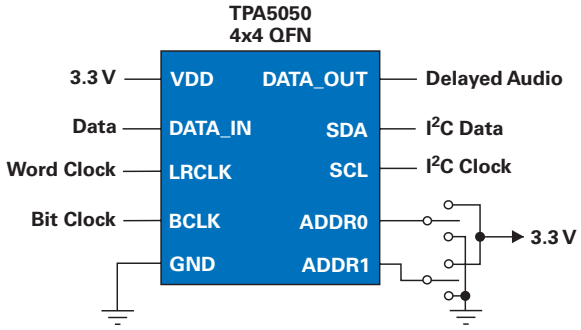
Applications

- Flat-panel TVs
  - DLP®, LCD, plasma
- Home theaters
- DVD minicompos

**Expected release June 2006.*

Product Options

Device	Channels	Max Delay (ms/ch)	Control Type
TPA5050	2	170	I^2C
TPA5051	4	85	I^2C
TPA5052	2	170	Pin-selectable



TPA505x typical application circuit

Featured Products

I²S™-to-PWM Processor – 4 Channel
TAS5504

Get datasheets at: **www.ti.com/sc/device/TAS5504**

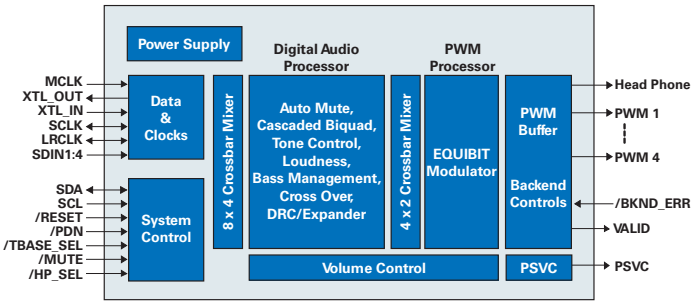
The TAS5504 is a four-channel digital pulse width modulator that provides advanced performance and high-level system integration. It is designed to interface seamlessly with multiple digital audio processors.

Key Features

- Four-channel digital audio pulse width modulation (PWM) processor
  - I²S inputs
  - PWM output
- Supply voltage: 3.3 V
  - Inputs are 5-V tolerant
- High-performance digital audio (DAP)
- 48-bit audio processing
- Dynamic range: > 102 dB
- Sampling rates: 32 kHz to 192 kHz
- Four bass and treble tone controls

Applications

- Plasma TVs



TAS5504 block diagram

20-W Digital Power Stage
TPA3300D2

Get datasheets at: **www.ti.com/sc/device/TPA3300D2**

PREVIEW* The TPA3300D2 is a fully integrated power stage accepting PWM inputs and 20 W × 2 output. It is TI's first power stage with integrated feedback, allowing very high PSRR and improved audio performance. In addition, it detects fault conditions such as over-current or over-temperature.

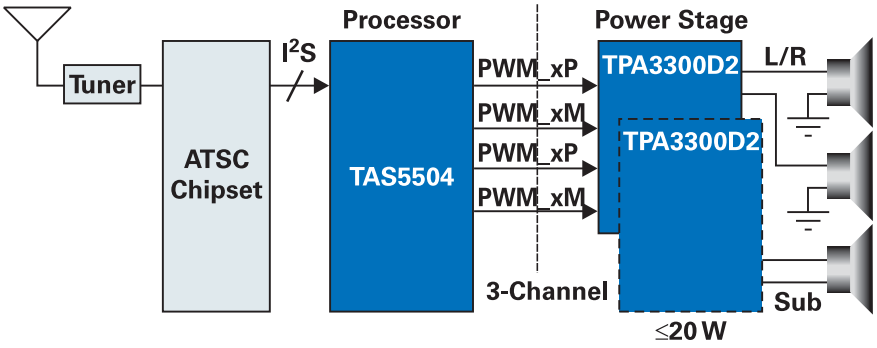
Key Features

- Efficient Class-D operation
- Wide 10- to 26-V supply voltage operation
- Direct connection to PWM processor
- High-power-supply rejection
- Fault reporting

Applications

- CRTs
- DLP® TVs
- LCD TVs
- PDPs

**Expected release June 2006.*



Advanced TV solutions

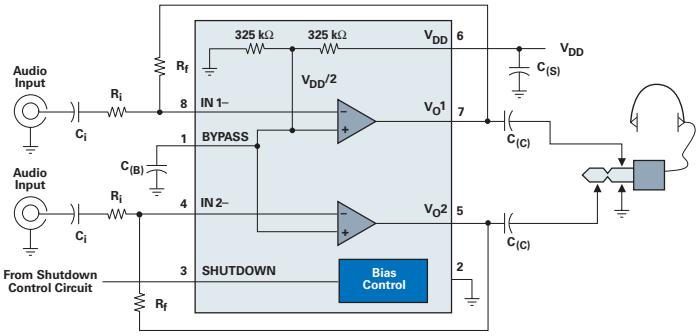
Stereo Class AB Headphone Driver
TPA6110A2

Get datasheets, samples, EVMs, and app reports at:
www.ti.com/sc/device/TPA6110A2

The TPA6110A2 is a stereo headphone driver designed to connect directly to the TPA3004D2 or TPA3002D2 with minimal external components. The integrated depop circuitry nulls "pops" and "clicks" during startup or shutdown transitions.

Key Features
- 150-mW stereo into 16 Ω from 4.5 V with < 0.1% THD+N
- Full short-circuit and thermal protection
- Excellent depop circuitry
- Low supply current: 1.5 mA from 5 V

Applications
- Large-screen multifunction monitors and LCD TVs
- Portable DVD players



Stereo Class AB headphone driver

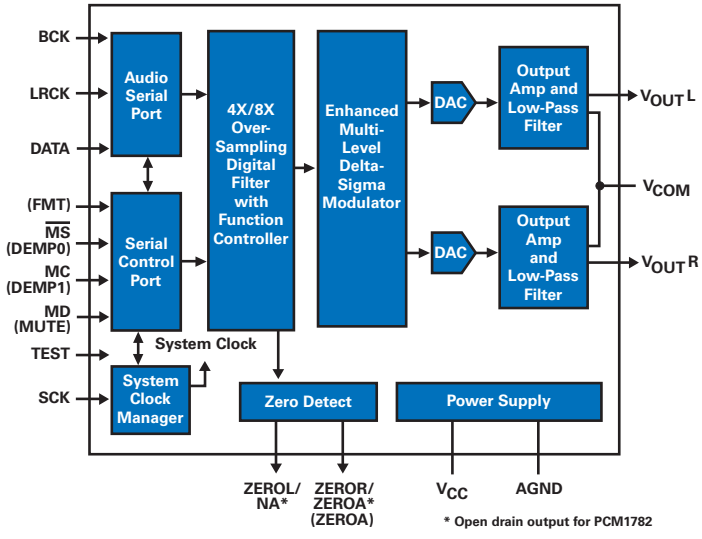
High-Performance Stereo DAC Converters
PCM178x

Get samples, datasheets and app reports at:
www.ti.com/sc/device/PARTnumber
(Replace **PARTnumber** with **PCM1780**, **PCM1781** or **PCM1782**)

The PCM1780/81/82 are cost-effective, high-performance stereo digital-to-analog converters. Utilizing TI's enhanced multi-level delta-sigma architecture, they achieve excellent dynamic performance and improved tolerance to clock jitter. The PCM1780 is footprint-compatible with the PCM1680 eight-channel DAC, enabling faster design time for multiple product families.

Key Features
- THD+N: 0.002%
- Dynamic range and SNR: 106 dB
- Full-scale output: 3.9 V_{PP} (typ)
- Sampling rate: 5 to 200 kHz
- System clock: 128 f_S, 192 f_S, 256 f_S, 384 f_S, 512 f_S, 768 f_S or 1152 f_S
- Single power supply: +5 V
- Packaging: 16-pin SSOP, Pb-Free

Applications
- AV receivers
- DVD movie players
- DVD audio players
- HDTV receivers



PCM1780/81/82 block diagram

Featured Products

3-W Stereo Class-D Audio Amplifier
TPA2008D2

Get datasheets at: **www.ti.com/sc/device/TPA2008D2**

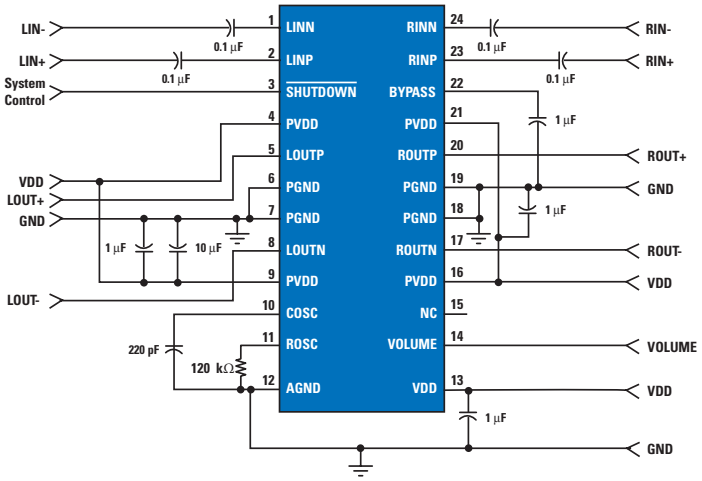
The TPA2008D2 is an analog input Class-D audio power amplifier that will drive 3-W stereo into 3-Ω speakers without a heat sink or large output filter components. The output power level and integrated DC volume control is ideal for multifunction monitors (MFMs).

Key Features

- 3-W stereo into 3 Ω from 5 V with 10% THD+N
- Filter-free modulation
  - Filter not required for efficiency or audio quality, but a low-cost ferrite bead will reduce EMI
  - Improved efficiency
  - Improved SNR: 96 dB
- Full short-circuit and thermal protection
- DC volume control

Applications

- Multifunction monitors
- LCD TVs



TPA2008D2 application diagram

3-W Stereo Class-AB Audio Amplifier
TPA6030A4

Get datasheets at: **www.ti.com/sc/device/TPA6030A4**

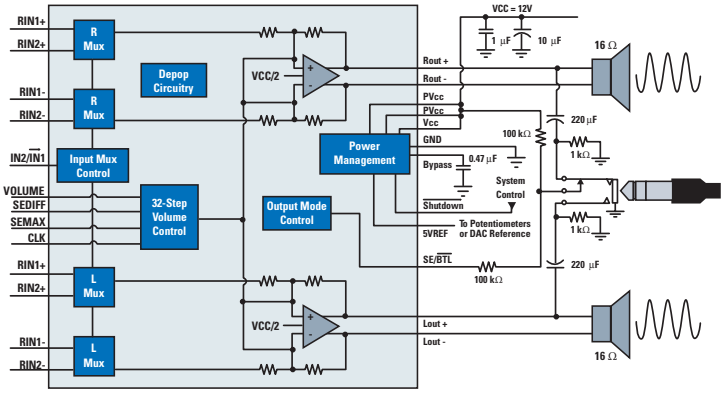
The TPA6030A4 is a fully integrated stereo speaker, stereo headphone and DC volume control audio solution. Features like integrated depop circuitry that null pops and clicks during startup or shutdown transitions and the 12-V operation make the TPA6030A4 ideal for multifunction monitors (MFMs).

Key Features

- 3-W stereo into 16 Ω from 12 V with 10% THD+N
- Supply voltage range: 7 V to 15 V
- Integrated stereo headphone driver
- DC volume control
- Excellent depop circuitry
- Full short-circuit and thermal protection
- Integrated gain set to 1.5 V/V

Applications

- Multifunction monitors
- LCD TVs



TPA6030A4 application diagram

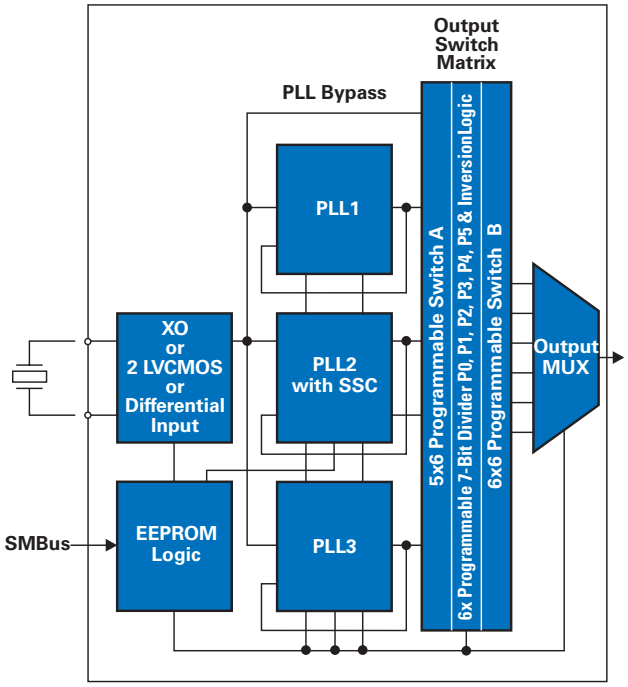
Programmable 3-PLL Clock Synthesizer/ Multiplier/Divider
CDCE906

Get datasheets at: **www.ti.com/sc/device/CDCE906**

PREVIEW Ideal for consumer applications, the CDCE906 provides almost any programmable frequency up to 167 MHz while maintaining a typical period jitter of 60 ps. Additionally, it includes programmable spread spectrum, slew rate control and selectable output voltages. All options can be hot-programmed and locked in on the integrated chip EEPROM while the device is in the system.

Key Features
- Wide PLL divider ratio allows 0-ppm output clock error
- Generates video (27 or 54 MHz) and audio system clocks from multiple sampling frequencies; f_S = 16, 22.05, 24, 32, 44.1, 48 or 96 kHz
- Accepts crystal frequencies from 8 to 54 MHz
- Accepts LVCMOS or differential input frequencies from 1 to 160 MHz
- Programmable center spread spectrum clocking (SSC) modulation (0.2%, 0.5% and 0.8%)
- Programmable down SSC modulation (1.0%, 1.5%, 2.0% and 3%)
- Programmable output slew-rate control (SRC) for lowering system EMI
- Separate power supplies for outputs (2.5 to 3.3 V)
- 3.3 V device power supply
- Packaging: 28-pin TSSOP

Applications
- Digital TVs
- Gaming
- Printers/scanners
- Set-top boxes
- Video/audio



CDCE906 block diagram

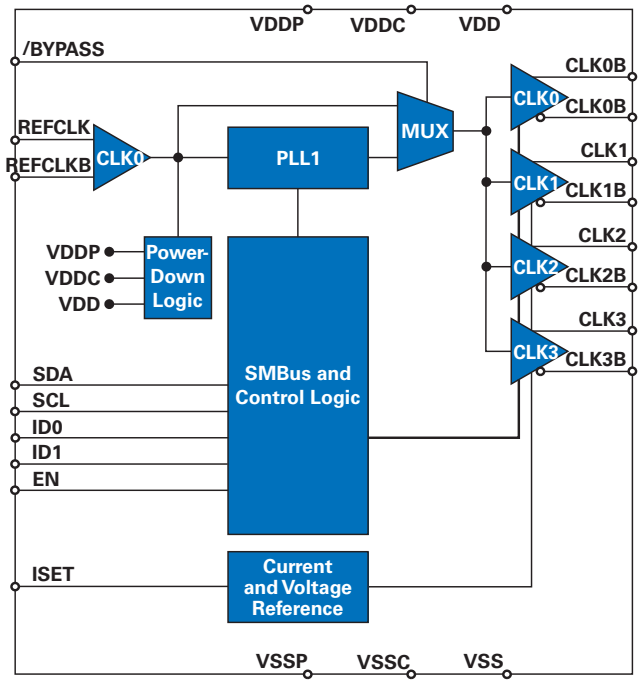
Rambus® XDR™ Clock Generator
CDCD5804

Get datasheets at: **www.ti.com/sc/device/CDCD5804**

PREVIEW The CDCD5804 is a Rambus XDR clock generator that supports speeds of 400 to 800 MHz. At the time of this publication, the CDCD5804 meets or exceeds the latest XCG specifications from Rambus. The 28-pin TSSOP package contains four differential clock outputs, providing an off-the-shelf solution for a broad range of high-performance interface applications.

Key Features
- 400- to 800-MHz clock source
- Spread-spectrum-compatible clock input
- Supports frequency multiplication factors of ×3, ×4, ×5, ×6, ×8, ×9/2, ×15/2 and ×15/4
- Very low 1- to 6-cycle jitter
  - –40 ps: 400 to 635 MHz
  - –30 ps: 636 to 800 MHz
- Operates from single 2.5-V supply
- Packaging: 28-pin TSSOP

Applications
- TVs
- Gaming
- Set-top boxes



CDCD5804 block diagram

Featured Products

Digital Audio Processor with CODEC
TAS3004

Get datasheets at: **www.ti.com/sc/device/TAS3004**

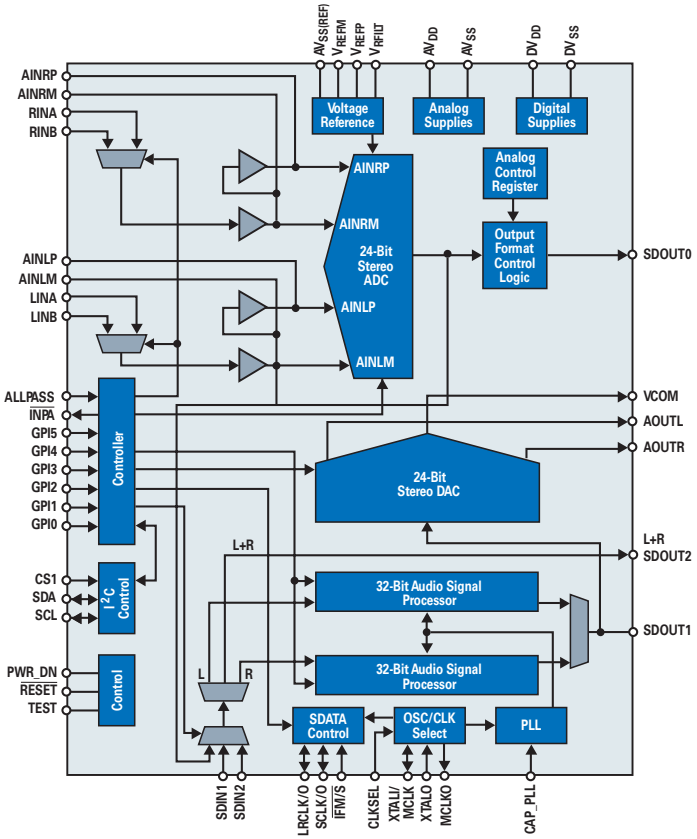
The TAS3004 device is a system-on-a-chip that replaces conventional analog equalization to perform digital parametric equalization, dynamic range compression and loudness contour. Additionally, this device provides high-quality, soft digital volume, bass and treble control.

Key Features

- I^2C control
  - Seven band parametric equalization
  - Digital bass and treble control
  - Digital volume control
  - Loudness contour/dynamic bass
- Analog audio input and output
- Voltage supply: 3.3 V
- Sampling rates: 32 kHz, 44.1 kHz or 48 kHz

Applications

- LCD TVs



TAS3004 block diagram

30-W Digital Amplifier Power Stage
TAS5122

Get datasheets, samples, EVMs and app reports at:
www.ti.com/sc/device/TAS5122

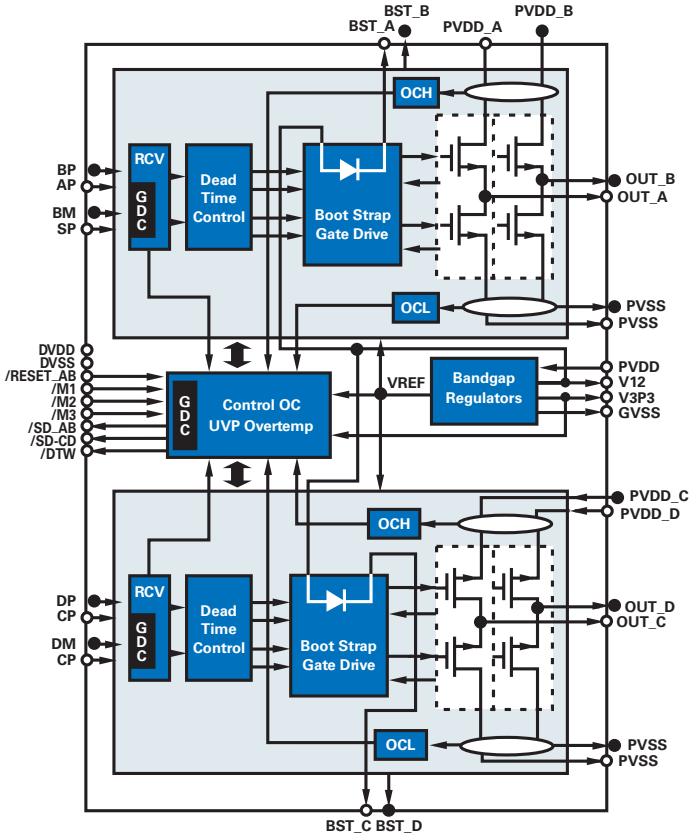
The TAS5122 is a digital input power stage designed to drive 30-W into stereo speakers with no large external heat sinks. The device incorporates TI's PurePath Digital™ technology and is used in conjunction with a digital audio PWM processor and a simple passive demodulation filter to deliver high-quality, high-efficiency, true-digital audio amplification.

Key Features

- 30-W stereo into 6 Ω from 23 V with < 0.4% THD+N
- Greater than 90% efficient
- 95-dB maximum dynamic range
- Full short-circuit, under voltage and thermal protection with reporting

Applications

- Plasma TVs



TAS5122 block diagram

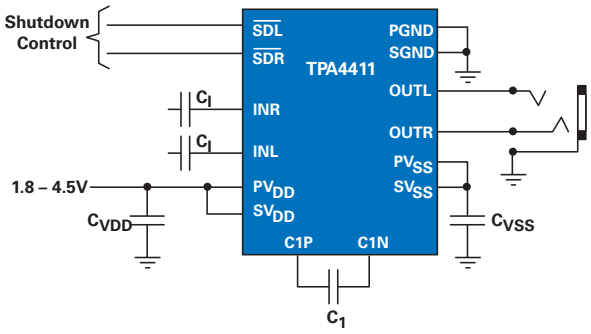
Cap-Free Stereo Headphone Amplifier
TPA4411

Get datasheets, samples, EVMs and app reports at:
www.ti.com/sc/device/TPA4411

The TPA4411 is a stereo headphone driver that eliminates the need for large (often expensive) output capacitors required by other headphone amplifiers to block DC voltages.

Key Features
- 80-mW stereo into 16 Ω from 4.5 V with < 1% THD+N
- Ground-referenced outputs
  - Eliminates need for DC blocking capacitors (i.e., cap-free operation)
  - Save space and cost
  - Improves low frequency (i.e., bass) response
  - Greatly reduces pop and click noise during power and shutdown transitions
- Full short-circuit and thermal protection
- Integrated gain set to 1.5 V/V

Applications
- Multifunction monitors
- LCD TVs
- Portable DVD players
- Cellular phones



TPA4411 application diagram

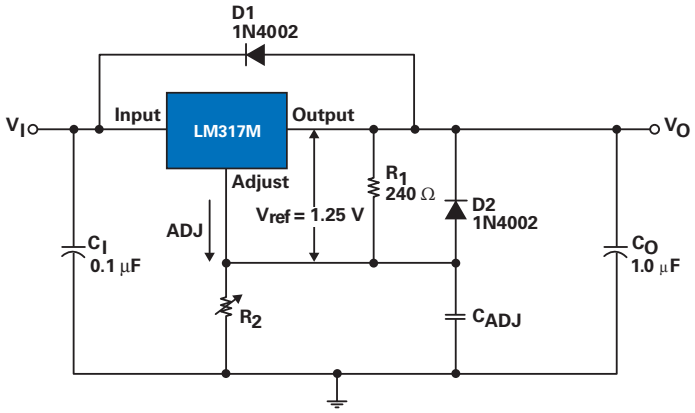
3-Terminal Adjustable Regulator
LM317M

Get datasheets at: **www.ti.com/sc/device/LM317M**

The LM317M is an adjustable three-terminal positive-voltage regulator capable of supplying more than 500 mA over an output-voltage range of 1.25 V to 37 V. The LM317M is exceptionally easy to use and requires only two external resistors to set the output voltage. Furthermore, both line and load regulation are better than standard fixed regulators.

Key Features
- Output voltage: 1.2 V to 37 V
- Output current: > 500 mA
- Internal short-circuit current limiting
- Thermal overload protection

Applications
- LCD TVs
- Multifunction monitors
- Plasma TVs



LM317M application diagram

Featured Products

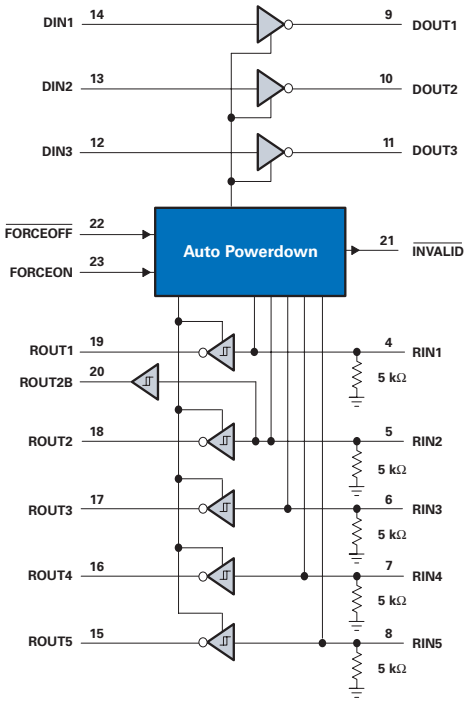
3-V to 5.5-V Multichannel RS-232 Line Driver/ Receiver with ±15-kV ESD (HBM) Protection
MAX3243C/I

Get datasheets at: **www.ti.com/sc/device/MAX3243**

The MAX3243 device consists of three line drivers, five line receivers, and a dual charge-pump circuit with ±15-kV ESD human-body model (HBM) protection pin-to-pin (serial-port connection pins, including GND). The device meets the requirements of TIA/EIA-232-F and provides the electrical interface between an asynchronous communication controller and the serial-port connector.

Key Features
- Operates up to 250 kbit/s
- Designed to transmit at a data rate of 250 kbit/s
- Low standby current: 1 μA typical
- External capacitors: 4 × 0.1 μF
- Accepts 5-V logic input with 3.3-V supply
- Always-active noninverting receiver output (ROUT2B)
- Designed to be interchangeable with Maxim MAX3243
- Alternative high-speed pin-compatible device (1 Mbit/s)
- Auto-power-down feature to disable driver outputs when no valid RS-232 signal is sensed

Applications
- Battery-powered systems
- PDAs
- Notebooks, laptops
- Palmtop PCs
- Hand-held equipment



MAX3243 logic diagram

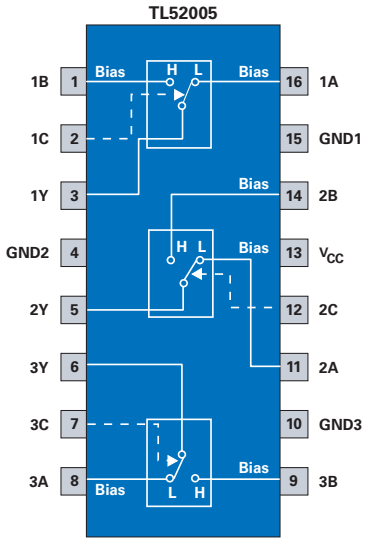
A Wide-Bandwidth 2-Input, 1-Output, 3-Circuit Video Switch
TL52055

Get datasheets at: **www.ti.com/sc/device/TL52055**

Texas Instruments now offers the TL52055, a wide-bandwidth 2-input, 1-output, 3-circuit video switch for handling high-quality analog video signals. Unlike conventional video switches, the high-performance TL52055 has a flat frequency response up to 40 MHz with extremely low signal degradation and operates at low voltages (in the 5-V range). The TL52055 is ideal for high-definition TVs, DVD recorders, set-top boxes, car navigation devices and AV amplifiers.

Key Features
- Wide, flat bandwidth up to 40 MHz (handles 1080i format)
- Same electrical properties and performance with 5-V or 9-V supply voltage
- No need for externally mounted parts like transistors or resistors, due to the high-output-drive current and the push-pull circuit
- Small TSSOP

Applications
- Composite and RGB video



TL52055 functional diagram

4-Channel Differential 8:16 MUX Switch for DVI/HDMI Applications

TS3DV416

Get samples, datasheets and app reports at:

www.ti.com/sc/device/TS3DV416

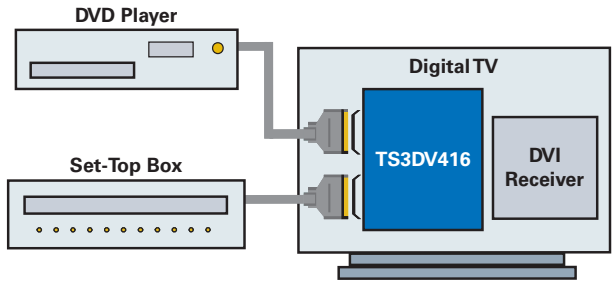
The TS3DV416 is a 16- to 8-bit multiplexer/demultiplexer digital video switch with a single select (SEL) input that controls the data path of the multiplexer/demultiplexer. The device provides a low and flat on-state resistance (r_{on}) and an excellent on-resistance match. Low input/output capacitance, high bandwidth, low skew and low crosstalk among channels make the TS3DV416 suitable for various digital video applications such as DVI and HDMI.

Key Features

- Wide bandwidth (900 MHz typ, 1.8 Gbps)
- Low crosstalk (X_{TALK} = –41 dB typ)
- Low bit-to-bit skew ($t_{sk(o)}$ = 0.2 ns max)
- Low and flat on-state resistance (r_{on} = 4 Ω typ, $r_{on(flat)}$ = 0.7 Ω typ)
- Low input/output capacitance (C_{on} = 10 pF typ)
- Rail-to-rail switching on data I/O ports (0 to 5 V)
- V_{DD} operating range from 3 to 3.6 V
- I_{off} supports partial-power-down mode operation
- Latch-up performance exceeds 100 mA per JESD 78, Class II
- ESD performance tested per JESD 22
  - 2000-V human-body model (A114-B, Class II)
  - 1000-V charged-device model (C101)

Applications

- Digital video signal switching
- Differential DVI, HDMI signal MUXing for audio/video receivers and high-definition television (HDTV)



TS3DV416 typical application

5-Channel Differential 10:20 MUX Switch for DVI/HDMI Applications

TS3DV520

Get samples, datasheets, evaluation modules and app reports at:

www.ti.com/sc/device/TS3DV520

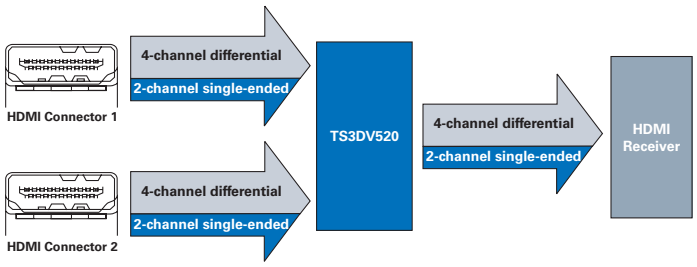
The TS3DV520is a 20-bit to 10-bit multiplexer/demultiplexer digital video switch with a single select (SEL) input. It is specifically designed for muxing HDMI signals from two sources. The SEL input controls the data path of the multiplexer/demultiplexer. It can also be used as four differential channels and two single-ended channels for DDC switching in the HDMI application. This device provides a low and flat ON-state resistance (r_{on}) and an excellent on resistance match. Low input/output capacitance, high bandwidth, low skew, and low crosstalk among channels make this device suitable for HDMI (including 1080i, 1080p, and 720p modes). It is available in the space-saving 56-pin QFN package.

Key Features

- Wide bandwidth (>1.2 GHz typ, 2.4 Gbps)
- Low crosstalk (X_{TALK} = –41 dB typ)
- Low bit-to-bit skew ($t_{sk(o)}$ = 0.2 ns max)
- Low and flat on-state resistance (r_{on} = 6 Ω max, r on(flat) = 0.5 Ω typ)
- Low input/output capacitance (C_{on} = 8 pF typ)
- Rail-to-rail switching on data I/O ports (0 to 5 V)
- V_{CC} operating range from 3 V to 3.6 V
- I_{off} supports partial-power-down mode operation
- Two channels can be used for muxing data display channel (DDC)
- Latch-up performance exceeds 100 mA per JESD 78, Class II
- ESD performance tested per JESD 22
- 2000-V human-body model (A114-B, Class II)
- 1000-V charged-device model (C101)

Applications

- High-speed differential signal switching
- Differential HDMI signal muxing for audio/video receivers and high-definition television (HDTV)



TS3DV520 block diagram

Overview

In This Section

For detailed information about set-top box components featured in this section:

TMS320DM644x Digital Media Processors	18
TMS320DM64x™ Digital Media Processors	18
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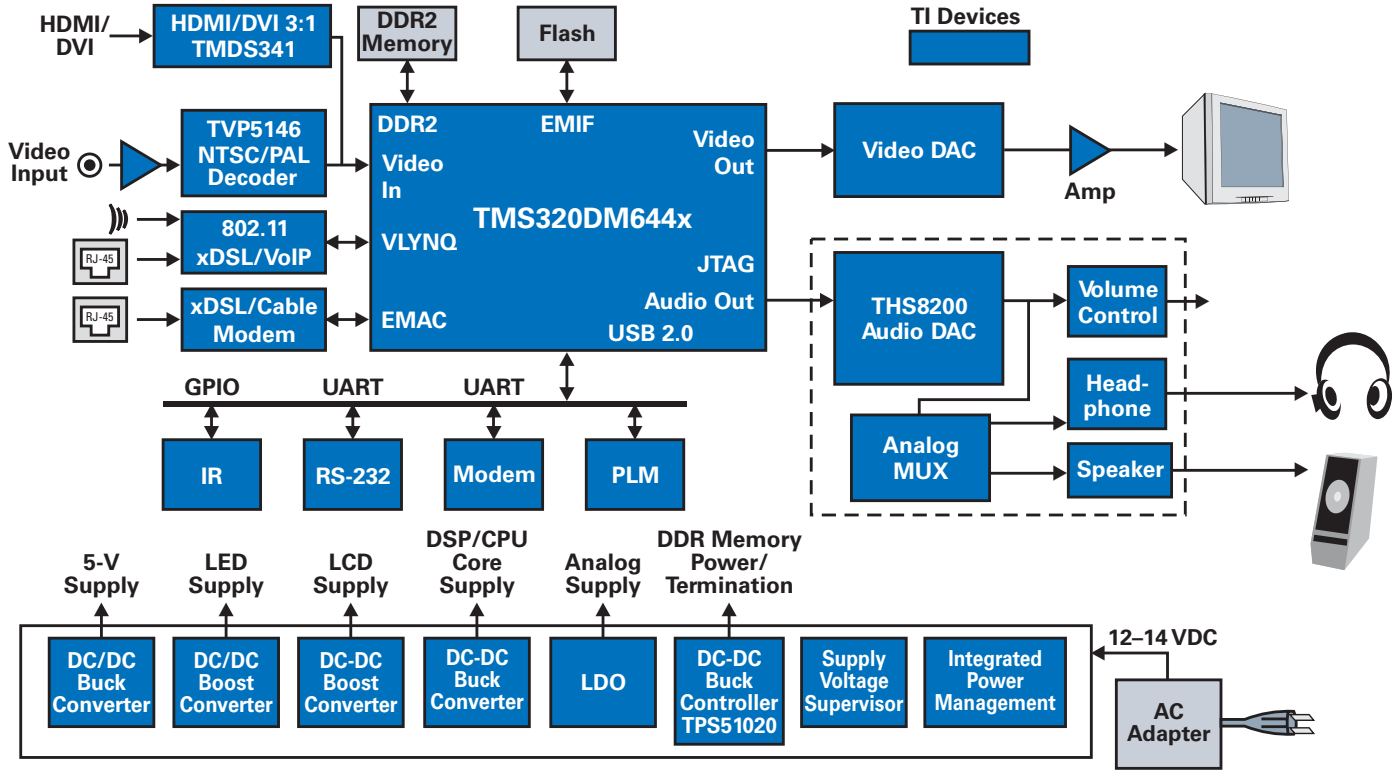
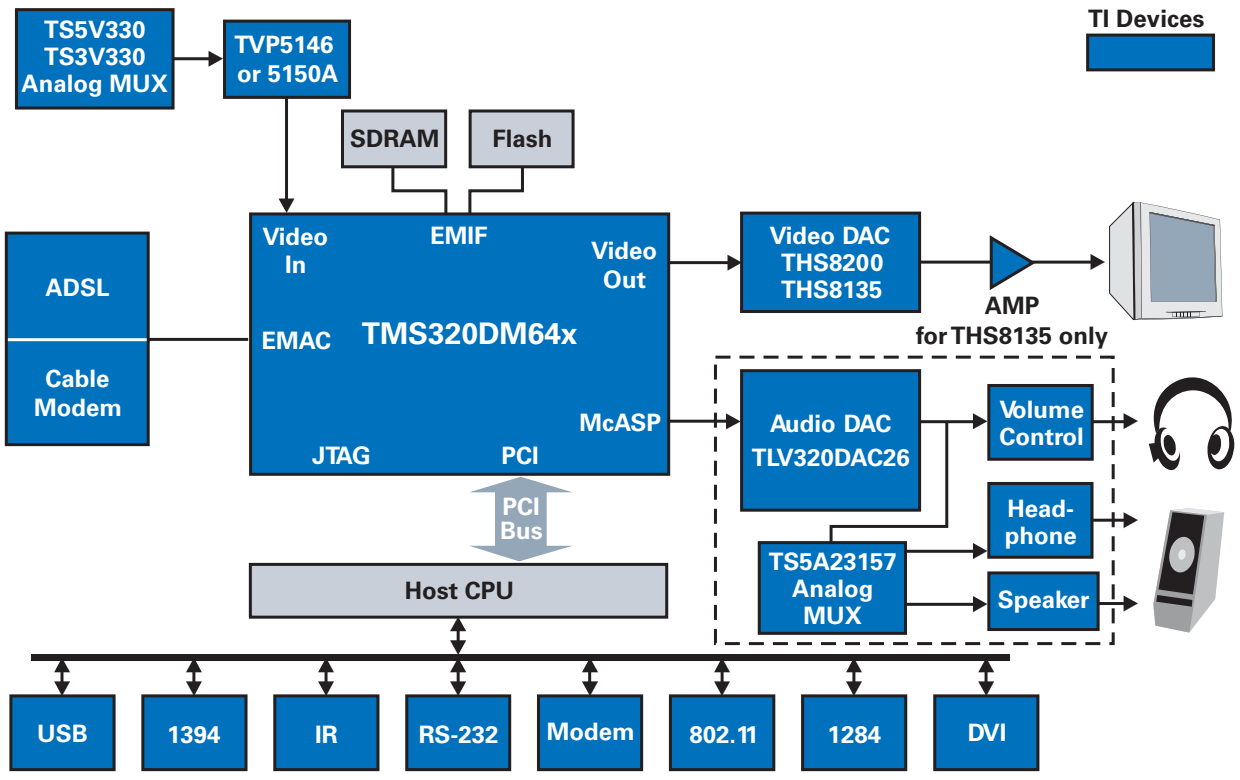
Reshaping the way digital media content is delivered, high-performance digital media technologies include integration of video, voice and data content into many new and different applications.

Some of the challenges faced by digital media include real-time performance, greater channel density and the software programming flexibility for simultaneous processing of video, voice and data streams across both wired and wireless networks. Typical digital media processing functions include encoding and decoding media streams, transcoding (converting from one format to another) and transrating streams (scaling from a higher to a lower bit rate) to accommodate various system-level dependencies. Other processing functions include compression, decompression, encryption, packetization and transport of media streams.

TMS320DM644x-Based Block Diagram, VOD-Enabled IP Set-Top Box



VOD-Enabled IP Set-Top Box Based on TMS320DM64x™ Digital Media Processors



Featured Products

High-Performance Digital Signal Processors
TMS320DM644x Digital Media Processors

Get samples, datasheets and app reports at: **www.ti.com/davinci**

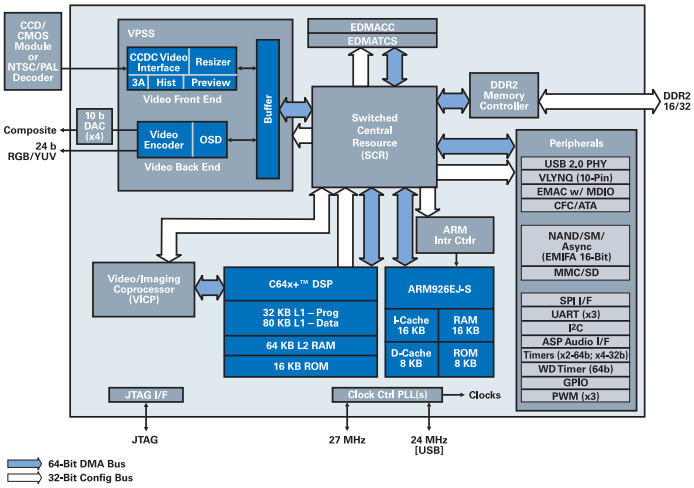
The TMS320DM6446/3 leverage TI's DaVinci™ technology to meet the networked media encode and decode application processing needs of next-generation embedded devices. The DSP subsystem supports a programmable audio/video multimedia engine that provides application flexibility and support for future CODEC standards. The integrated ARM®-based application processor supports all the required call control, device drivers and network provisioning. The Video Processing subsystem supports functions such as video resizing, On Screen Display (OSD) support, and a full compliment of video I/O capabilities.

Key Features

- TMS320C64x+™ DSP performance: 600 MHz
- ARM926EJ-S performance: 300 MHz
- Video processing subsystem (VPSS) with configurable video/imaging peripheral
- Highly integrated peripherals; including video accelerators, (4) DACs, hardware OSD, USB 2.0 and more
- Advanced connectivity with 10/100 Ethernet MAC; half or duplex plus QoS support
- Ready-to-use application software such as H.264, H.263, MPEG4, G.729ab, WVM9 and more
- Supports glueless interfaces for common video and audio formats
- Performance real-time image processing, resizing, auto focus and more
- DDR2 and SDRAM support
- Packaging: 361-pin Pb-Free BGA (ZWT suffix; 0.8-mm pitch)

Applications

- Set-top boxes
- Networked digital media centers
- Home security



TMS320DM6446 digital media system-on-chip (DMSoC) block diagram

High-Performance Digital Signal Processors
TMS320DM64x™ Digital Media Processors

Get samples, datasheets and app reports at: **www.ti.com/dsp**

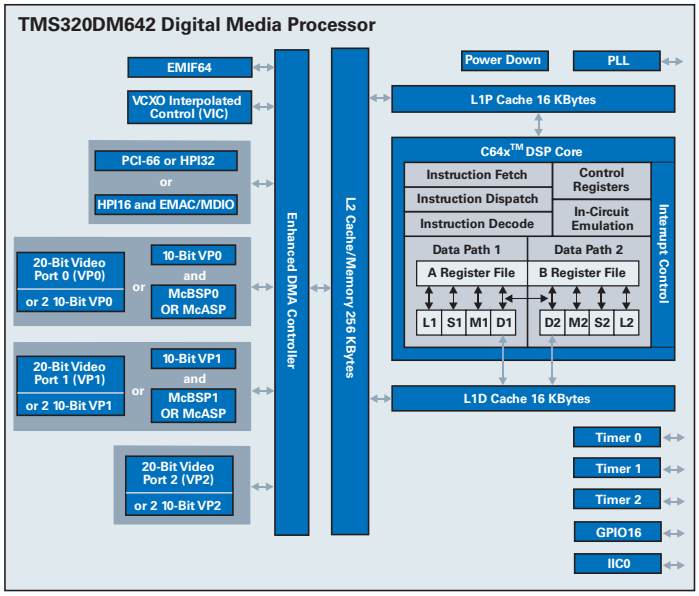
The TMS320DM64x digital media processors offer the industry's highest performance and are programmable protecting your code investment. On-chip video ports offer an easy connection to video devices and are capable of handling both video and audio encode/ decode for IP-based video infrastructure applications.

Key Features

- Performance up to 5760 MIPS at 720 MHz
  - 400/500/600 MHz options also available
- Multiple input/output glueless interfaces for common video and audio formats
- Performance real-time video encoding, decoding/transcoding between CODECs
- Three dual-channel video ports support simultaneous video input/output
- Advanced connectivity with 10/100 Ethernet MAC and 66 MHz PCI
- Ready-to-use application software such as MPEG4, MPEG2, MPEG1, WMV9, H.263, H.261, M-JPEG, JPEG2000, JPEG, H.264 and more

Applications

- IP-based video conferencing and IP-based videophones
- Network camera-based surveillance and IP video nodes
- Video-on-demand set-top boxes, personal video recorders and digital media centers
- Statistical multiplexers and broadcast encoders



TMS320DM642 digital media processor block diagram

World's Lowest-Power MCU
MSP430x20x1, MSP430x20x2, MSP430x20x3

Get datasheets, app reports and EVMs at: **www.ti.com/msp430**

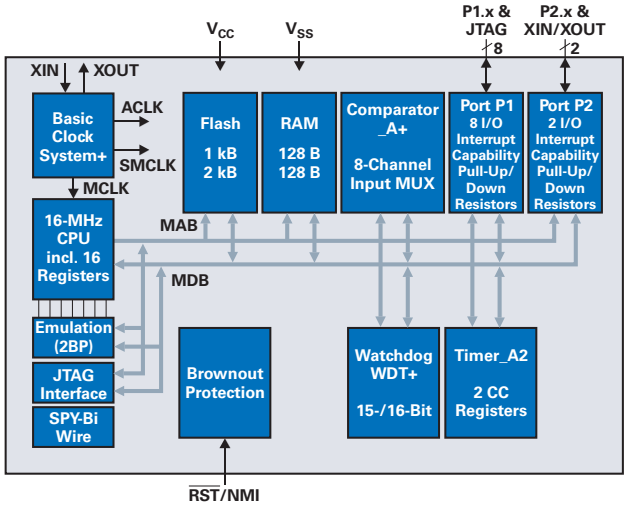
The newest MSP430F20xx low pin-count, ultra-low power MCU series delivers a 500-nanoamp standby mode utilizing unique very-low-power oscillator (VLO) technology. The industry leading 500-nanoamp standby is achieved with all device failsafe features active including zero-power brown-out reset.

Key Features

- Low supply voltage range 1.8 V – 3.6 V
- Ultra-low power consumption as low as 500-nanoamp standby, 220 µA at 1 MHz, 2.2 V active, 0.1 µA off mode (RAM retention)
- Ultra-fast wake-up from standby mode in less than 1 µs
- 16-bit RISC architecture, 62.5-ns instruction cycle time
- Basic clock module configurations:
  - Internal frequencies up to 16 MHz with four calibrated frequencies to ±1%
  - Internal very-low-power LF oscillator
  - 32-kHz crystal
  - External digital clock source
- 16-Bit Timer_A with two capture/compare registers
- On-chip comparator for analog signal compare function or slope A/D (MSP430x20x1 only)
- The MSP-FET430U14 offers a completely integrated development environment for only U.S. $149
- Packaging: 14-pin TSSOP, PDIP or 16-pin QFN

Applications

- Self-managed, high-precision A/D
- Remote security sensors
- Real-time housekeeping
- Power management
- Flexible "glue" logic



NOTE: See port schematics section for detailed I/O information.

MSP430x20x1 functional block diagram

TI PanelBus™ Digital Transmitters
TFP510, TFP513

Get the datasheets and app reports at: **www.ti.com/sc/device/TFP510** or **www.ti.com/sc/device/TFP513**

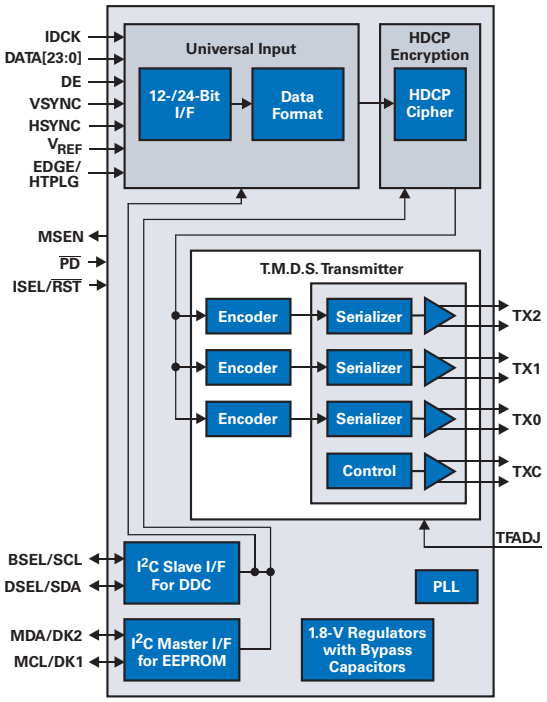
The TFP510 and TFP513 provide a universal interface allowing a glue-less connection to most commonly available graphics controllers. Some of the advantages of this universal interface include selectable bus widths, adjustable signal levels and differential and single-ended clocking. The DVI interface supports flat panel display resolutions up to UXGA at 165 MHz in 24-bit true color pixel format.

Key Features

- Digital visual interface (DVI) compliant
- Supports resolutions from VGA to UXGA (25-MHz to 165-MHz pixel rates)
- Universal graphics controller interface
  - 12-bit, dual-edge and 24-bit, single-edge input modes
  - Adjustable 1.1-V to 1.8-V and standard 3.3-V CMOS input signal levels
  - Fully differential and single-ended input clocking modes
  - Standard Intel® 12-bit digital video port compatible as on Intel 81x chipsets
- Programmable using I²C serial interface
- Monitor detection through hot-plug and receiver detection
- Packaging: 64-pin TQFP PowerPAD™

Applications

- Set-top boxes
- DVD recorders/players



TFP510 block diagram

Featured Products

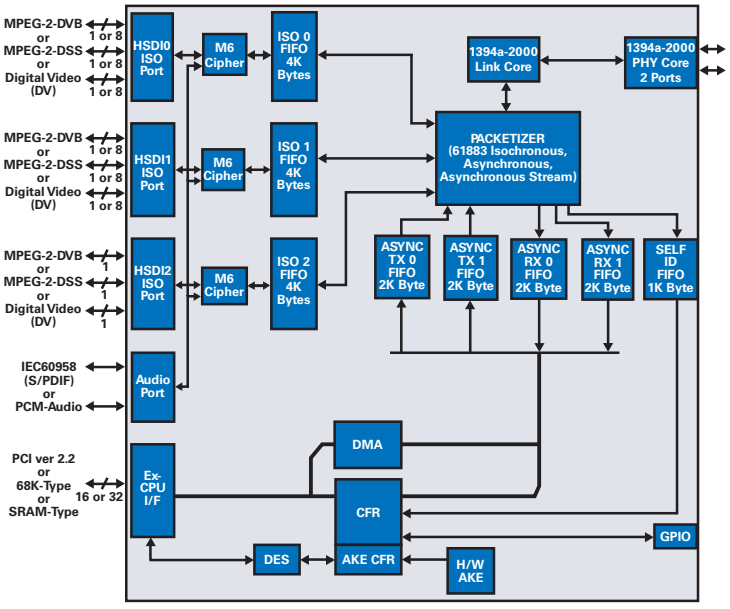
Third-Generation, Integrated IEEE 1394a Link/PHY Solution
TSB43DA42

Get datasheets, app reports and samples at: **www.ti.com/sc/device/TSB43DA42**

The TSB43DA42 is a third-generation integrated 1394 Link/PHY solution with an optimized feature set and enhanced performance to enable the next generation of digital connectivity for consumer electronic devices.

Key Features
- Integrated 2-port, 400-Mbps 1394a PHY
- DTCP content protection enabled with three 5C ciphers and full AKE performed with hardware assist
- Support for IEC61883 including MPEG2, DirecTV™ (DSS), DV and audio (A&M)
- Packet insertion and PID filtering for MPEG2 and DSS transmit (partial TS)
- Support for PCI, SRAM-like, or 68K-style external CPU interfaces
- Higher asynchronous throughput with DMA hardware enhancements for faster OSD and high-speed HDD support

Applications
- Digital TVs
- Set-top boxes
- PVRs
- A/V receivers
- DVD recorders



TSB43DA42 block diagram

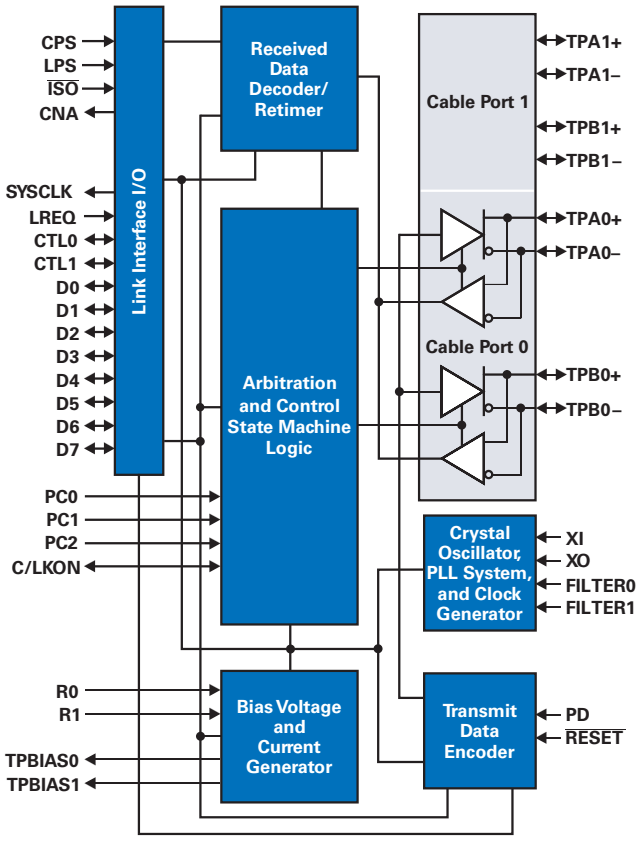
IEEE 1394a-2000 Two-Port Cable Transceiver/Arbiter
TSB41AB2

Get datasheets, app reports and samples at: **www.ti.com/sc/device/TSB41AB2**

The TSB41AB2 provides the digital and analog transceiver functions needed to implement a two-port node in a cable-based IEEE 1394 network. The cable ports incorporate two differential line transceivers. The transceivers include circuitry to monitor the line conditions as needed for determining connection status, for initialization and arbitration and for packet reception and transmission.

Key Features
- Devices are offered in multiple pin count/package types with 1, 2, 3, 4 and 6 ports to fit a variety of applications
- Interfaces directly with TI's link layer devices and will support serial bus data rates of 100, 200 and 400 Mbps
- 1394a-compliant, features suspend/resume and fly-by arbitration
- Provides bus holding buffers for simple and cost-effective single-capacitor isolation
- Ultra-low power
- Packaging: 64-pin TQFP PowerPAD™

Applications
- HDTVs
- Set-top boxes



TSB41AB2 block diagram

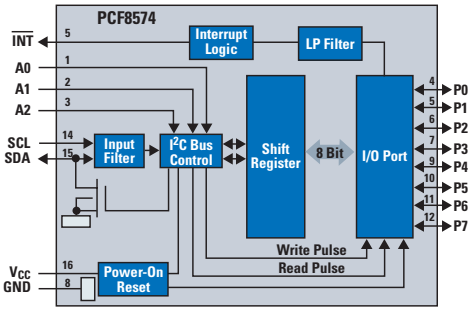
I/O Expanders
PCF8574, PCF8574A

Get datasheets, app reports and samples at: **www.ti.com/i2c**

The PCF8574 and PCF8574A are two-wire I^2C bus™ to 8-bit parallel bus I/O expanders from TI's I^2C logic portfolio. They are designed to provide a simple and cost-effective method to monitor and control several peripheral signals. The difference between the PCF8574 and PCF8574A is the I^2C address.

Key Features
- Pin-to-pin compatible and functionally equivalent with competitive offerings. These are offered in a variety of packages including:
  - 20-pin TVSOP (23% smaller than 20-pin TSSOP)
  - 20-pin QFN package (62% smaller than 20-pin TSSOP); industry's smallest PCF8574 and PCF8574A package
- Two-wire I^2C bus to eight-bit bidirectional parallel-bus expander
- Operating supply voltage from 2.5-V to 6-V V_{CC}
- Low standby current consumption of 10 mA maximum (F_{SCL} = 0 Hz)
- Open-drain interrupt output to signal a change on an I/O pin
- Latched outputs with high-current drive capability for driving LEDs
- Addressed by three hardware-address pins

Applications
- Fan control
- LED drivers
- System monitoring
- Temperature sensor monitoring
- Push button monitoring
- Eight-bit bidirectional



PCF8574/A functional block diagram

Pin Descriptions*

Symbol	Pin	Description
A0	1	Address Input 0
A1	2	Address Input 1
A2	3	Address Input 2
P0	4	Bi-Direction I/O 0
P1	5	Bi-Direction I/O 1
P2	6	Bi-Direction I/O 2
P3	7	Bi-Direction I/O 3
GND	8	Ground

Symbol	Pin	Description
P4	9	Bi-Direction I/O 4
P5	10	Bi-Direction I/O 5
P6	11	Bi-Direction I/O 6
P7	12	Bi-Direction I/O 7
$\overline{INT}$	13	Interrupt Output (Active Low)
SCL	14	Serial Clock Line (SCL)
SDA	15	Serial Data Line (SDA)
V_{CC}	16	Supply Voltage

**All pin numbers shown are for 16-pin SOIC and PDIP packages. See datasheet for 20-pin package options.*

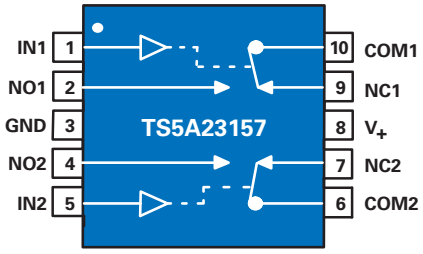
Dual-SPDT 5-V Analog Switch
TS5A23157

Get samples, datasheets and app reports at: **www.ti.com/signalswitches**

The TS5A23157 is a dual single-pole, double-throw (SPDT) analog switch designed for 1.65- to 5.5-V V_{CC} operation. The TS5A23157 can handle both analog and digital signals and permits signals with amplitudes of up to 5.5 V (peak) to be transmitted in either direction without clipping. Analog switches in the TS switch product family provide low-power consumption and high speed while maintaining exceptional signal integrity. Typical applications include analog signal routing, signal gating, chopping and digital signal multiplexing/demultiplexing.

Key Features
- Passes both analog and digital signals
- Specified break-before-make switching
- Low-charge injection
- Excellent on-resistance matching
- Low total harmonic distortion
- 1.8- to 5.5-V single-supply operation
- Bidirectional data flow with near-zero propagation delay

Benefits
- Optimizes circuit routing on densely populated PCBs
- Low-power consumption (10 µA at 1.95 V) supports portable applications
- Supports both digital and analog applications
- Low input/output capacitance minimizes loading and signal distortion
- TS5A23157DGSR offers space-saving, low-profile TSSOP (MSOP-10) package



TS5A23157 package and functional diagram

Featured Products

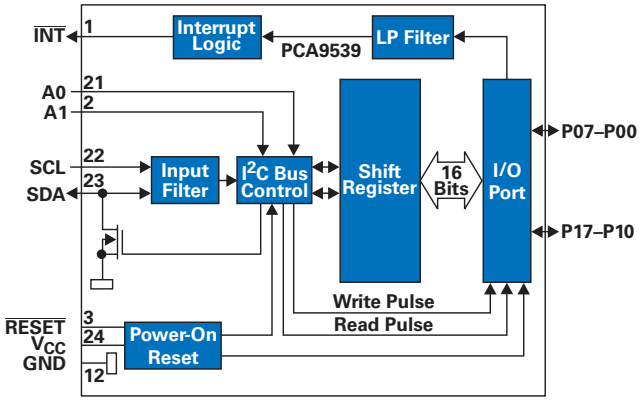
16-Bit I²C and SMBus I/O Expander with Interrupt and Reset
PCA9539

Get datasheets at: **www.ti.com/sc/device/PCA9539**

The PCA9539 consists of two 8-bit configuration (input or output selection), input port, output port and polarity inversion (active-high or active-low operation) registers. At power-on, the I/Os are configured as inputs. The system master can enable the I/Os as either inputs or outputs by writing to the I/O configuration bits. The data for each input or output is kept in the corresponding input or output register. The polarity of the input port register can be inverted with the polarity inversion register. All registers can be read by the system master.

Key Features
- V_{CC} range: 2.3 to 5.5 V
- Low standby current consumption of 1 μA max
- Open-drain interrupt output to signal a change on an I/O pin
- /RESET input which initializes the slave device without de-powering it
- Latched outputs with high-current drive capability for driving LEDs
- Internal I²C address set by two hardware address pins for use of up to four devices on the I²C bus™
- Consists of two 8-bit configuration, input, output and polarity inversion registers

Applications
- System monitoring: Fan, LED and temperature
- Humidity sensors
- Audio control
- 16-bit bidirectional expansion



Pin numbers shown are for DB, DBQ, DGV, DW, N, PW and RHL packages.
All I/Os are set to inputs at reset.

PCA9539 block diagram

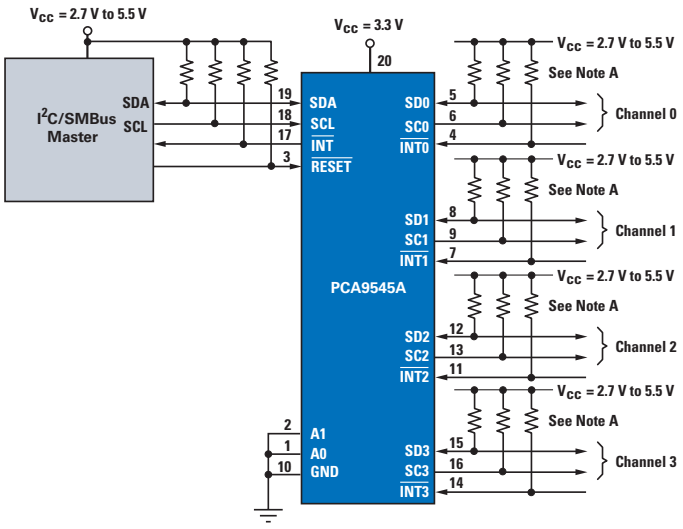
4-Channel I²C Switch with Interrupt and Reset
PCA9545A

Get samples, datasheets and app reports at:
www.ti.com/sc/device/PCA9545A

The PCA9545A is a quad, bidirectional translating switch controlled via the I²C bus. The SCL/SDA upstream pair fans out to four downstream pairs, or channels. Any individual SCn/SDn channel or combination of channels can be selected, determined by the contents of the programmable control register.

Key Features
- Four bidirectional translating switches
- Each channel (SCLn/SDAn) can be selected via I²C bus
- Low RDS_{ON} switches (10 Ω typically)
- V_{CC} range: 2.3 to 5.5 V
- Voltage-level translation between 2.5-, 3.3- and 5-V buses
- Internal I²C address: 1110 0xx
- Two address pins
- One to four channels can be selected at one time
- Interrupt output signals change on a channel
- RESET input initializes the device without de-powering it and deselects all channels

Applications
- System monitoring: Fan, LED and temperature
- Mixed voltage I²C systems
- I²C bus expansion



NOTE A: If the device generating the interrupt has an open-drain output structure or can be 3-stated, a pullup resistor is required.
If the device generating the interrupt has a totem-pole output structure and cannot be 3-stated, a pullup resistor is not required. The interrupt inputs should not be left floating.

PCA9545A block diagram

Stereo ADCs with Input Multiplexer and PGA
PCM1850, PCM1851

Get samples, datasheets and app reports at:

www.ti.com/sc/device/PCM1850 or **www.ti.com/sc/device/PCM1851**

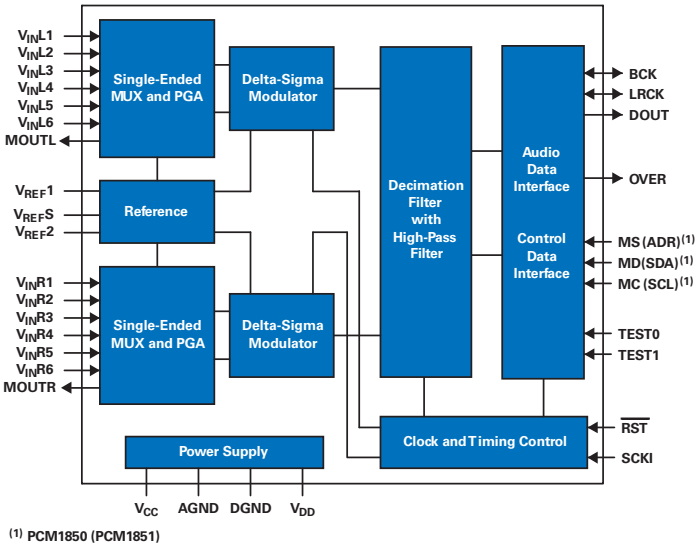
The PCM1850 is a high-performance stereo analog-to-digital converter that features an input multiplexer (MUX) and wide-range programmable gain amplifier (PGA). The input MUX allows the user to connect up to six stereo sources, which may be selected through SPI (PCM1850) or I^2C (PCM1851) control interfaces.

Key Features

- Input multiplexer, six stereo channels
- PGA gain: +11 to –11 dB range, 0.5 dB step
- SNR: 101 dB (typ)
- SPI (PCM1850) or I^2C (PCM1851) control
- Sampling rate: 16 to 96 kHz
- System clock: 256 f_S, 384 f_S, 512 f_S or 768 f_S
- +5 V for analog, +3.3 V for digital
- Packaging: 32-pin TQFP, Pb-Free

Applications

- DVD recorders
- AV amp receivers
- CD recorders
- MD recorders
- Multitrack receivers



(1) PCM1850 (PCM1851)

PCM1850 block diagram

3-Channel Video Amplifier with SAG Correction, 2:1 Input MUX and Selectable Input Bias Modes
THS7303

Get samples, datasheets, app reports and EVMs at:

www.ti.com/sc/device/THS7303

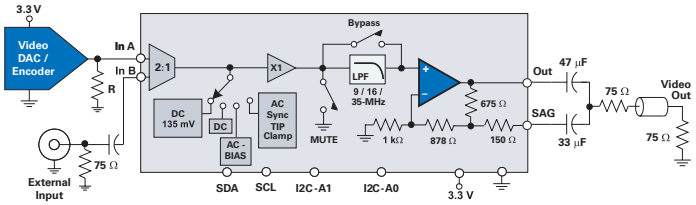
Fabricated using the BiCOM-III process, the THS7303 is a low-power, three-channel integrated video buffer. It incorporates a selectable 5th-order Butterworth filter to eliminate data converter images. Each channel is individually I^2C configurable for all functions, which makes it flexible for any application. Its rail-to-rail output stage allows for both AC and DC coupling applications, and the 6-dB gain along with built-in SAG correction allows for maximum flexibility as an output video buffer.

Key Features

- 3 video amps for CVBS, S-Video, Y'U'V', SD/ED/HD Y'P'BP'R and R'G'B'
- I^2C control of all functions
- Integrated low-pass filters
- Selectable input bias modes
- 2:1 input MUX allows multiple input sources
- Built-in 6-dB gain (2 V/V)
- Single supply: 2.7 V to 5 V
- Low quiescent current: 16.6 mA
- Differential gain/phase: 0.13%/0.55° at 3.3 V

Applications

- Set-top box output video buffering
- PVR/DVDR output buffering
- USB/Portable video buffering



THS7303—3-3-V, single-supply, DC-input/AC-video output system with SAG correction (1 of 3 channels shown)

Overview

In This Section

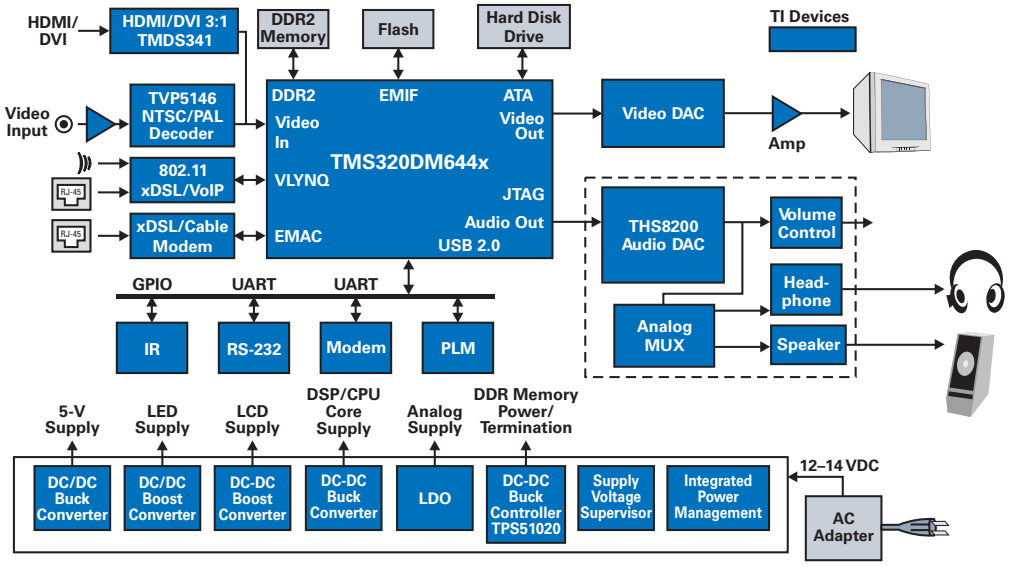
For detailed information about personal video recorder/ digital media center components featured in this section:

TMS320DM644x Digital Media Processors	25
TMS320DM64x™ Digital Media Processors	25
THS7353: 3-Channel Video Amplifier with Selectable Filters, 2:1 Input MUX and External Gain Control	26

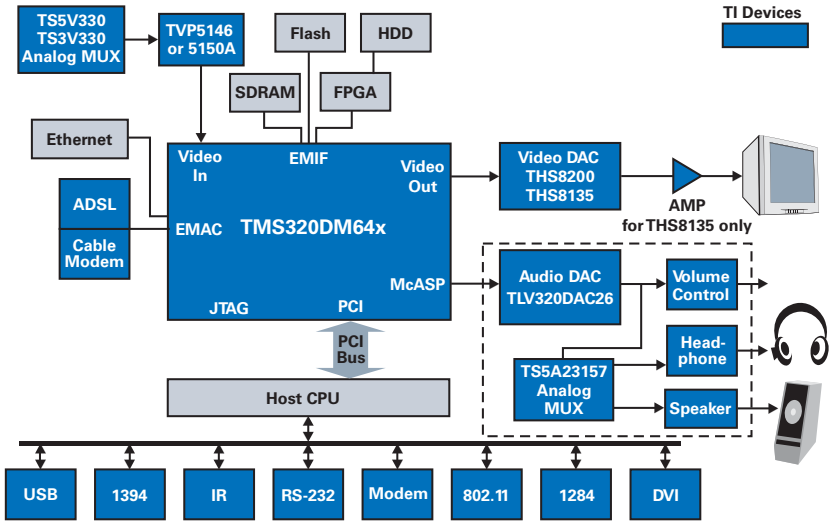
High-performance streaming media technologies cover a wide range of digital media and emerging media-based technologies that include integration of video, voice and data content into many new and different applications, reshaping the way digital media content gets delivered.

Some of the challenges faced by streaming media include real-time performance, greater channel density and the software programming flexibility for simultaneous processing of video, voice and data streams across both wired and wireless networks. Typical digital media processing functions include encoding and decoding media streams, transcoding (converting from one format to another) and transrating streams (scaling from a higher to a lower bit rate) to accommodate various system-level dependencies. Other processing functions include compression, decompression, encryption, packetization and transport of media streams.

IP-Enabled Personal Video Recorder/Digital Media Center Application Based on TMS320DM644x Digital Media Processor



TMS320DM64x™-Based IP-Enabled Personal Video Recorder/Digital Media Center Application



High-Performance Digital Signal Processors
TMS320DM644x Digital Media Processors

Get samples, datasheets and app reports at: **www.ti.com/davinci**

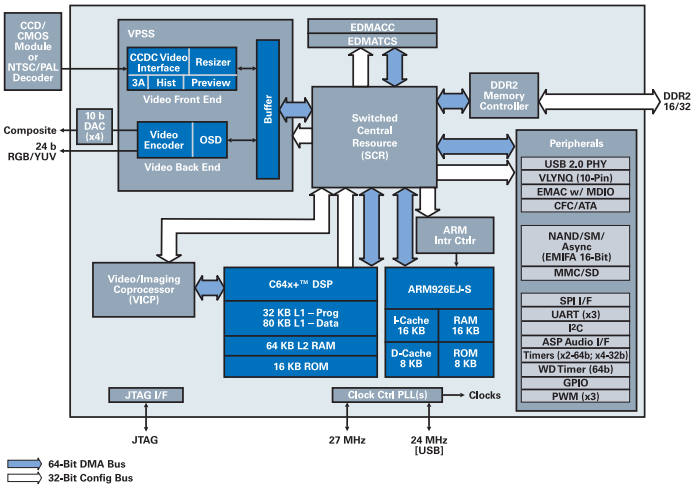
The TMS320DM6446/3 leverage TI's DaVinci™ technology to meet the networked media encode and decode application processing needs of next-generation embedded devices. The DSP subsystem supports a programmable audio/video multimedia engine that provides application flexibility and support for future CODEC standards. The integrated ARM®-based application processor supports all the required call control, device drivers and network provisioning. The Video Processing subsystem supports functions such as video resizing, On Screen Display (OSD) support, and a full compliment of video I/O capabilities.

Key Features

- TMS320C64x+™ DSP performance: 600 MHz
- ARM926EJ-S performance: 300 MHz
- Video processing subsystem (VPSS) with configurable video/imaging peripheral
- Highly integrated peripherals; including video accelerators, (4) DACs, hardware OSD, USB 2.0 and more
- Advanced connectivity with 10/100 Ethernet MAC; half or duplex plus QoS support
- Ready-to-use application software such as H.264, H.263, MPEG4, G.729ab, WVM9 and more
- Supports glueless interfaces for common video and audio formats
- Performance real-time image processing, resizing, auto focus and more
- DDR2 and SDRAM support
- Packaging: 361-pin Pb-Free BGA (ZWT suffix; 0.8-mm pitch)

Applications

- Set-top boxes
- Networked digital media centers
- Home security



TMS320DM6446 digital media system-on-chip (DMSoC) block diagram

High-Performance Digital Signal Processors
TMS320DM64x™ Digital Media Processors

Get samples, datasheets and app reports at: **www.ti.com/dsp**

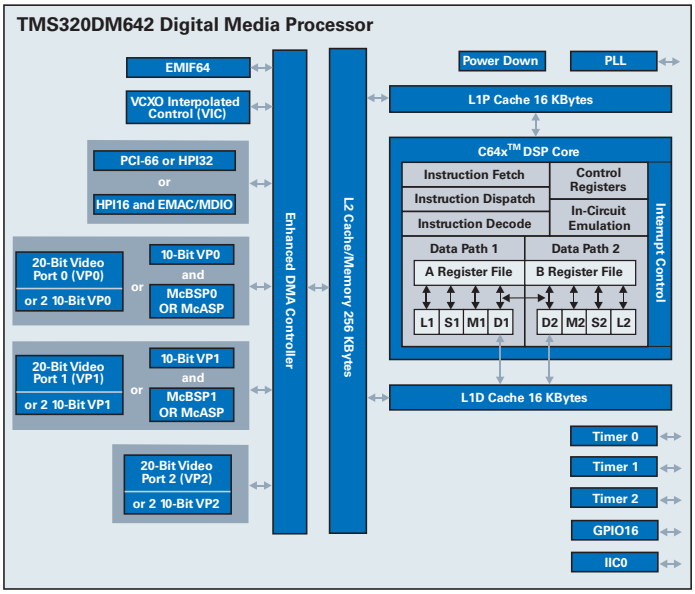
The TMS320DM64x digital media processors offer the industry's highest performance and are programmable protecting your code investment. On-chip video ports offer an easy connection to video devices and are capable of handling both video and audio encode/ decode for IP-based video infrastructure applications.

Key Features

- Performance up to 5760 MIPS at 720 MHz
  - 400/500/600 MHz options also available
- Multiple input/output glueless interfaces for common video and audio formats
- Performance real-time video encoding, decoding/transcoding between CODECs
- Three dual-channel video ports support simultaneous video input/output
- Advanced connectivity with 10/100 Ethernet MAC and 66 MHz PCI
- Ready-to-use application software such as MPEG4, MPEG2, MPEG1, WMV9, H.263, H.261, M-JPEG, JPEG2000, JPEG, H.264 and more

Applications

- IP-based video conferencing and IP-based videophones
- Network camera-based surveillance and IP video node
- Video-on-demand set-top boxes, personal video recorders and digital media centers
- Statistical multiplexers and broadcast encoders



TMS320DM642 digital media processor block diagram

Featured Products

3-Channel Video Amplifier with Selectable Filters, 2:1 Input MUX and External Gain Control
THS7353

Get samples, datasheets, app reports and EVMs at: **www.ti.com/sc/device/THS7353**

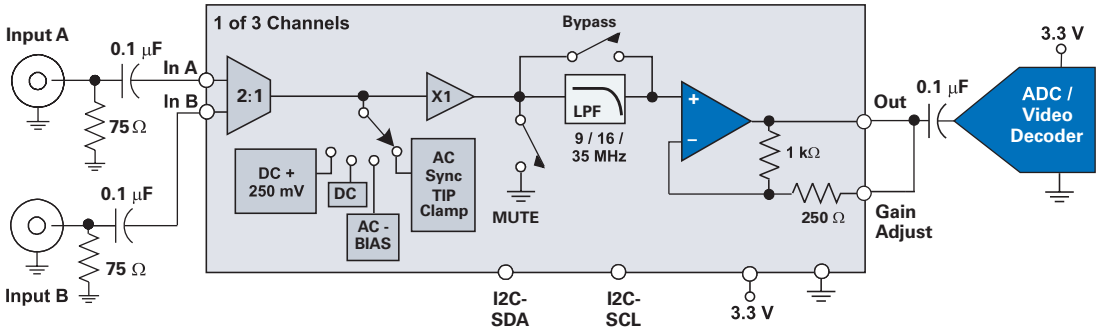
Fabricated using the BiCOM-III process, the THS7353 is a low-power, three-channel integrated video buffer. It incorporates a selectable 5th-order Butterworth anti-aliasing/DAC reconstruction filter to eliminate data converter images. Each channel is individually I^2C configurable. Its rail-to-rail output stage allows for both AC and DC coupling applications, and the externally controlled gain adjust pin allows for fine tuning of the gain such as line driving, compensating for cable losses or Sin-X/X compensation.

Key Features

- 3 video buffers for CVBS, S-Video, SD/ED/HD Y'P'BP'R and R'G'B'
- I^2C control of all functions
- Integrated low-pass filters
- Selectable input bias modes
- 2:1 input MUX allows multiple input sources
- External gain control range: 0 dB to 14 dB
- Single supply: 2.7 V to 5 V
- Low quiescent current: 16.2 mA
- Differential gain/phase: 0.15%/0.3°

Applications

- HDTV video buffering
- PVR/DVDR output buffering
- Projector video buffering
- USB/Portable video buffering



THS7353—3.3-V, single-supply, AC-input/AC-video output system with SAG correction (1 of 3 channels shown)

To Know More

Digital Still Cameras	**28**
Portable Media Players	**31**

Demand for portable devices to become more powerful is ever increasing. Devices in this category must maintain low power while increasing their ability to handle a variety of content and process numerous functions. Challenges that developers must overcome include increasing the ability to process greater volumes of image data at higher speeds while providing higher resolution images as well as adding multiple features such as audio, video, communications, plug-ins, etc. In addition, form factors must be appealing and consumer price points need to be reasonable. TI offers a variety of solutions for a multitude of products in this market segment that address each one of these needs and many more.

Overview

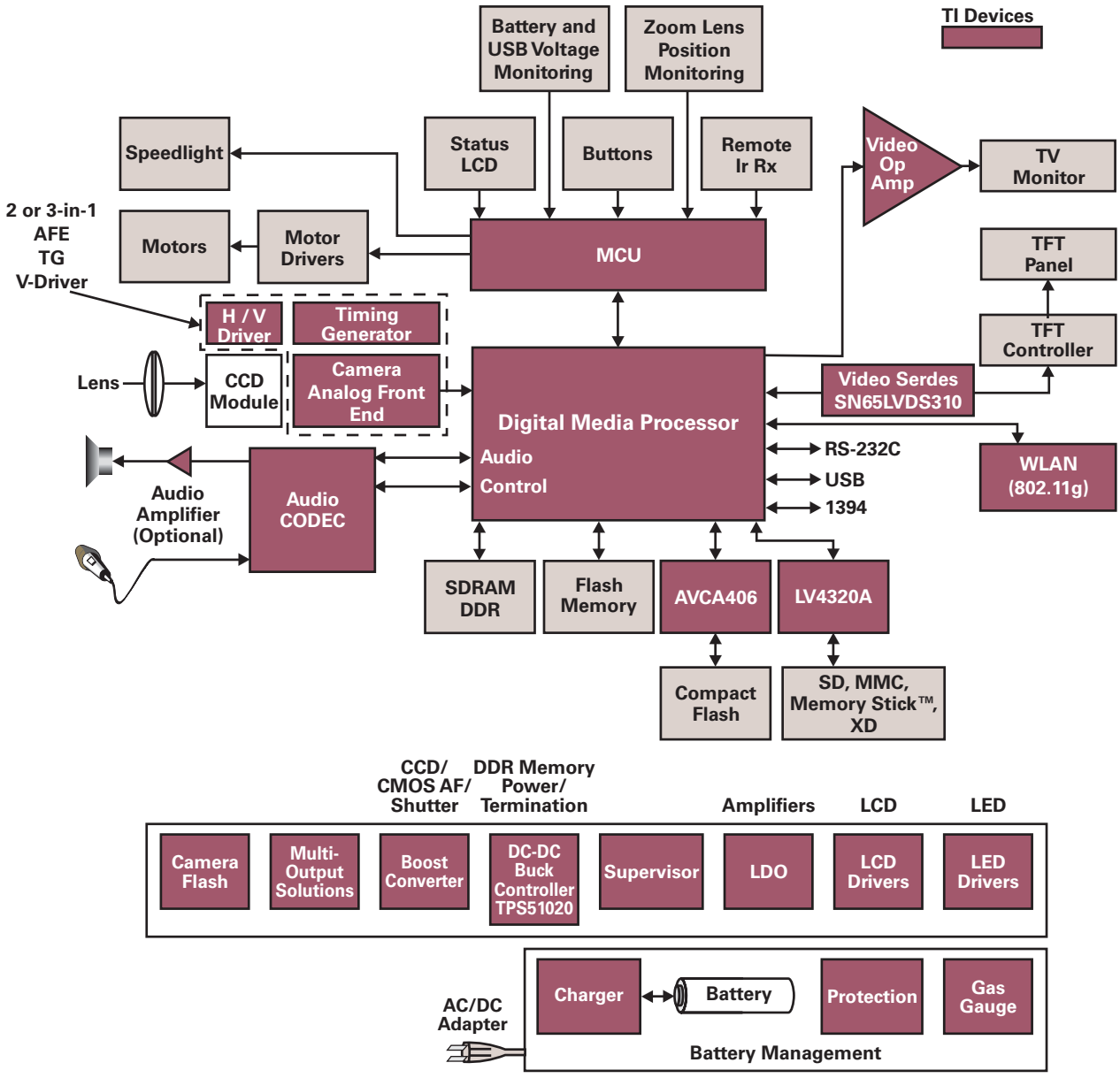
In This Section

For detailed information about digital still camera components featured in this section:

MSP430F412/MSP430F413: Microcontrollers	29
OPA358/OPA360/OPA361: Smallest Complete Video Driver Solution for Portable Applications	29
TLV320AIC32/TLV320AIC31: Low-Power, Stereo Audio CODECs	30

Digital still cameras (DSCs) have been around for many years, but only recently have technical advancements brought their cost into the reach of most consumers. However, analysts say the DSC market is ready to explode in a flash. They predict that more than 95 million DSCs will be shipped in 2006, while traditional film camera sales decline.

Digital Camera Block Diagram



High-Performance, 16-bit RISC Flash MCU With Integrated LCD Driver
MSP430F412, MSP430F413

Get samples, datasheets, app reports and EVMs at: **www.ti.com/msp430**

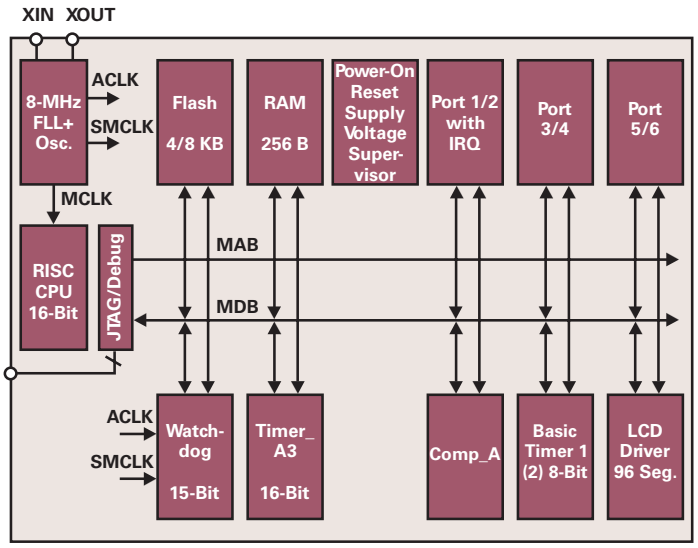
Experience the ultimate system-on-a-chip (SoC) solution for low-power applications. MSP430F412/F413 features the combination of ultra-low power consumption and integrated high-performance analog peripherals—ideal for cost-, power- and space-sensitive applications.

Key Features

- Ultra-low power consumption of <1 µA in standby mode at 2.2 V (typ) extends battery life
- 16-bit RISC architecture enables new applications at a fraction of the code size
- High-performance, integrated analog and digital peripherals including LCD driver, reduce system cost and speed time-to-market
- Integrated analog comparator is ideal for precise mixed-signal measurement
- On-board SVS combats brownout and lock-up conditions
- In-system programmable Flash permits last-minute code changes, field upgrades and data logging to Flash
- The MSP-FET430P410 offers a completely integrated development environment for only U.S. $99
- Packaging: 64-pin QFP

Applications

- Communications, Smart Card and human interface applications
- Basic encryption
- Thermal monitoring
- Small form factor integrated LCD driver for information displays



MSP430F412/413 block diagram

Smallest Complete Video Driver Solution for Portable Applications
OPA358, OPA360, OPA361

Get samples and datasheets at: **www.ti.com/sc/device/PARTnumber**
(Replace **PARTnumber** with **OPA358**, **OPA360** or **OPA361**)

Enhance your video output and decrease board space with these new 3-V video amplifiers. This family of video amplifiers provides high levels of feature/integration in the tiny SC-70 package. With integrated shutdown, 6-dB gain, a 2-pole, low-pass filter and SAG correction, designers of video-enabled, low-power equipment can save both cost and board space while increasing video performance. SAG correction allows the reduction in output coupling cap size from one big 470-µF cap to two smaller caps, resulting in dramatic size and cost savings. 50-mV level shifter allows for DC-coupling of output without clipping, providing the best video performance in a 5 mm^2 total solution size.

Key Features

- Excellent video performance:
  - 0.5-db gain flatness: 35 MHz
  - Diff gain: 0.02%, Diff phase: 0.05°
- Unity gain bandwidth: 75 MHz
- High slew rate: 100 V/µs
- Input range includes ground
- Rail-to-rail output
- Low power: 6 mA enabled, 2.5 µA shutdown
- Single-supply operating range: 2.7 V to 3.3 V
- Packaging: Microsize package SC-70

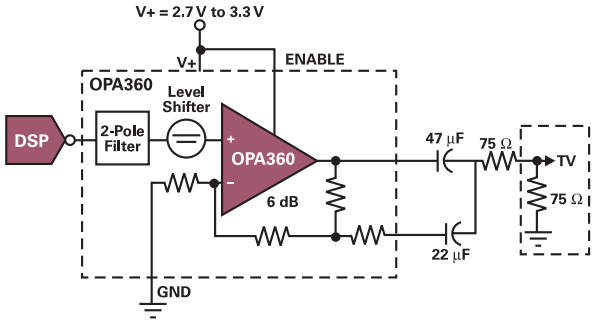
Applications

- Digital still cameras
- Video-enabled mobile phones
- Portable media players
- Set-top-box video filters
- Digital TVs

Available Device Options

	Channels	Shutdown	Internal Gain	Low-Pass Filter	SAG Correction	Smallest Package	Price[1]
OPA358	1	✔	—	—	—	SC-70	0.45
OPA360	1	✔	2	✔	✔	SC-70	0.49
OPA361	1	✔	5.2	✔	—	SC-70	0.49

[1] *Suggested resale price in U.S. dollars in quantities of 1,000.*



OPA360 block diagram

Featured Products

Low-Power, Stereo Audio CODECs
TLV320AIC32, TLV320AIC31

Get samples, datasheets, evaluation modules and app reports at: **www.ti.com/sc/device/TLV320AIC32** or **www.ti.com/sc/device/TLV320AIC31**

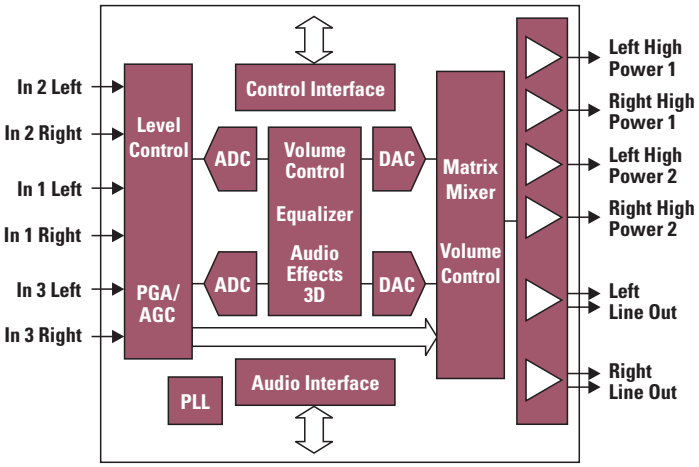
The TLV320AIC32/TLV320AIC31 are highly integrated, low-power stereo CODECs for use in a variety of portable audio equipment. The TLV320AIC32 includes six single-ended analog inputs. The TLV320AIC31 includes two single-ended analog inputs and two differential analog inputs. Both CODECs have six output drivers. They also include two line output drivers and four high-power amplifiers that can be configured as stereo headphone drivers or stereo speaker drivers.

Key Features

- Stereo DAC (100 dBA) and ADC (92 dBA) support rates up to 96 kSPS
- 14-mW power dissipation with stereo playback at 48 kSPS
- Stereo headphone drivers and 500-mW, 8-Ω speaker driver
- Stereo microphone preamps and hardware automatic gain control
- Integrated PLL for flexible audio clock generation
- Programmable digital audio bass/treble/EQ with 3D effects
- Analog inputs are configurable as single-ended (AIC32/AIC31) or fully differential (AIC31 only)
- Up to six analog inputs, six output drivers for easy connectivity to multiple devices in a cellular telephony system
- Packaging: 5 × 5 mm 32-pin QFN

Applications

- Cellular and smart phones
- Digital still cameras, digital video cameras
- MP3 and portable media players
- PDAs
- Talking toys and toys with audio



TLV320AIC32 block diagram

Overview

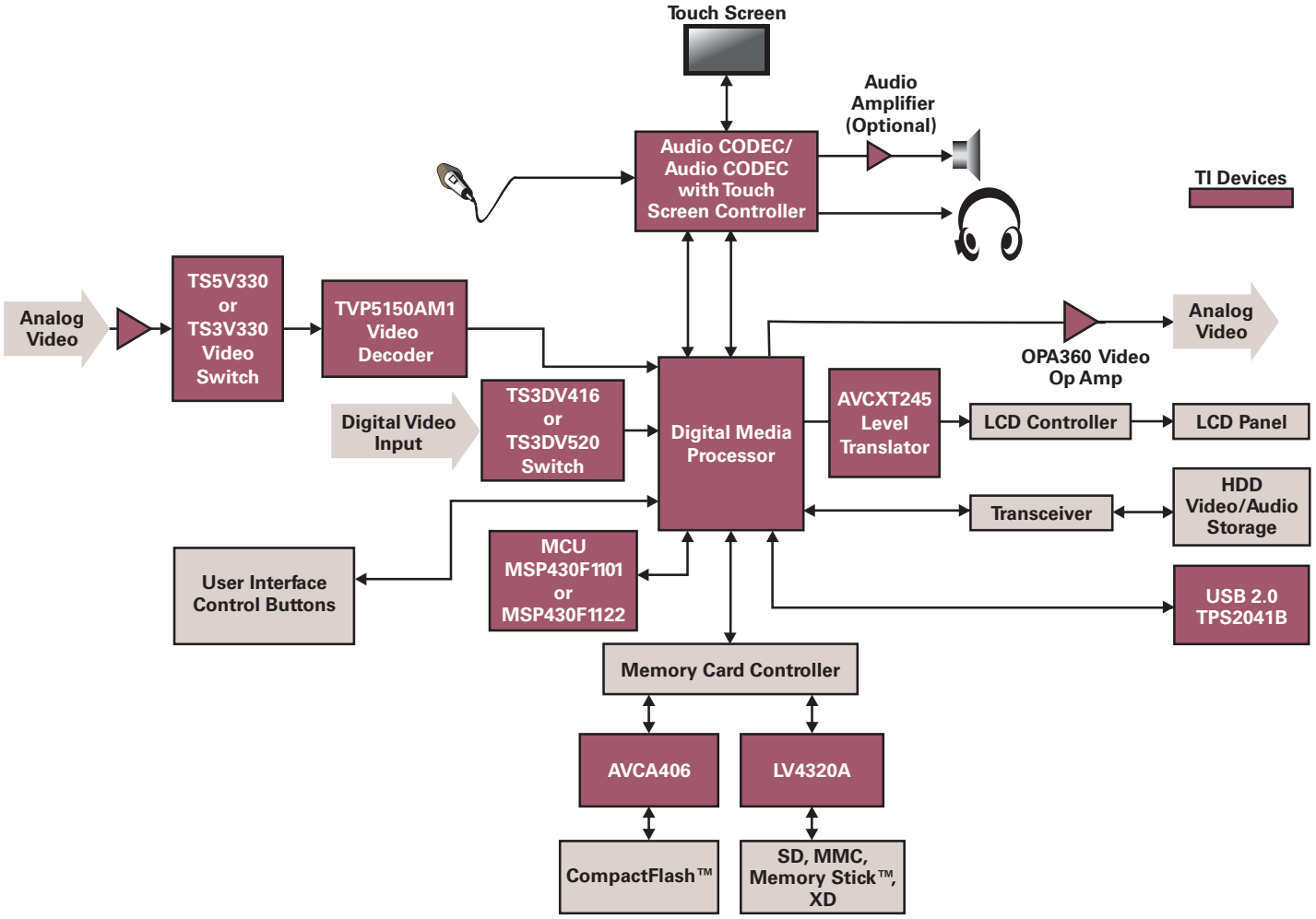
In This Section

For detailed information about portable media components featured in this section:

TS5V330/TS3V330: Video Switches	32
SN74AVCXT245/74LVCXT245: Dual-Supply Level Translators	32
SN74LV4320A: CompactFlash™ Interface Transceiver	33
TLV320AIC32/TLV320AIC31: Low-Power, Stereo Audio CODECs	33
PCM3792A: Low-Power Stereo Audio CODEC	34
TSC2100/TSC2102: High-Performance "Smart" Touch-Screen Controllers w/ Integrated Low-Power Audio Converters	34
TSC2301/TSC2302: High-Performance "Smart" Touch-Screen Controllers w/ Integrated Low-Power Audio Converters	35
SN74AVCA406/SN74AVCA406L: MMC, SD, Memory Stick™, SmartMedia™ and xD-Picture Card™ Transceivers	35

Sometimes called audio video jukeboxes, portable media players or portable video players, portable multimedia jukeboxes represent a market of great interest for consumers and consumer electronics manufacturers. Typically hard-disk drive-based, these devices are able to hold hours of content and provide entertainment for today's on-the-go lifestyle. While the market for these products is relatively small today, the initial entrants to this market space have been well received.

Portable, Multifunctional Digital Media Device



Featured Products

Video Switches
TS5V330, TS3V330

Get samples, datasheets and app reports at: **www.ti.com/signalswitches**

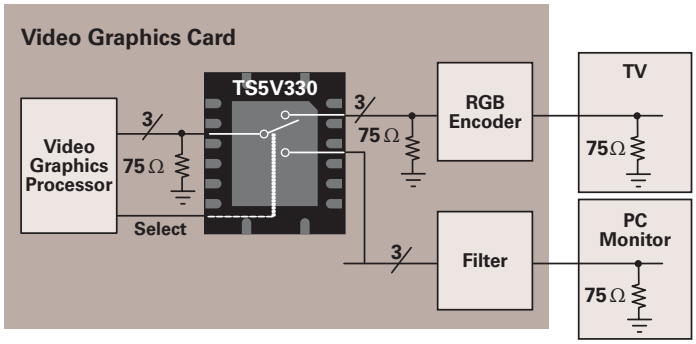
Video switches in the TS switch product family provide low differential gain and phase, making these switches ideal for composite and RGB video applications. TS video switches also offer the wide bandwidth and low crosstalk required to support high-frequency video applications.

Key Features

- Low differential gain and phase (3-V D_G = 0.82%, D_P = 0.1 degrees typ) (5-V D_G = 0.64%, D_P = 0.1 degrees typ)
- Wide bandwidth (BW = 300 MHz min)
- Low crosstalk (3-V X_{TALK} = –80 dB typ) (5-V X_{TALK} = –63 dB typ)
- Low-power consumption (I_{CC} = 3 μA max)
- Bidirectional data flow, with near-zero propagation delay
- Low ON-state resistance (r_{on} = 3 Ω typ)
- Rail-to-rail switching on data I/O ports (0 to V_{CC})
- I_{off} supports partial-power-down mode operation
- Suitable for both RGB and composite-video switching

Applications

- Composite and RGB video



Multiplexing video signals from the video graphics processor to two external video ports of the VGA card

Dual-Supply Level Translators
SN74AVCXT245, SN74LVCXT245

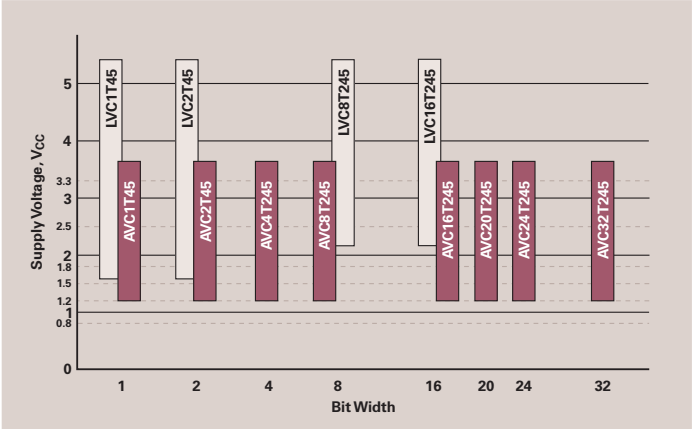
Get samples, datasheets and app reports at: **www.ti.com/trans**

Dual-supply level shifters are the ideal solution for bidirectional level translation. These devices have two separate V_{CC} supplies, one for each port (V_{CCA} and V_{CCB}), which gives them flexibility to operate in mixed-mode applications. These dual-supply devices allow for bidirectional level translation between different voltage nodes from 1.2 V to 3.6 V and 1.65 V to 5.5 V. TI also offers a wide range of bit-width options.

TI's Dual-Supply Level-Translation Portfolio

Device	Bit Width	V_{CCA} (V)	V_{CCB} (V)	Smallest Package
SN74AVC1T45[1]	1	1.2 to 3.6	1.2 to 3.6	6-pin NanoStar™/NanoFree™
SN74LVC1T45	1	1.65 to 5.5	1.65 to 5.5	6-pin NanoStar/NanoFree
SN74AVC2T45[1]	2	1.2 to 3.6	1.2 to 3.6	8-pin NanoStar/NanoFree
SN74LVC2T45	2	1.65 to 5.5	1.65 to 5.5	8-pin NanoStar/NanoFree
SN74AVC4T245[1]	4	1.2 to 3.6	1.2 to 3.6	16-pin QFN
SN74AVC8T245[1]	8	1.2 to 3.6	1.2 to 3.6	24-pin QFN
SN74LVC4245A	8	4.5 to 5.5	2.7 to 3.3	24-pin TSSOP
SN74LVC8T245[1]	8	1.65 to 5.5	1.65 to 5.5	24-pin QFN
SN74LVCC3245A	8	2.3 to 3.3	2.7 to 5.5	24-pin TSSOP
SN74LVCC4245A	8	4.5 to 5.5	2.7 to 3.3	24-pin TSSOP
SN74AVC16T245[1]	16	1.2 to 3.6	1.2 to 3.6	56-ball VFBGA
SN74ALVC164245	16	2.3 to 3.6	3.0 to 5.5	56-ball VFBGA
SN74AVCA164245[1]	16	1.4 to 3.6	1.4 to 3.6	56-ball VFBGA
SN74AVCB164245[1]	16	1.4 to 3.6	1.4 to 3.6	56-ball VFBGA
SN74LVC16T245[1]	16	1.65 to 5.5	1.65 to 5.5	56-ball VFBGA
SN74AVC20T245[1]	20	1.2 to 3.6	1.2 to 3.6	56-ball VFBGA
SN74AVC24T245[1]	24	1.2 to 3.6	1.2 to 3.6	83-ball LFBGA
SN74AVC32T245[1]	32	1.2 to 3.6	1.2 to 3.6	96-ball LFBGA
SN74AVCB324245[1]	32	1.2 to 3.6	1.2 to 3.6	96-ball LFBGA

[1] *Bus-hold option available.*



Extended family of dual-supply level-translation devices

CompactFlash™ Interface Transceiver
SN74LV4320A

Get sample and, datasheets at: **www.ti.com/sc/device/SN74LV4320A**

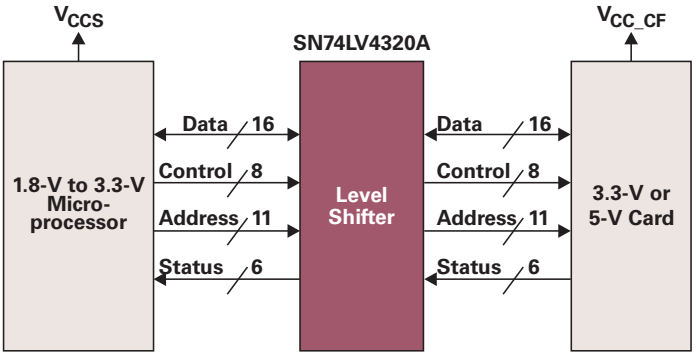
This CompactFlash (CF) interface chip is designed to provide a single-chip solution for CF card interfaces. Separate V_{CC} rails for the system bus side and the CF connector bus side allow voltage-level shifting. This is helpful for interfacing between a core chipset, which may operate from 3.3 V down to 1.65 V, and CF cards with 3.3-V or 5-V supply voltages.

Key Features

- Level translation supports both 3.3- and 5-V CompactFlash cards
- High degree of integration
- Schmidt-trigger inputs for CompactFlash control signals
- I_{off} and /MASTER_EN (shutdown) pin
- Internal decode logic for direction control (DIR)
- Robust ESD protection (+8-kV HBM) on card pins

Applications

- PDAs
- Handheld scanners
- Set-top boxes
- Network equipment



SN74LV4320A typical application diagram

Low-Power, Stereo Audio CODECs
TLV320AIC32, TLV320AIC31

Get samples, datasheets, evaluation modules and app reports at:
www.ti.com/sc/device/TLV320AIC32 or
www.ti.com/sc/device/TLV320AIC31

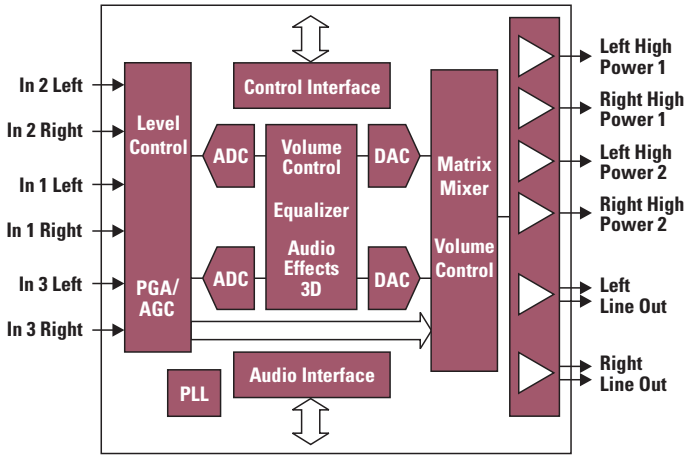
The TLV320AIC32/TLV320AIC31 are highly integrated, low-power stereo CODECs for use in a variety of portable audio equipment. The TLV320AIC32 includes six single-ended analog inputs. The TLV320AIC31 includes two single-ended analog inputs and two differential analog inputs. Both CODECs have six output drivers. They also include two line output drivers and four high-power amplifiers that can be configured as stereo headphone drivers or stereo speaker drivers.

Key Features

- Stereo DAC (100 dBA) and ADC (92 dBA) support rates up to 96 kSPS
- 14-mW power dissipation with stereo playback at 48 kSPS
- Stereo headphone drivers and 500-mW, 8-Ω speaker driver
- Stereo microphone preamps and hardware automatic gain control
- Integrated PLL for flexible audio clock generation
- Programmable digital audio bass/treble/EQ with 3D effects
- Analog inputs are configurable as single-ended (AIC32/AIC31) or fully differential (AIC31 only)
- Up to six analog inputs, six output drivers for easy connectivity to multiple devices in a cellular telephony system
- Packaging: 5 × 5 mm 32-pin QFN

Applications

- Cellular and smart phones
- Digital still cameras, digital video cameras
- MP3 and portable media players
- PDAs
- Talking toys and toys with audio



TLV320AIC32 block diagram

Featured Products

Low-Power Stereo Audio CODEC
PCM3792A

Get datasheets at: **www.ti.com/sc/device/PCM3792A**

PREVIEW The PCM3792A is a single-chip, 20-bit stereo audio CODEC with three single-ended analog inputs, three stereo outputs and two mono outputs. It includes an integrated stereo Class-D audio power amplifier. The PCM3792A accepts left-justified, right-justified and I²S™ data formats for simple interface to audio DSP or decoder/encoder chips. It can be controlled with a two- or three-wire serial interface. The PCM3792A is suitable for a wide variety of portable applications where good performance and low power are required.

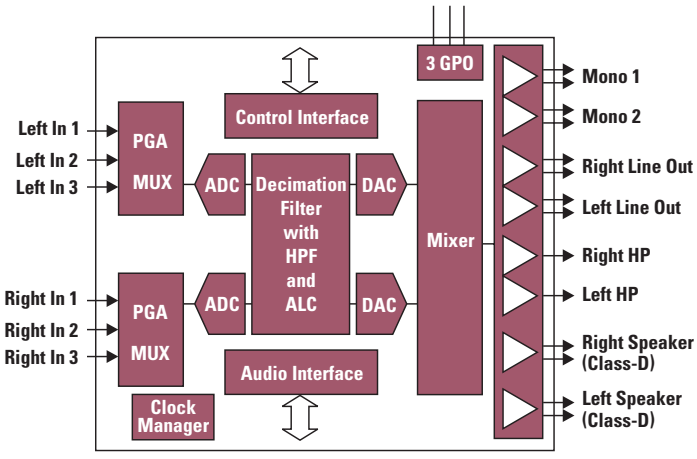
Key Features

- 95-dB SNR DAC, 90-dB SNR ADC
- Stereo 500 mW at 8 Ω for speaker amplifier
- Stereo 30 mW at 32 Ω for headphone amplifier
- +6-dB to –70-dB volume control for each analog output
- +30-dB to –12-dB gain control for analog inputs
- 48-mW power dissipation at 3.3 V (playback)
- 67-mW power dissipation at 3.3 V (recording)
- Auto Level Control (ALC) for playback and recording
- Power supply:
  - 1.8 to 3.6 V for digital I/O
  - 2.7 to 3.6 V for digital and analog
  - 2.7 to 4.5 V for speaker amplifier
- Packaging: 6 × 6 mm BGA

Applications

- Mobile phones, PDAs
- Video camcorders, movie digital still cameras
- Portable digital audio players

**Expected release April 2006.*



PCM3792A block diagram

High-Performance "Smart" Touch-Screen Controllers with Integrated Low-Power Audio Converters
TSC2100, TSC2102

Get samples, datasheets, evaluation modules and app reports at:
www.ti.com/sc/device/TSC2100 or **www.ti.com/sc/device/TSC2102**

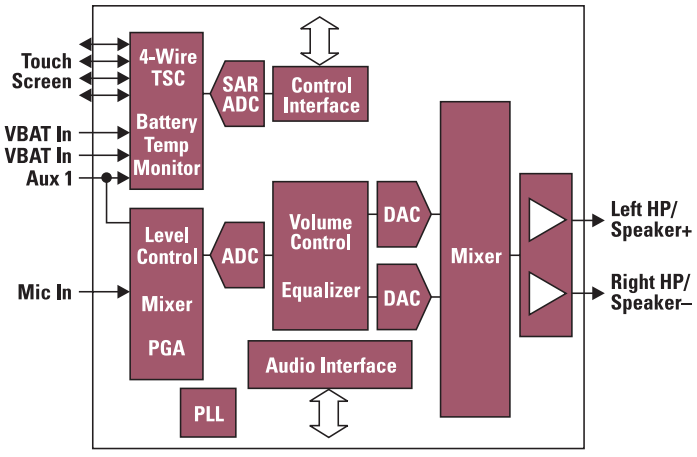
The TSC2100 is a four-wire smart touch-screen controller (TSC) with an integrated audio CODEC, a headphone/speaker amplifier and a 12-bit battery/temperature/auxiliary measurement SAR ADC. The TSC2102 is a pin- and software-compatible version of the TSC2100, incorporating the smart four-wire TSC, a stereo audio DAC and a headphone/speaker driver.

Key Features

- Four-wire smart touch-screen controller
- Stereo DAC and mono audio ADC (TSC2100) support up to 53 kSPS
- 97-dB stereo playback at 11-mW power dissipation
- Audio output drivers provide 325 mW into 8 Ω and also support stereo headphones with capless output option
- Integrated PLL for flexible audio clock generation
- Programmable digital audio bass/treble/EQ/de-emphasis (TSC2100 only)
- Microphone preamp and hardware automatic gain control
- Direct battery measurement accepts up to 6-V input
- On-chip temperature and auxiliary-input measurement
- Packaging: 7 × 7 mm 48-pin QFN (TSC2101)
  5 × 5 mm 32-pin QFN (TSC2100)
  32-pin TSSOP (TSC2100)

Applications

- Portable media players
- PDAs
- Portable audio products



TSC2100 block diagram

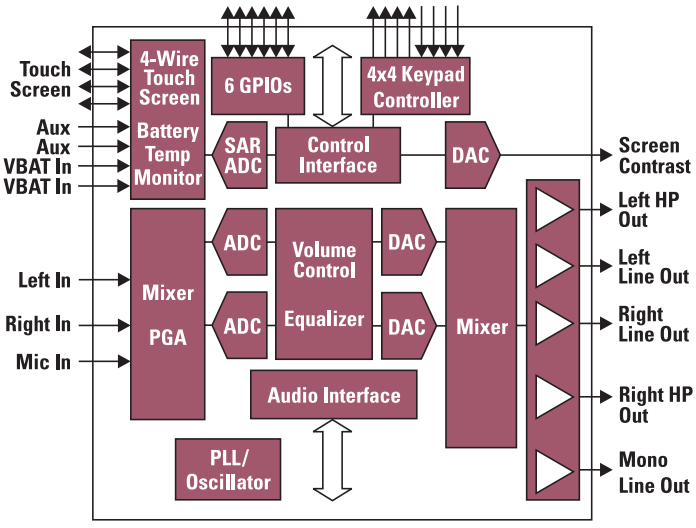
High-Performance "Smart" Touch-Screen Controllers with Integrated Low-Power Audio Converters
TSC2301, TSC2302

Get samples, datasheets, evaluation modules and app reports at:
www.ti.com/sc/device/TSC2301 or **www.ti.com/sc/device/TSC2302**

The TSC2301 is a 4-wire smart touch-screen controller (TSC) with an integrated audio codec, a headphone/speaker amplifier and a 12-bit battery/temperature/auxiliary measurement ADC. The TSC2301 includes a keypad controller and 6 additional GPIO pins.

Key Features
- 4-wire smart touch-screen controller
- 4 × 4 keypad interface (TSC2301 only)
- 6 GPIO pins (TSC2301 only)
- Full stereo codec supporting up to 48 kSPS
- 98-dB stereo playback with 27-mW power dissipation
- 8-bit DAC for LCD contrast control
- Integrated PLL for flexible audio clock generation
- 27-mW stereo headphone driver with capless output option
- Programmable digital audio bass/treble/EQ/de-emphasis
- Microphone preamp and hardware automatic gain control
- Direct battery measurement accepts up to 6-V input
- On-chip temperature and auxiliary-input measurement
- Packaging: 6 × 6 mm 120-ball BGA (TSC2301), 64-pin TQFP (TSC2301), 7 × 7 mm 48-pin QFN (TSC2302)

Applications
- Smart phones
- PDAs
- Portable media players
- Low-power audio products



TSC2301 block diagram

MMC, SD, Memory Stick™, SmartMedia™ and xD-Picture Card™ Transceivers
SN74AVCA406, SN74AVCA406L

Get samples, datasheets and app reports at:
www.ti.com/sc/device/SN74AVCA406 or
www.ti.com/sc/device/SN74AVCA406L

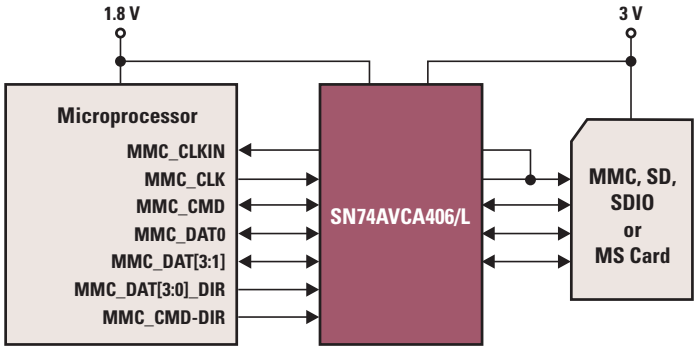
The SN74AVCA406 is a transceiver for interfacing microprocessors with MultiMediaCard (MMC), SD Secure Digital™ cards, Memory Stick-compliant products, SmartMedia cards, or xD-Picture Card. It integrates high ESD protection, which eliminates the need for external ESD diodes.

Key Features
- Transceiver for interface with MultiMediaCard (MMC), SD Secure Digital, Memory Stick (MS) compliant products, SmartMedia and xD-Picture Card
- Configurable I/O switching levels with dual-supply pins operating over full 1.4- to 3.6-V power-supply range
- A ports are placed in high-impedance state when card-side supply voltage is switched off
- ESD protection for card-side pins exceeds ±15-kV air gap discharge, ±8-kV contact discharge

Applications
- Handsets
- PDAs
- Handheld scanners
- Digital still cameras
- Set-top boxes

Comparison of SN74AVCA406 and SN74AVCA406L

	SN74AVCA406	SN74AVCA406L
Cards supported	SD/MMC/MS (single or dual cards), xD-Picture Card	SD, MMC, MS
Packages	48-ball BGA, 4 × 4 mm	20-ball BGA (3 × 2.5 mm), 24-ball BGA (3 × 3 mm)
Card-side ESD protection	15-kV air gap discharge, 8-kV contact discharge	8-kV human-body model (HBM)
V_{CCA} range	0 to V_{CCB}	0 to 3.6 V
I_{OFF} feature (for partial-power-down applications)	No	Yes



Memory card interface with the SN74AVCA406

Overview

To Know More

Broadcast Encoder	37
Statistical Multiplexer	39

Video infrastructure systems are primarily involved in digital media compression, transport, conversion and enhancement of video streams in the broadcast, cable, satellite and DSL markets. Products in this area include multimedia broadcast encoders, multimedia routers, cable head-end systems and statistical multiplexers.

TI's high-performance TMS320C645x DSPs are ideal for these applications which implement a variety of processor intensive tasks. The TI DSP Third Party Network provides cost-competitive, optimized video compression/decompression algorithms including MPEG2, MPEG4, H.263, H.264 and WM9.

In This Section

For detailed information about broadcast encoder components featured in this section:

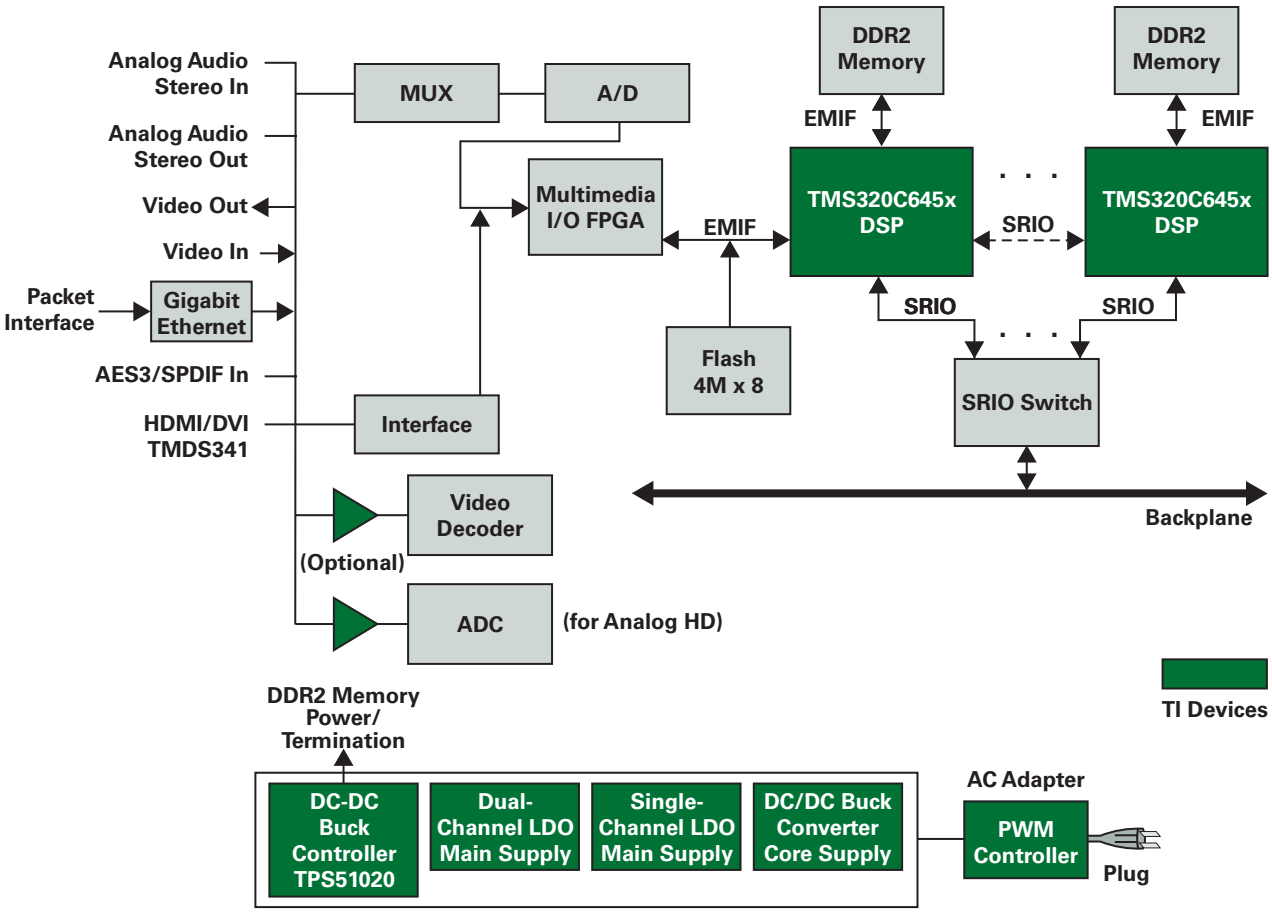
TMS320C6455 DSP 38

Solutions for video/imaging products provide developers the flexibility to design a wide range of products. By leveraging the DSP programmability, processing performance, video-specific peripherals and support for all major multimedia CODECs, developers can design differentiated products with customized features to meet changing market needs.

For developers of video solutions requiring live MPEG4, H.264 and WMV9 encoding, there is a TI DSP-based solution to reduce time-to-market and minimize risk. This broadcast video solution is embedded with multiple TI TMS320C645x DSPs to execute high-end video compression algorithms, such as H.264 live encoding of synchronized video and audio. The solution is targeted toward many video applications, which require high quality and performance, with full D1 video and AAC audio code compatible. Roadmap to HD-based products can also be worked out.

For more specific information on this solution, please visit **www.ti.com/broadcastencoder**

SD/HD Broadcast Encoder Typical Block Diagram



Featured Product

High–Performance Multi–Processing
TMS320C6455 DSP

Get samples, datasheets and app reports at: **www.ti.com/dsp**

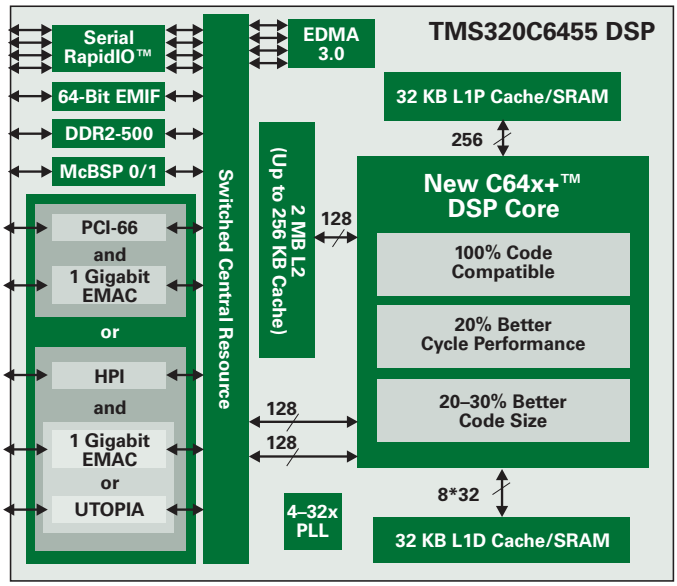
The TMS320C6455 DSP offers improved performance, reduced code size plus more on-chip memory. In addition, this new DSP enables high-performance, multi-processing via Serial RapidIO™ and other new high bandwidth peripherals. These features enable the C6455 DSP to bring greater functionality and higher system performance to applications such as infrastructure video, telecom and imaging. As the telecom and video industries continue to develop new services, the programming flexibility of the C6455 DSP allows developers to keep pace with changes in standards and to quickly implement multiple voice and video CODECs in their system design.

Key Features

- High-performance TMS320C64x+™ DSP with speeds at 750 MHz, 850 MHz and 1 GHz
- Serial RapidIO: Up to 10 Gbits/sec full-duplex high-speed bus
- Other high bandwidth peripherals: Gigabit Ethernet MAC, 500-MHz DDR2 and PCI-66
- 2 MBytes of L2 memory
- Based on the C64x+™ DSP core
  - Better debug through exception handling and cache coherency visibility
  - Enhanced development with memory protection and real-time band
  - 20% higher cycle performance improves overall system performance via doubled multiplication bandwidth, instruction set enhancements for FFT, FIR and DCT, new EDMA 3.0 engine
  - 20–30% smaller code size reduces system cost:
    - 16-bit compact instructions and SPLOOP buffer

Applications

- Infrastructure video
- Telecom
- Imaging



TMS320C6455 DSP block diagram

In This Section

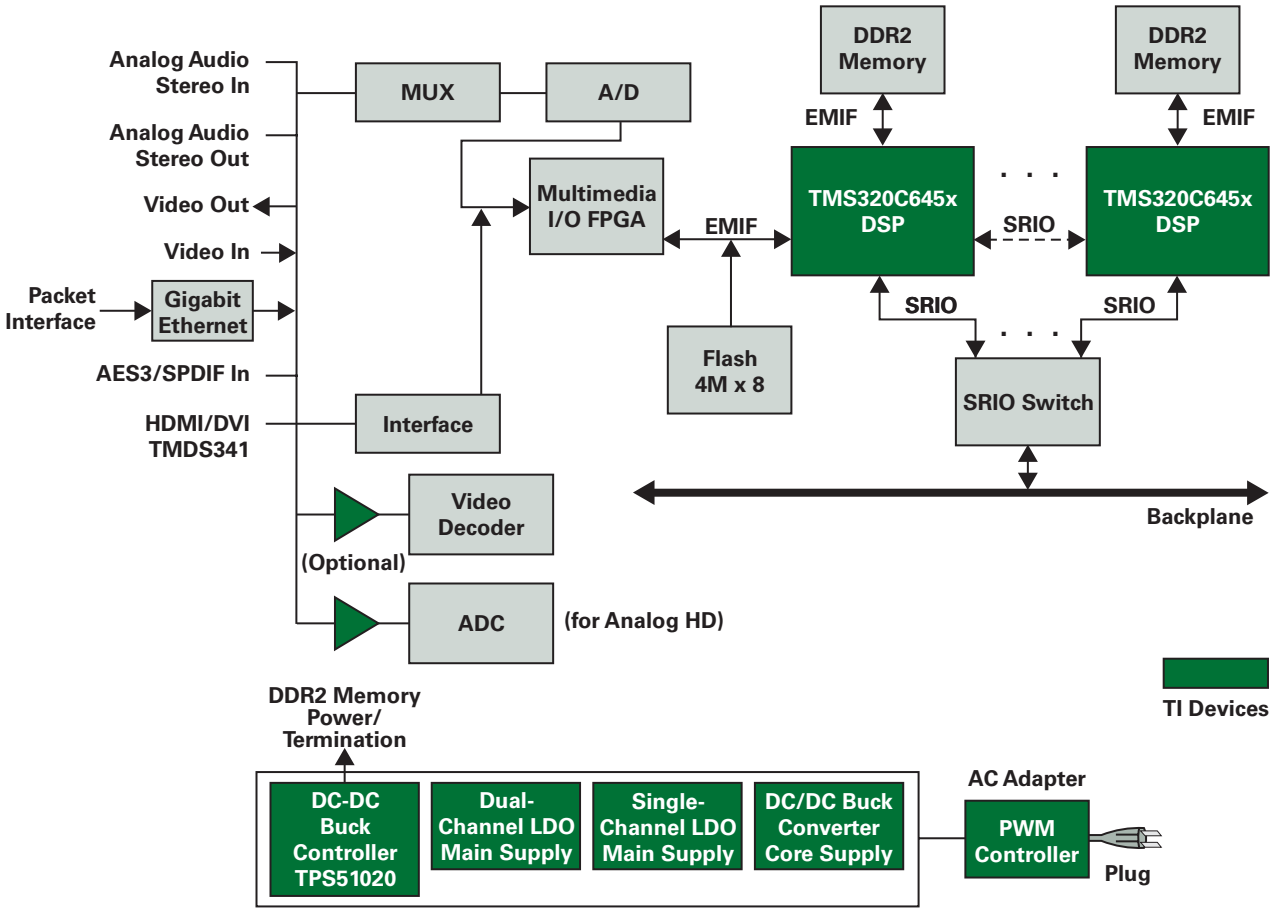
For detailed information about statistical multiplexer components featured in this section:

TMS320C6455 DSP 40

The video statistical multiplexer is cable head-end infrastructure equipment typically residing at the local cable service provider. Statistical multiplexers take in multiplexed digital channels as inputs, perform typical functions that include video content encoding, inserting programming advertisements and content from local video servers and providing as output a specific single subscriber's cable package.

TI's TMS320C64x™ generation of DSPs can execute the following DSP functions: video transcoding (converting from one video format to another), video transrating (scaling from a higher to a lower bit rate), real-time audio synchronization, audio encoding/decoding support, multiplexing and demultiplexing of video streams and encryption.

Video Statistical Multiplexer Typical Block Diagram



Featured Product

High–Performance Multi–Processing
TMS320C6455 DSP

Get samples, datasheets and app reports at: **www.ti.com/dsp**

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Key Features

- High-performance TMS320C64x+™ DSP with speeds at 750 MHz, 850 MHz and 1 GHz
- Serial RapidIO: Up to 10 Gbits/sec full-duplex high-speed bus
- Other high bandwidth peripherals: Gigabit Ethernet MAC, 500-MHz DDR2 and PCI-66
- 2 MBytes of L2 memory
- Based on the C64x+™ DSP core
  - Better debug through exception handling and cache coherency visibility
  - Enhanced development with memory protection and real-time band
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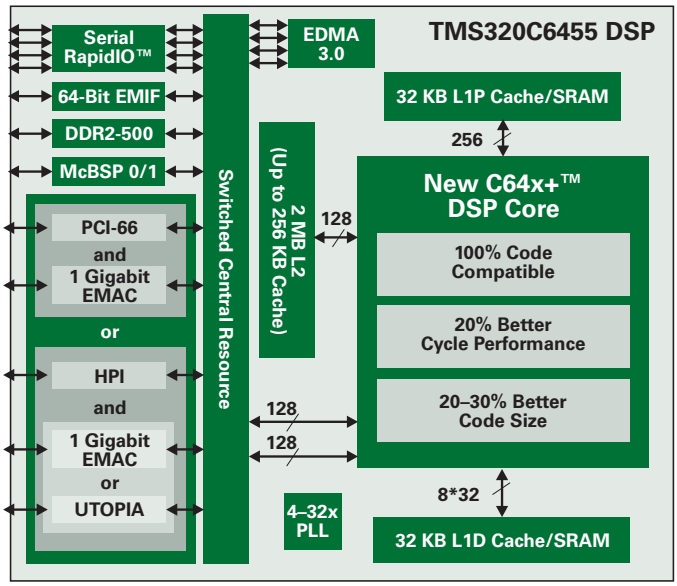


TMS320C6455 DSP block diagram

Applications

- Infrastructure video
- Telecom
- Imaging

To Know More

Digital Video Recorder	42
IP Network Camera	44
IP Video Node/Video Server/Matrix	46

A digital video surveillance system consist of an appliance that has embedded image capture capabilities which allows video images or extracted information to be compressed, stored or transmitted over communication networks or digital data link. This appliance can be used for any type of monitoring, either for commercial or personal use.

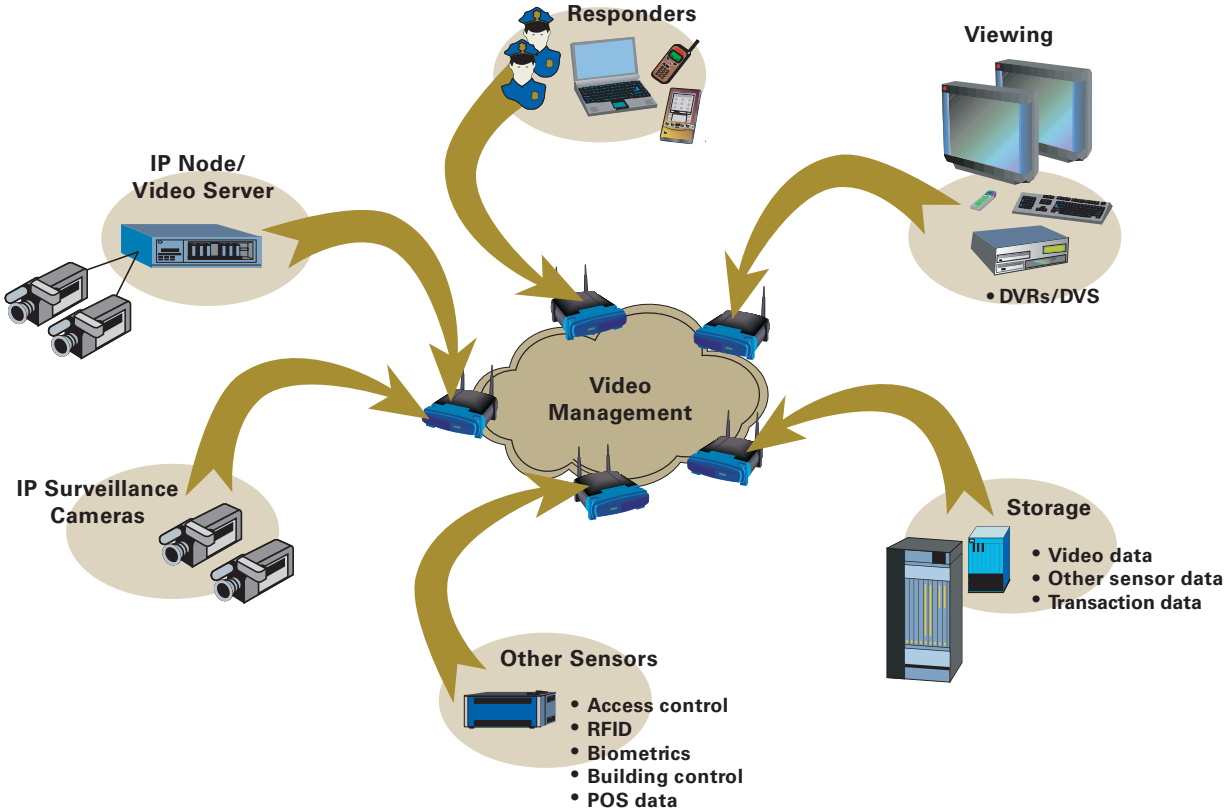
Digital surveillance is now recognized as an essential element for security in applications of all types. Homes, stores, offices and industrial/institutional facilities can all benefit from the ease of management and access provided by digital security surveillance. Digital video surveillance systems bring together the ever increasing computing power of today's central processing chipsets (CPUs), with specialized digital processing technology (DSP). DVR cards, also known as digital video recorders, along with specially written software can now turn virtually any PC into a digital surveillance recorder. DVRs can be enabled as standalone systems as well.

TI DSPs are used to process the image in a variety of ways including compressing it in capable formats. Additionally, TI DSPs offer the ability to use intelligent image analysis functions and different types of networking protocol support. TI DSP hardware and software partners offer complete solutions for a diversified range of products.

Intelligent video analysis algorithms are based on artificial intelligence called "computer vision," which runs all objects in a camera's view against pre-programmed rules. When an object violates a rule, for example, a person crosses a tripwire or an object disappears from an area of interest, the software alerts security personnel by phone, pager, e-mail or an alert console.

The DSP-based technology enables analytical capabilities to reside directly on edge devices, such as video cameras, digital video recorders, network encoders or other video management platforms, which will make intelligent video analysis more accessible to the mass market. OEMs' customers benefit by investing in truly smart devices and deploying intelligence throughout their video surveillance environment in a cost-effective manner.

Video Surveillance System Diagram



Overview

In This Section

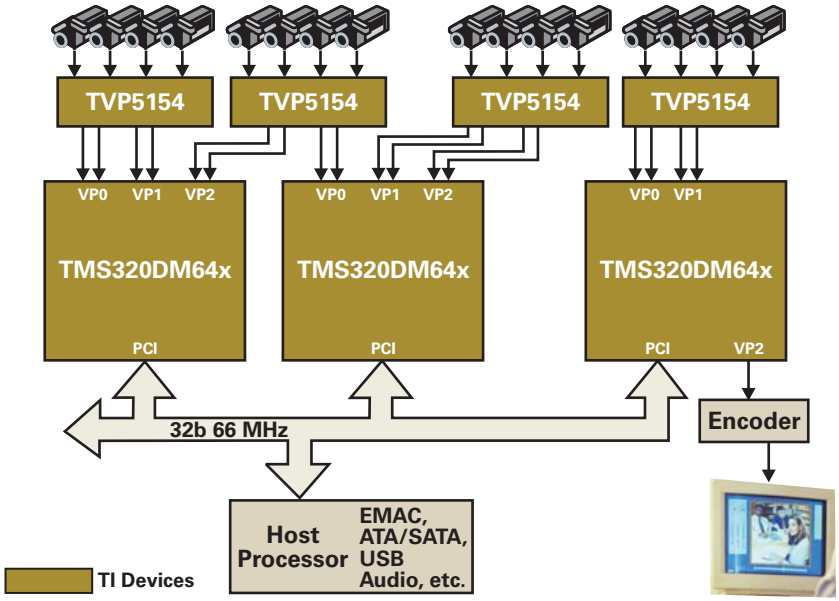
For detailed information about digital video recorder components featured in this section:

TMS320DM64x™ Digital Media Processors 43

Digital Video Recorders (DVRs) store multiple camera inputs. DVRs can be implemented as a standalone system or as a PC card. DVRs have much longer recording periods than conventional recording equipment. Users can have perfect still picture pause, often used in security. Also digitally stored images do not degrade over time. This appliance can be used for any type of monitoring, either for business or personal use.

TI's DSPs are used to compress the image in a variety of standard and non-standard video formats. Additionally, TI DSPs offer the ability to use intelligent image analysis functions and various types of networking protocol support.

TMS320DM64x Processor-Based Digital Video Recorder Solution



High-Performance Digital Signal Processors
TMS320DM64x™ Digital Media Processors

Get samples, datasheets and app reports at: **www.ti.com/dsp**

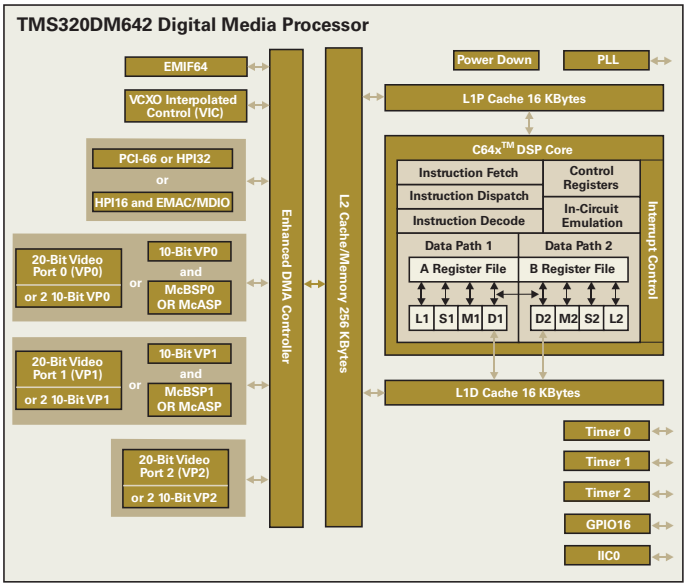
TI's video surveillance solutions are primarily based on the high-performance DM64x™ DSP-based digital media processors. The DM64x DSP-based digital media processors have on-chip video ports for easy connection to video devices and are capable of handling both video and audio encode and decode for IP-based video surveillance applications. The single, programmable digital media processor is a cost-effective solution because the need for external PCI or EMAC is eliminated.

Key Features

- Performance up to 5760 MIPS at 720 MHz
  - 400/500/600 MHz options also available
- Multiple input/output glueless interfaces for common video and audio formats
- Performance real-time video encoding, decoding and/or transcoding
- Three dual-channel video ports support simultaneous video input and output
- Advanced connectivity with 10/100 Ethernet MAC and 66-MHz PCI
- Ready-to-use application software such as MPEG4, MPEG2, MPEG1, WMV9, H.263, H.261, M-JPEG, JPEG2000, JPEG, H.264 and more

Applications

- Network camera-based surveillance and IP video node
- Video-on-demand set-top boxes, personal video recorders and digital media centers
- Statistical multiplexers and broadcast encoders
- IP-based video conferencing and IP-based videophones



TMS320DM642 digital media processor block diagram

Overview

In This Section

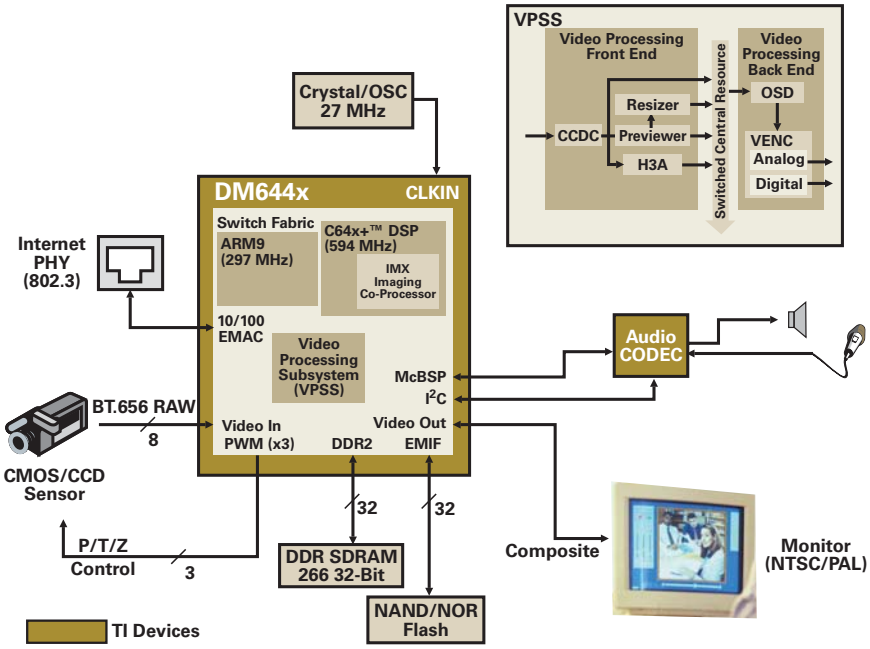
For detailed information about IP network camera components featured in this section:

TMS320DM644x Digital Media Processors	45
TMS320DM64x™ Digital Media Processor	45

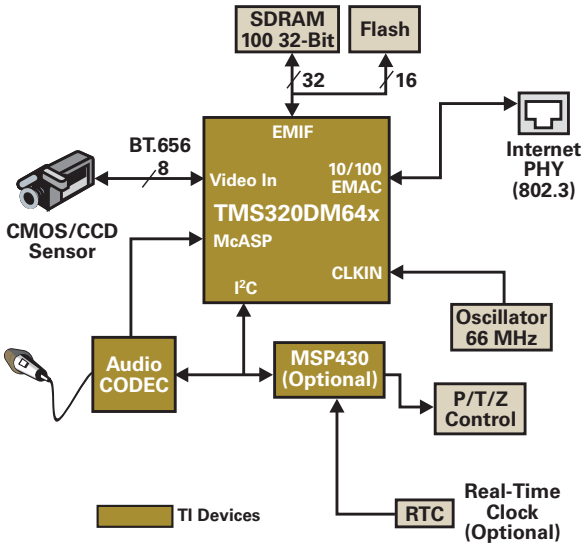
The world of video surveillance is moving toward the IP network. IP network cameras can be defined as a camera with networking and video processing combined into one unit. A network camera has its own IP address and the computing functions to handle network communication. It captures and transmits lie images over the network enabling remove viewing and user control from anywhere, anytime.

TI's DSPs are used to compress the image in a variety of standard and non-standard video formats. Additionally, TI DSPs offer the ability to use intelligent image analysis functions and various types of networking protocol support. Digital video transmission is fast becoming the standard requirement for security and surveillance systems. Both wired and wireless links are of interest for security and surveillance architects.

DaVinci™-Based IP Network Camera Block Diagram



TMS320DM64x™ Digital Media Processor-Based IP Network Camera Block Diagram



High-Performance Digital Signal Processors
TMS320DM644x Digital Media Processors

Get samples, datasheets and app reports at: **www.ti.com/davinci**

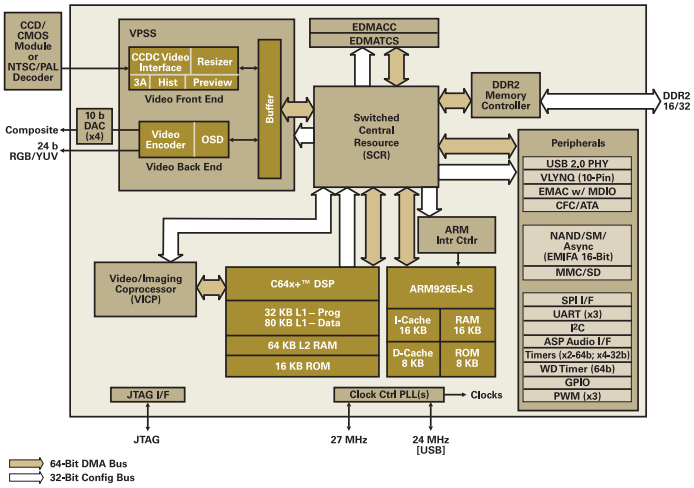
The TMS320DM6446/3 leverage TI's DaVinci™ technology to meet the networked media encode and decode application processing needs of next-generation embedded devices. The DSP subsystem supports a programmable audio/video multimedia engine that provides application flexibility and support for future CODEC standards. The integrated ARM®-based application processor supports all the required call control, device drivers and network provisioning. The Video Processing subsystem supports functions such as video resizing, On Screen Display (OSD) support, and a full compliment of video I/O capabilities.

Key Features

- TMS320C64x+™ DSP performance: 600 MHz
- ARM926EJ-S performance: 300 MHz
- Video processing subsystem (VPSS) with configurable video/imaging peripheral
- Highly integrated peripherals; including video accelerators, (4) DACs, hardware OSD, USB 2.0 and more
- Advanced connectivity with 10/100 Ethernet MAC; half or duplex plus QoS support
- Ready-to-use application software such as H.264, H.263, MPEG4, G.729ab, WVM9 and more
- Supports glueless interfaces for common video and audio formats
- Performance real-time image processing, resizing, auto focus and more
- DDR2 and SDRAM support
- Packaging: 361-pin Pb-Free BGA (ZWT suffix; 0.8-mm pitch)

Applications

- Set-top boxes
- Networked digital media centers
- Home security



TMS320DM6446 digital media system-on-chip (DMSoC) block diagram

High-Performance Digital Signal Processors
TMS320DM64x™ Digital Media Processors

Get samples, datasheets and app reports at: **www.ti.com/dsp**

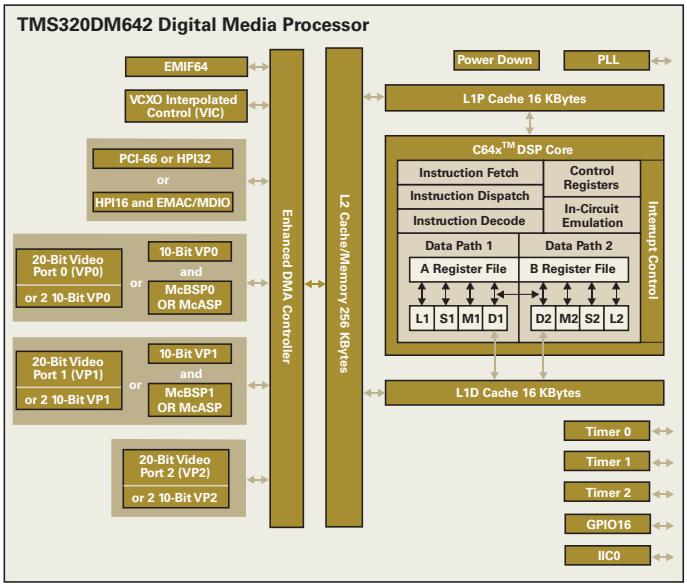
TI's video surveillance solutions are primarily based on the high-performance DM64x™ DSP-based digital media processors. The DM64x DSP-based digital media processors have on-chip video ports for easy connection to video devices and are capable of handling both video and audio encode and decode for IP-based video surveillance applications. The single, programmable digital media processor is a cost-effective solution because the need for external PCI or EMAC is eliminated.

Key Features

- Performance up to 5760 MIPS at 720 MHz
  - 400/500/600 MHz options also available
- Multiple input/output glueless interfaces for common video and audio formats
- Performance real-time video encoding, decoding and/or transcoding
- Three dual-channel video ports support simultaneous video input and output
- Advanced connectivity with 10/100 Ethernet MAC and 66-MHz PCI
- Ready-to-use application software such as MPEG4, MPEG2, MPEG1, WMV9, H.263, H.261, M-JPEG, JPEG2000, JPEG, H.264 and more

Applications

- Network camera-based surveillance and IP video nodes
- Video-on-demand set-top boxes, personal video recorders and digital media centers
- Statistical multiplexers and broadcast encoders
- IP-based video conferencing and IP-based videophones



TMS320DM642 digital media processor block diagram

Overview

In This Section

For detailed information about IP video node/video server/matrix components featured in this section:

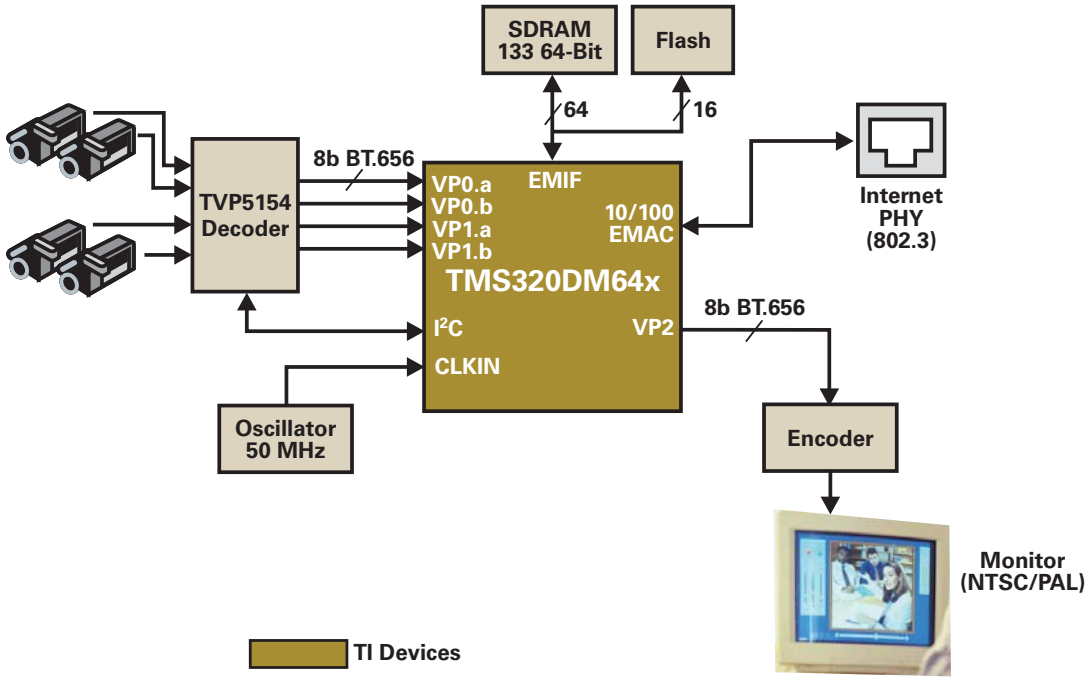
TMS320DM64x™ Digital Media Processors 47

IP video nodes, video servers and video matrixes serve very similar needs. They handle multiple camera inputs, digitize, compress and stream digital media content over an IP network such as a LAN, intranet or Internet, turning an analog video system into a network video system. Users are able to view live images using web browsers or application software on any local or remote computer on a network.

User configuration and control can also be done remotely. It allows authorized viewers from different locations to simultaneously access images from the same analog camera(s), as well as network cameras if they are added to the system. These devices can also store video as an option and typically operate as a standalone unit.

Digital video transmission is fast becoming the standard requirement for security and surveillance systems. TI's DSPs provide developers the flexibility to design a wide range of digital surveillance products. By leveraging the DSP programmability, processing performance, video-specific peripherals and support for all major multimedia CODECs, developers can design differentiated products with customized features to meet changing market needs.

IP Video Node Block Diagram



Featured Product

High-Performance Digital Signal Processors
TMS320DM64x™ Digital Media Processors

Get samples, datasheets and app reports at: **www.ti.com/dsp**

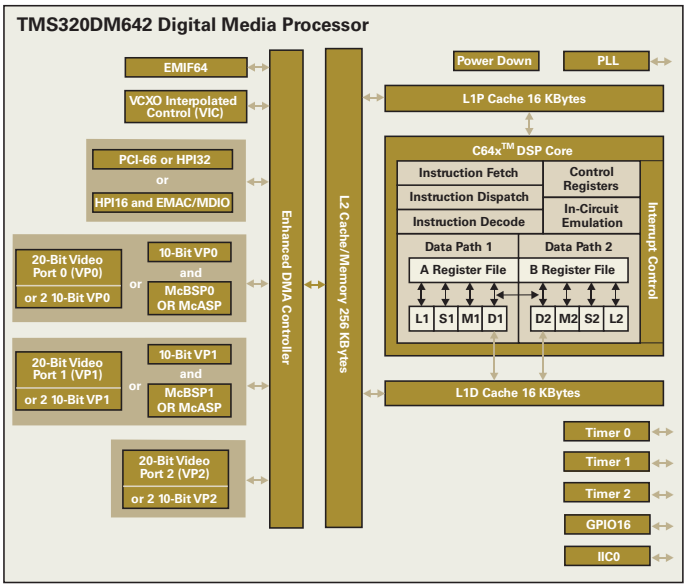
TI's video surveillance solutions are primarily based on the high-performance DM64x™ DSP-based digital media processors. The DM64x DSP-based digital media processors have on-chip video ports for easy connection to video devices and are capable of handling both video and audio encode and decode for IP-based video surveillance applications. The single, programmable digital media processor is a cost-effective solution because the need for external PCI or EMAC is eliminated.

Key Features

- Performance up to 5760 MIPS at 720 MHz
  - 400/500/600 MHz options also available
- Multiple input/output glueless interfaces for common video and audio formats
- Performance real-time video encoding, decoding and/or transcoding
- Three dual-channel video ports support simultaneous video input and output
- Advanced connectivity with 10/100 Ethernet MAC and 66-MHz PCI
- Ready-to-use application software such as MPEG4, MPEG2, MPEG1, WMV9, H.263, H.261, M-JPEG, JPEG2000, JPEG, H.264 and more

Applications

- Network camera-based surveillance and IP video nodes
- Video-on-demand set-top boxes, personal video recorders and digital media centers
- Statistical multiplexers and broadcast encoders
- IP-based video conferencing and IP-based videophones



TMS320DM642 digital media processor block diagram

Overview

To Know More

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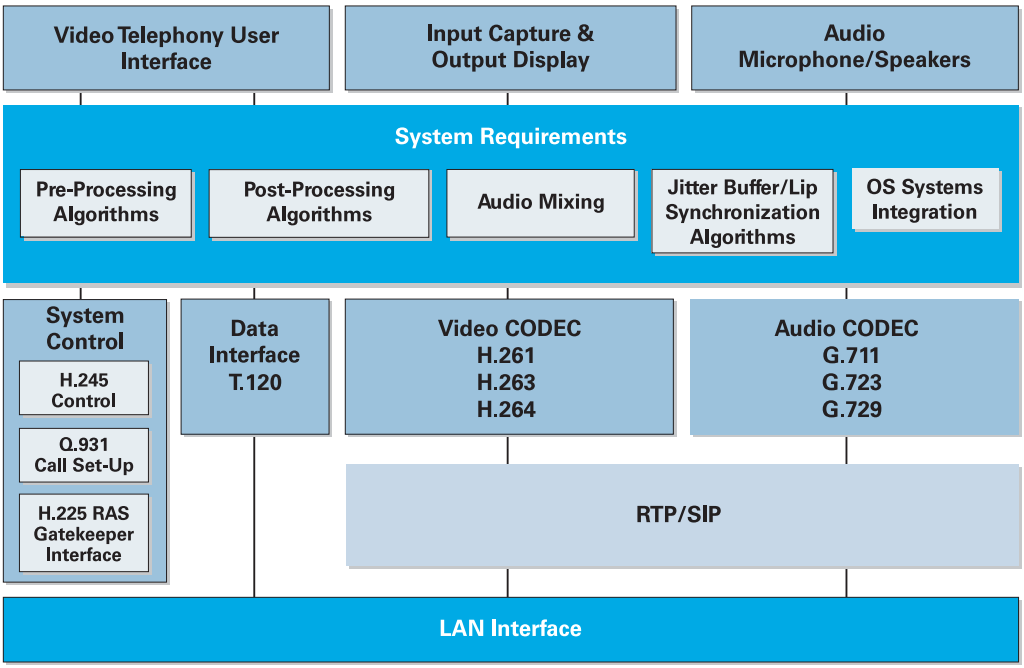
The market is demanding video telephony applications to be compact, all-in-one communication devices that take the complexity out of video conferencing and allow free person-to-person video calls anywhere in the world. There is a growing demand for this communication to be over a broadband IP connection. These products provide large and small enterprises, government institutions and educational environments with the tools to be more productive, train and educate more efficiently and avoid the burden of travel expenses. As IP network deployments continue to grow, consumers are looking for additional features and integration of video streaming capabilities in a cost-effective fashion.

The video telephony market includes:

- IP-based videophones
- Video conferencing terminals/end-points
- Multi-point control unit (MCUs) and gateways

Typical H.323-Based Video Telephony Systems Requirements



Overview

In This Section

For detailed information about IP-based videophone components featured in this section:

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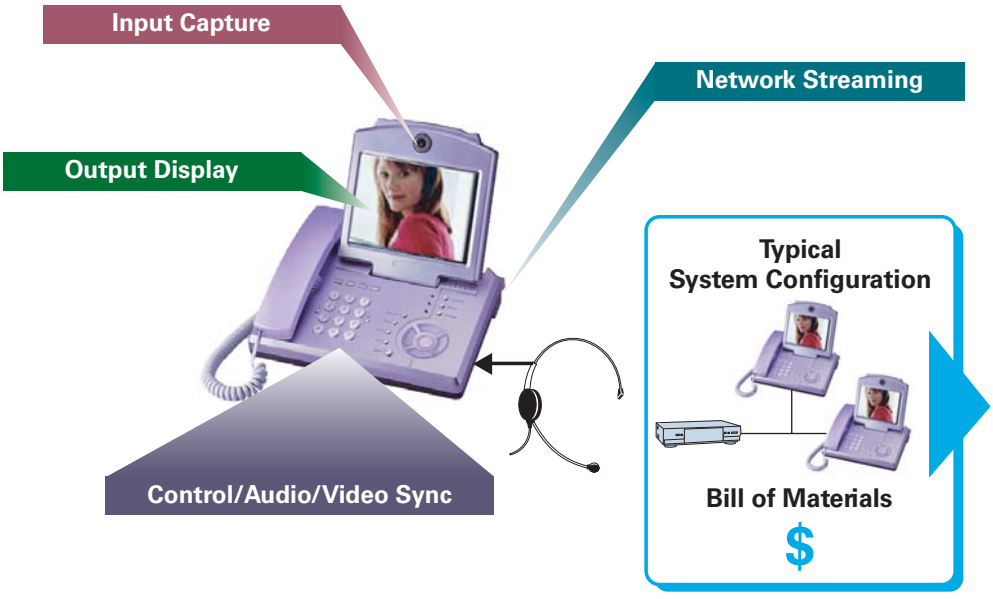
Enabled by broadband access and growing network penetration, IP Videophone demand continues to increase in both the enterprise and residential markets. For the enterprise market, a typical IP Videophone is a compact, all-in-one desktop phone that takes the complexity out of video conferencing and allows free person-to-person video calls anywhere in the world over a broadband IP connection. However, the residential market prefers a more versatile IP Videophone that allows the end user more mobility during video calls and more integration options with other streaming media appliances in the home. Overall, this product provides both the enterprise and residential markets a more efficient and cost effective way to communicate with others over a broadband IP connection.

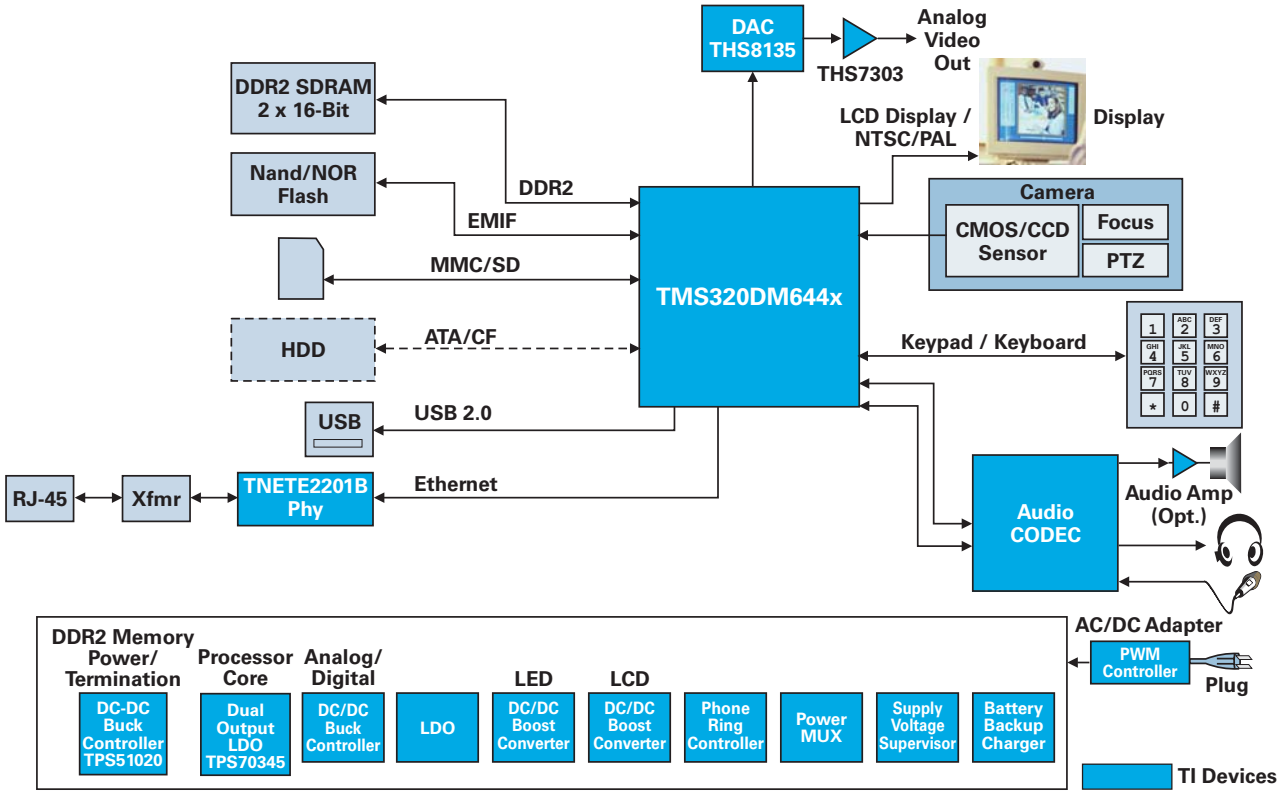
TI's high-performance, dual-core, DaVinci™ technology-based IP Videophone solutions enable a number of features including real-time audio/video synchronization; call control, three-way video conferencing; OS support, browser support and more. As shown in the diagram below, TI's DaVinci technology-based TMS320DM644x generation of digital media processors is a highly integrated, dual-core architecture that provides high processing performance, rich peripherals and maximum battery life to a IP Videophone product.

Typical IP-Based Videophone: Subcomponents

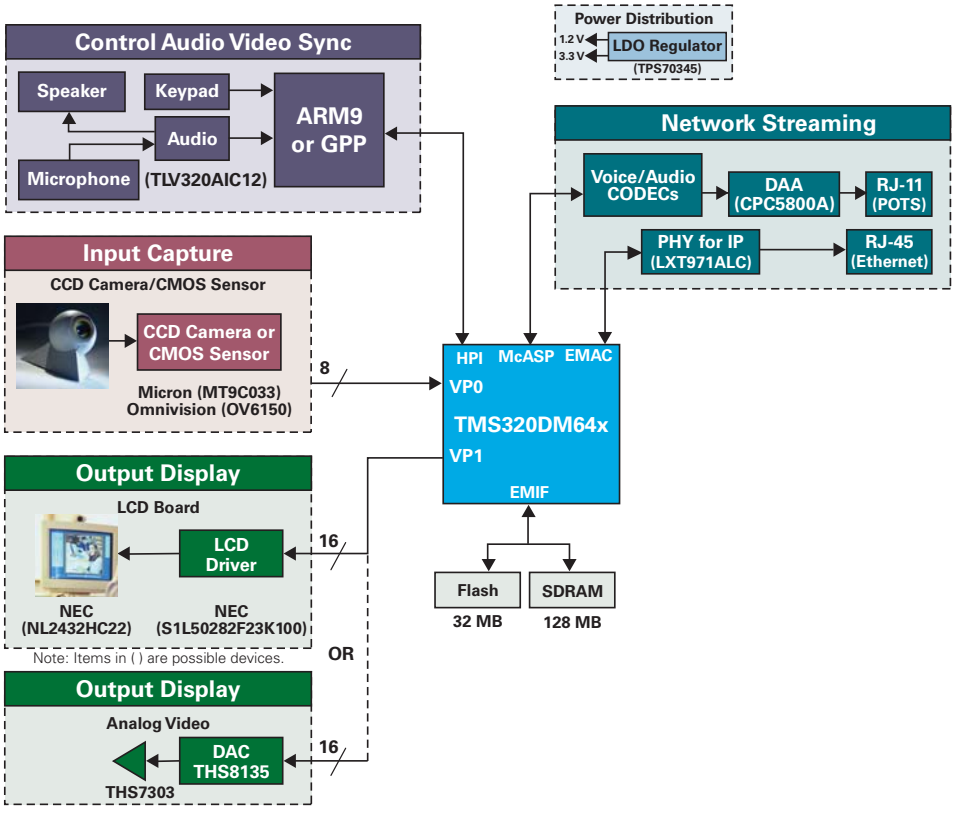


Overview

TMS320DM644x Digital Media Processor-Based Videophone System



Typical TMS320DM64x™ Digital Media Processor-Based Videophone System



High-Performance Digital Signal Processors
TMS320DM644x Digital Media Processors

Get samples, datasheets and app reports at: **www.ti.com/davinci**

The TMS320DM6446/3 leverage TI's DaVinci™ technology to meet the networked media encode and decode application processing needs of next-generation embedded devices. The DSP subsystem supports a programmable audio/video multimedia engine that provides application flexibility and support for future CODEC standards. The integrated ARM®-based application processor supports all the required call control, device drivers and network provisioning. The Video Processing subsystem supports functions such as video resizing, On Screen Display (OSD) support, and a full complement of video I/O capabilities.

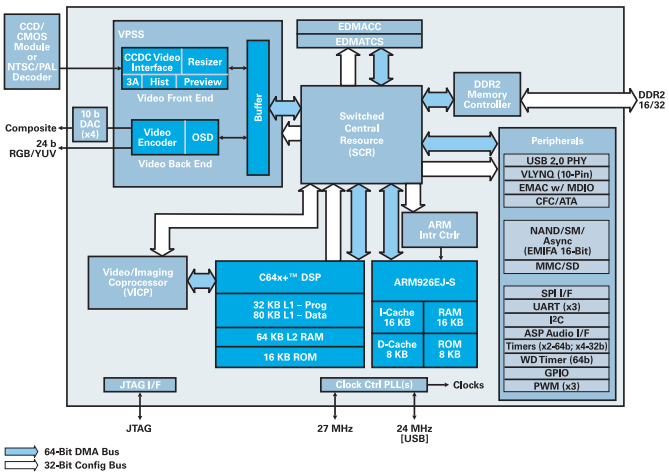
This system-on-a-chip solution reduces overall bill of material cost; thus, a cost-effective solution for IP Videophone products.

Key Features

- TMS320C64x+™ DSP performance: 600 MHz
- ARM926EJ-S performance: 300 MHz
- Video processing subsystem (VPSS) with configurable video/imaging peripheral
- Highly integrated peripherals; including video accelerators, (4) DACs, hardware OSD, USB 2.0 and more
- Advanced connectivity with 10/100 Ethernet MAC; half or duplex plus QoS support
- Ready-to-use application software such as H.264, H.263, MPEG4, G.729ab, WVM9 and more
- Supports glueless interfaces for common video and audio formats
- Performance real-time image processing, resizing, auto focus and more
- DDR2 and SDRAM support
- Packaging: 361-pin Pb-Free BGA (ZWT suffix; 0.8-mm pitch)

Applications

- Set-top boxes
- Networked digital media centers
- Home security



TMS320DM6446 digital media system-on-chip (DMSoC) block diagram

High-Performance Digital Signal Processors
TMS320DM64x™ Digital Media Processors

Get samples, datasheets and app reports at: **www.ti.com/dsp**

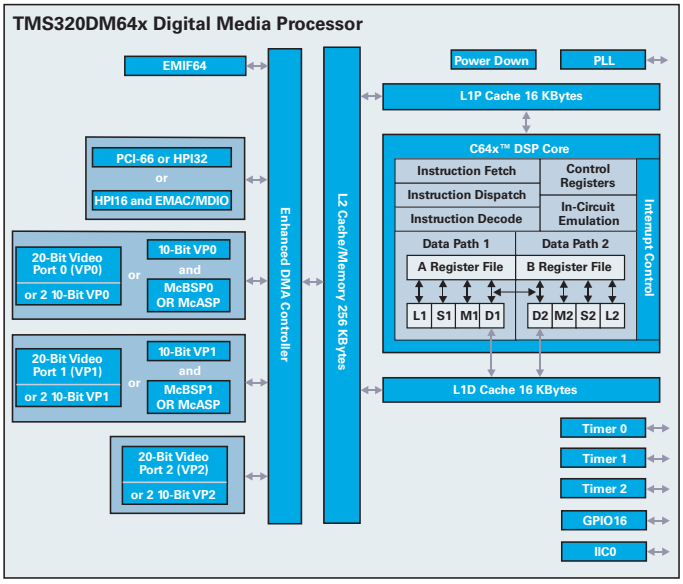
The DM64x™ digital media processors have on-chip video ports for easy connection to video devices and are capable of handling both video and audio encode/decode for IP-based video telephony applications. The single programmable digital media processor is a cost-effective solution because the need for external PCI Host Bus connectivity or 10/100 Ethernet MAC is eliminated.

Key Features

- Performance up to 5760 MIPS at 720 MHz
  - 400/500/600 MHz options also available
- Multiple input/output glueless interfaces for common video and audio formats
- Performance real-time video encoding, decoding and transcoding between CODECs – any video format to any video format
- Three dual-channel video ports – supports up to six channels of simultaneous video input/output
- Advanced connectivity with 10/100 Ethernet MAC and 66-MHz PCI
- Ready to use application software such as MPEG4, WMV9, H.264, H.263, H.261, and more
- Packaging: 548-pin BGA (23 mm^2 GDK and 27 mm^2 GNZ)

Applications

- IP-based video conferencing and IP-based videophones
- Network camera-based surveillance and IP video nodes
- Video-on-demand set-top boxes, personal video recorders and digital media centers
- Statistical multiplexers and broadcast encoders



TMS320DM64x digital media processor block diagram

Featured Products

Low-Power, Stereo Audio CODEC
TLV320AIC33

Get datasheets and app reports at: **www.ti.com/sc/device/TLV320AIC33**

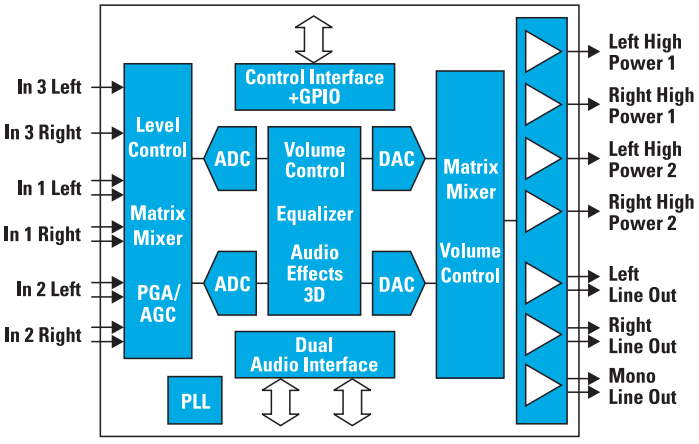
The TLV320AIC33 is a highly integrated, low-power stereo CODEC for use in a variety of portable audio equipment. The TLV320AIC33 includes six analog inputs, of which four can be configured as differential inputs. The TLV320AIC33 also has seven output drivers and targets cellular telephony applications. The TLV320AIC33 includes three line output drivers and four high-power amplifiers that can be configured as stereo headphone drivers or stereo speaker drivers.

Key Features

- Stereo DAC (100 dBA) and ADC (92 dBA) support rates up to 96 kSPS
- 14-mW power dissipation with stereo playback at 48 kSPS
- Stereo headphone drivers and 500-mW, 8-Ω speaker driver
- Stereo microphone preamps and hardware automatic gain control
- Digital microphone interface for low-noise microphone input
- Integrated PLL for flexible audio clock generation
- Programmable digital audio bass/treble/EQ with 3D effects
- Analog inputs are configurable as single-ended or fully differential
- Dual I²S™/PCM bus architecture with DSP and TDM modes
- 10 analog input pins, seven output drivers for easy connectivity to multiple devices in a cellular telephony system
- Packaging: 5 × 5 mm 80-ball BGA
  7 × 7 mm 48-pin QFN

Applications

- Cellular and smart phones
- Digital still cameras, digital video cameras
- MP3 and portable media players
- PDAs



TLV320AIC33 block diagram

Low-Power Voice-Band Converters
TLV320AIC12K, TLV320AIC14K, TLV320AIC20K, TLV320AIC24K

Get samples, datasheets and evaluation modules at:
www.ti.com/sc/device/PARTnumber
(Replace **PARTnumber** with **TLV320AIC12K**, **TLV320AIC14K**, **TLV320AIC20K** or **TLV320AIC24K**)

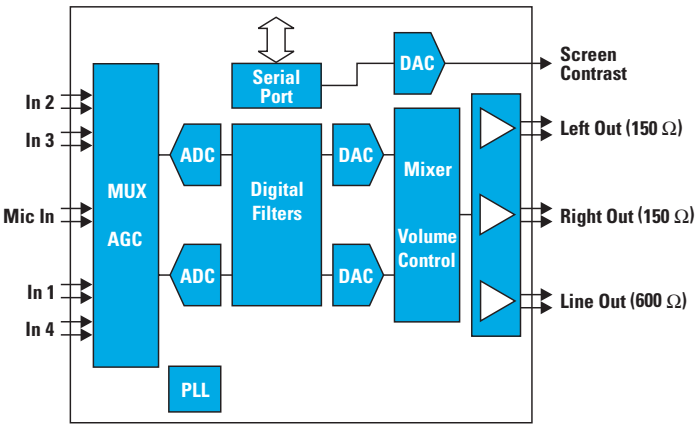
The TLV320AIC12K/14K are single-channel, low-power voice-band CODECs typically used in voice-only applications. The TLV320AIC12K integrates a 16-Ω speaker driver. The TLV320AIC20K/24K are dual-channel, low-power voice-band CODECs typically used in voice-only applications. The TLV320AIC20K integrates an 8-Ω speaker driver.

Key Features

- 16-bit, programmable sampling rate up to 26 kSPS
- Built-in microphone bias/preamp, handset/headset preamps, anti-aliasing filter and programmable gain amplifier
- Flexible host port: I²C or S²C
- SMARTDM serial port
- 10-mW typical power dissipation ('AIC12K/14K)
- 20-mW typical power dissipation ('AIC20K/24K)
- 16-Ω/8-Ω speaker driver (only on 'AIC12K/20K)
- Packaging: 30-pin TSSOP ('AIC12K/14K)
  48-pin TQFP ('AIC20K/24K)

Applications

- Low-power, portable voice products
- Voice over IP phone (VoIP)
- Digital telephony
- Speakerphones



TLV320AIC24K block diagram

Low-Power, Stereo Audio CODECs
TLV320AIC32, TLV320AIC31

Get samples, datasheets, evaluation modules and app reports at: **www.ti.com/sc/device/TLV320AIC32** or **www.ti.com/sc/device/TLV320AIC31**

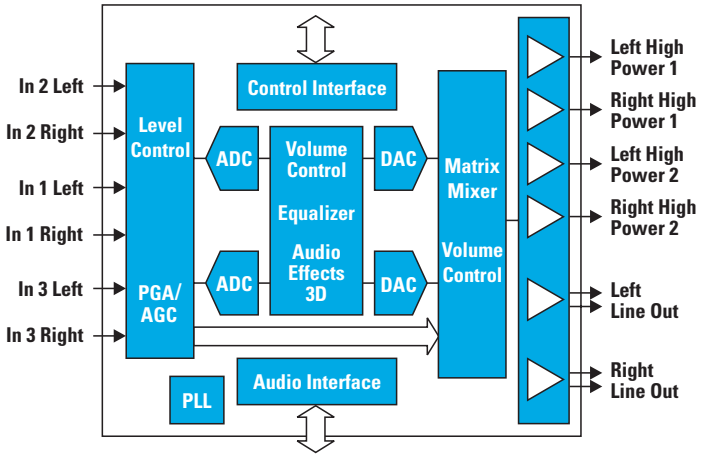
The TLV320AIC32/TLV320AIC31 are highly integrated, low-power stereo CODECs for use in a variety of portable audio equipment. The TLV320AIC32 includes six single-ended analog inputs. The TLV320AIC31 includes two single-ended analog inputs and two differential analog inputs. Both CODECs have six output drivers. They also include two line output drivers and four high-power amplifiers that can be configured as stereo headphone drivers or stereo speaker drivers.

Key Features

- Stereo DAC (100 dBA) and ADC (92 dBA) support rates up to 96 kSPS
- 14-mW power dissipation with stereo playback at 48 kSPS
- Stereo headphone drivers and 500-mW, 8-Ω speaker driver
- Stereo microphone preamps and hardware automatic gain control
- Integrated PLL for flexible audio clock generation
- Programmable digital audio bass/treble/EQ with 3D effects
- Analog inputs are configurable as single-ended (AIC32/AIC31) or fully differential (AIC31 only)
- Up to six analog inputs, six output drivers for easy connectivity to multiple devices in a cellular telephony system
- Packaging: 5 × 5 mm 32-pin QFN

Applications

- Cellular and smart phones
- Digital still cameras, digital video cameras
- MP3 and portable media players
- PDAs
- Talking toys and toys with audio



TLV320AIC32 block diagram

Overview

In This Section

For detailed information about video conferencing terminal components featured in this section:

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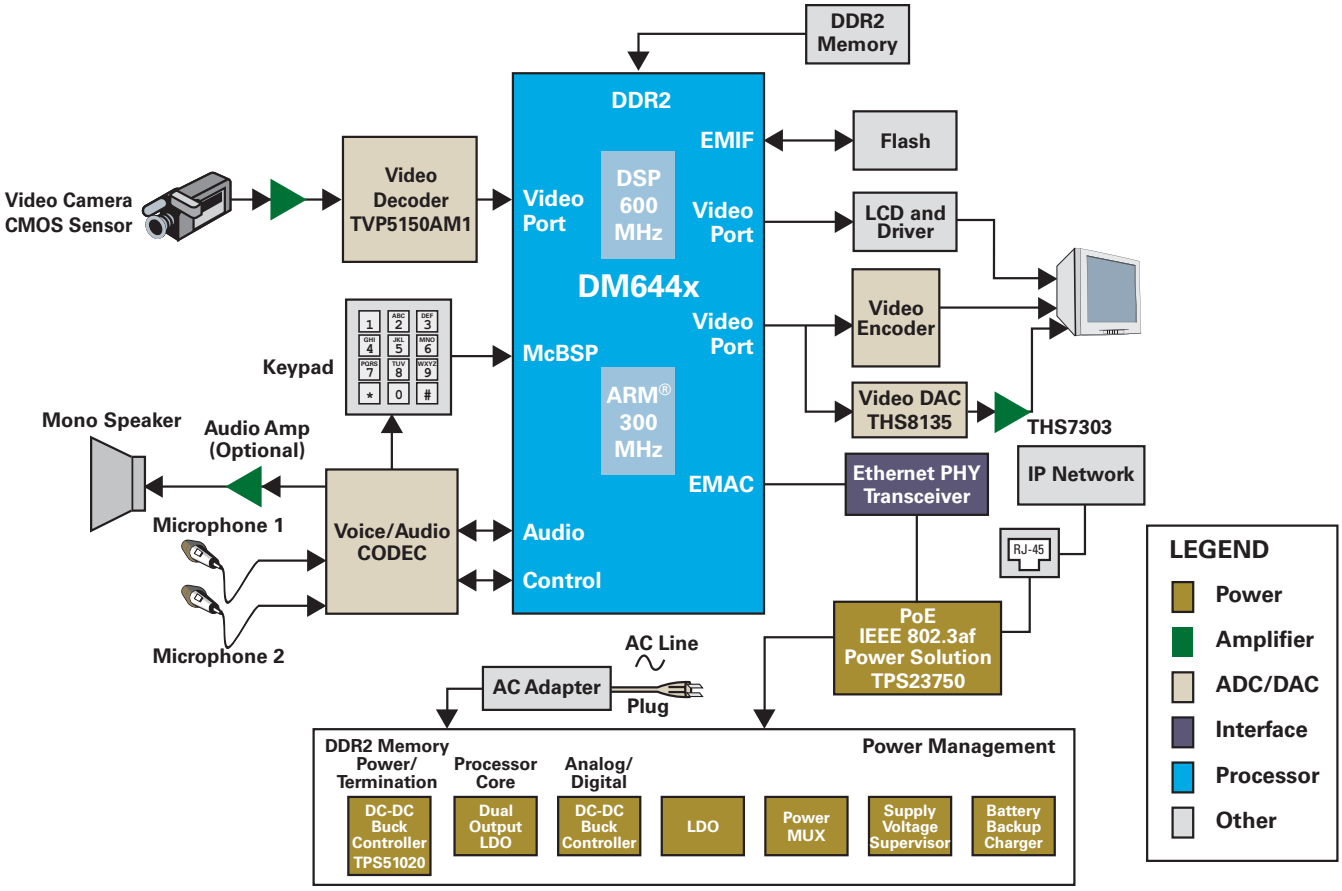
TLV320AIC12K/TLV320AIC14K/TLV320AIC20K/TLV320AIC24K: Low-Power Voice-Band Converters	57

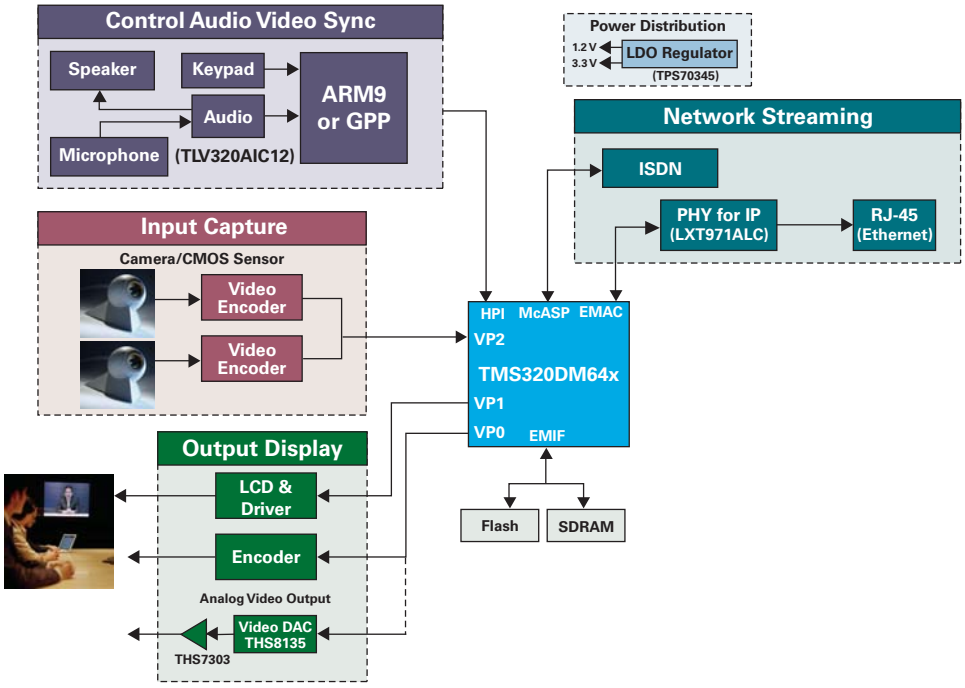
Video conferencing client endpoints are terminals that can be used to make point-to-point calls. It typically consists of a camera and a base unit that performs video compression algorithms to reduce network bandwidth and transmits the stream via IP or ISDN networks.

Texas Instruments video conferencing client endpoint solutions are based on the high-performance DM64x™ and DM644x digital media processors which have integrated on-chip video ports for easy hookup to a multitude of video devices. The DM64x and DM644x generations are capable of simultaneously handling both audio and video encode/decode for IP-based video conferencing client applications. Cost-competitive video algorithms, including the H.263 and H.264 baseline profile suite of video CODECs, are available through our Third Party Network. Audio CODECs are also available including G.72x algorithms.

Typical TMS320DM644x-Based Video Conferencing Terminal Block Diagram



TMS320DM64x™ Digital Media Processor-Based Video Conferencing Terminal Block Diagram



Featured Products

High-Performance Digital Signal Processors
TMS320DM644x Digital Media Processor

Get samples, datasheets and app reports at: **www.ti.com/davinci**

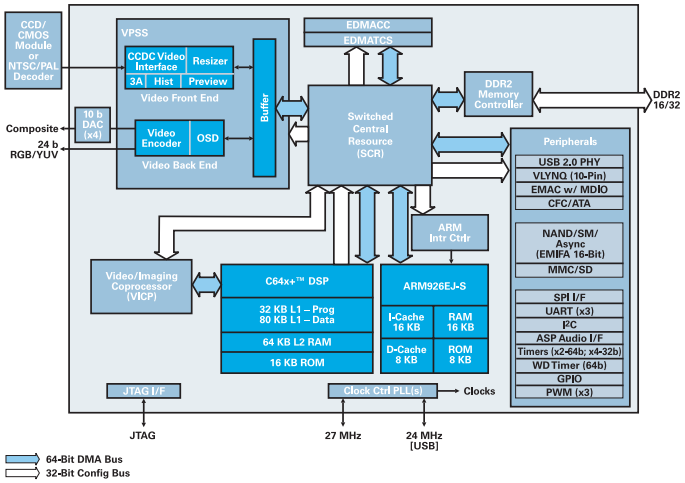
The TMS320DM6446/3 leverage TI's DaVinci™ technology to meet the networked media encode and decode application processing needs of next-generation embedded devices. The DSP subsystem supports a programmable audio/video multimedia engine that provides application flexibility and support for future CODEC standards. The integrated ARM®-based application processor supports all the required call control, device drivers and network provisioning. The Video Processing subsystem supports functions such as video resizing, On Screen Display (OSD) support, and a full compliment of video I/O capabilities.

Key Features

- TMS320C64x+™ DSP performance: 600 MHz
- ARM926EJ-S performance: 300 MHz
- Video processing subsystem (VPSS) with configurable video/imaging peripheral
- Highly integrated peripherals; including video accelerators, (4) DACs, hardware OSD, USB 2.0 and more
- Advanced connectivity with 10/100 Ethernet MAC; half or duplex plus QoS support
- Ready-to-use application software such as H.264, H.263, MPEG4, G.729ab, WVM9 and more
- Supports glueless interfaces for common video and audio formats
- Performance real-time image processing, resizing, auto focus and more
- DDR2 and SDRAM support
- Packaging: 361-pin Pb-Free BGA (ZWT suffix; 0.8-mm pitch)

Applications

- Set-top boxes
- Networked digital media centers
- Home security



TMS320DM6446 digital media system-on-chip (DMSoC) block diagram

High-Performance Digital Signal Processors
TMS320DM64x™ Digital Media Processors

Get samples, datasheets and app reports at: **www.ti.com/dsp**

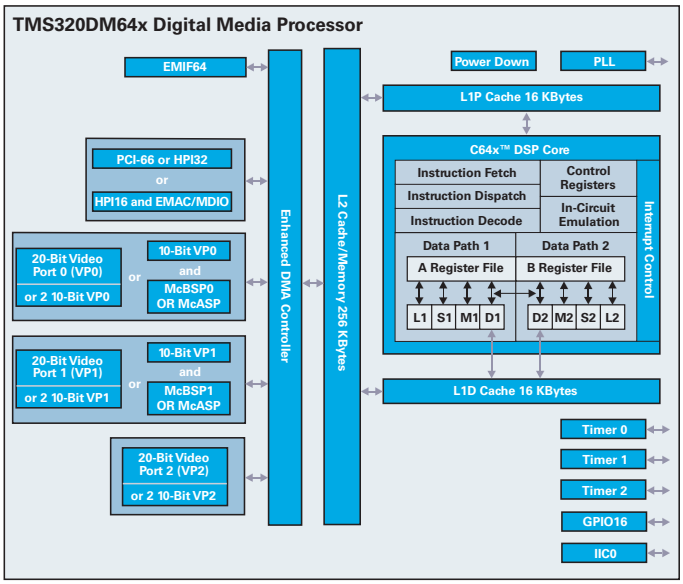
The DM64x™ digital media processors have on-chip video ports for easy connection to video devices and are capable of handling both video and audio encode/decode for IP-based video telephony applications. The single programmable digital media processor is a cost-effective solution because the need for external PCI Host Bus connectivity or 10/100 Ethernet MAC is eliminated.

Key Features

- Performance up to 5760 MIPS at 720 MHz
  - 400/500/600 MHz options also available
- Multiple input/output glueless interfaces for common video and audio formats
- Performance real-time video encoding, decoding and transcoding between CODECs – any video format to any video format
- Three dual-channel video ports – supports up to six channels of simultaneous video input/output
- Advanced connectivity with 10/100 Ethernet MAC and 66-MHz PCI
- Ready to use application software such as MPEG4, WMV9, H.264, H.263, H.261, and more
- Packaging: 548-pin BGA (23 mm^2 GDK and 27 mm^2 GNZ)

Applications

- IP-based video conferencing and IP-based videophones
- Network camera-based surveillance and IP video nodes
- Video-on-demand set-top boxes, personal video recorders and digital media centers
- Statistical multiplexers and broadcast encoders



TMS320DM64x digital media processor block diagram

Low-Power, Stereo Audio CODEC
TLV320AIC33

Get datasheets and app reports at: **www.ti.com/sc/device/TLV320AIC33**

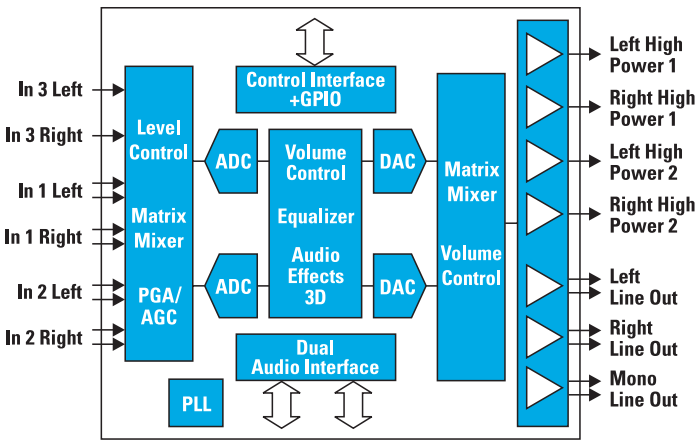
The TLV320AIC33 is a highly integrated, low-power stereo CODEC for use in a variety of portable audio equipment. The TLV320AIC33 includes six analog inputs, of which four can be configured as differential inputs. The TLV320AIC33 also has seven output drivers and targets cellular telephony applications. The TLV320AIC33 includes three line output drivers and four high-power amplifiers that can be configured as stereo headphone drivers or stereo speaker drivers.

Key Features

- Stereo DAC (100 dBA) and ADC (92 dBA) support rates up to 96 kSPS
- 14-mW power dissipation with stereo playback at 48 kSPS
- Stereo headphone drivers and 500-mW, 8-Ω speaker driver
- Stereo microphone preamps and hardware automatic gain control
- Digital microphone interface for low-noise microphone input
- Integrated PLL for flexible audio clock generation
- Programmable digital audio bass/treble/EQ with 3D effects
- Analog inputs are configurable as single-ended or fully differential
- Dual I²S™/PCM bus architecture with DSP and TDM modes
- 10 analog input pins, seven output drivers for easy connectivity to multiple devices in a cellular telephony system
- Packaging: 5 × 5 mm 80-ball BGA
  7 × 7 mm 48-pin QFN

Applications

- Cellular and smart phones
- Digital still cameras, digital video cameras
- MP3 and portable media players
- PDAs



TLV320AIC33 block diagram

Low-Power Voice-Band Converters
TLV320AIC12K, TLV320AIC14K, TLV320AIC20K, TLV320AIC24K

Get samples, datasheets and evaluation modules at:
www.ti.com/sc/device/PARTnumber
(Replace **PARTnumber** with **TLV320AIC12K**, **TLV320AIC14K**, **TLV320AIC20K** or **TLV320AIC24K**)

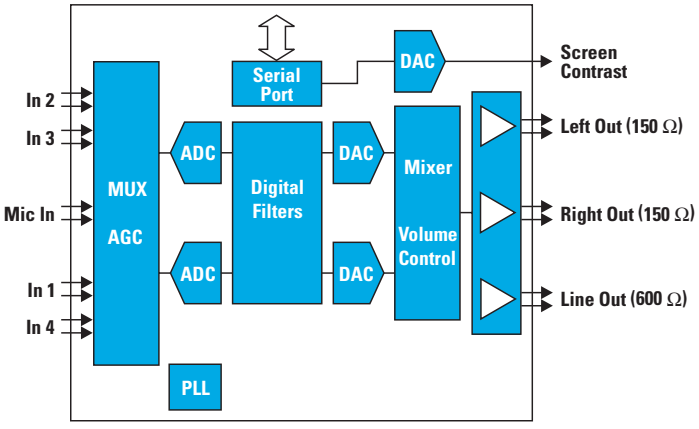
The TLV320AIC12K/14K are single-channel, low-power voice-band CODECs typically used in voice-only applications. The TLV320AIC12K integrates a 16-Ω speaker driver. The TLV320AIC20K/24K are dual-channel, low-power voice-band CODECs typically used in voice-only applications. The TLV320AIC20K integrates an 8-Ω speaker driver.

Key Features

- 16-bit, programmable sampling rate up to 26 kSPS
- Built-in microphone bias/preamp, handset/headset preamps, anti-aliasing filter and programmable gain amplifier
- Flexible host port: I²C or S²C
- SMARTDM serial port
- 10-mW typical power dissipation (AIC12K/14K)
- 20-mW typical power dissipation (AIC20K/24K)
- 16-Ω/8-Ω speaker driver (only on AIC12K/20K)
- Packaging: 30-pin TSSOP (AIC12K/14K)
  48-pin TQFP (AIC20K/24K)

Applications

- Low-power, portable voice products
- Voice-over-IP phones (VoIP)
- Digital telephony
- Speakerphones



TLV320AIC24K block diagram

Logic

Little Logic: Single-, Dual- and Triple-Gate Logic Devices

Get samples, datasheets and app reports at: **www.ti.com/littlelogic**

Little Logic offers voltage-range operating levels from 5.5-V all the way down to sub 1-V V_{CC} and can be utilized with AHC/T (5-V), LVC (3.3-V), AUP (3.3-V) and AUC (1.8-V) product families. Designs that require signal switching can take advantage of TI's CBT Little Logic families. The CBT devices provide bus switch solutions in a variety of options including CBTD for 5-V to 3.3-V translation and CBTLV for low-voltage operation. Little Logic provides packaging options in 5-, 6- and 8-pin packages, including NanoStar™ and NanoFree™, that are 70% smaller than the 5-pin SC-70 and 13% smaller than any other logic package available today.

Key Features

- 1.8-V to 5.5-V optimized performance
- Sub 1-V operation with AUC and AUP Little Logic
- World's smallest Logic package NanoStar/NanoFree
  - YEV/YZV = 4-ball NanoStar/NanoFree (0.9 mm × 0.9 mm)
  - YEP/YZP = 5-, 6- and 8-ball (see diagram below)
- Low-voltage bus switching (CBTLV)
- Pb-free offering
- Packaging: See below

Applications

- Portable media devices
- PDAs/pocket PCs
- Cellular phones
- Computing

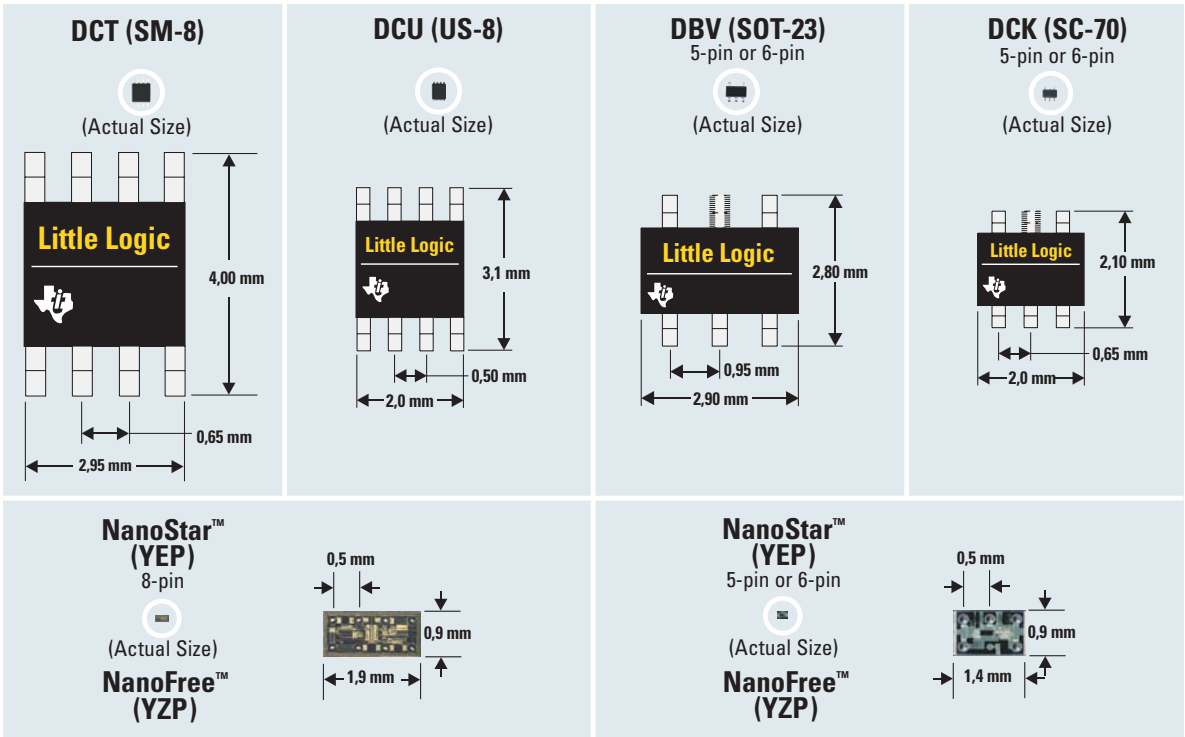
Little Logic Performance Comparisons

Family	Operating Voltage Range (V)	Optimized Voltage (V)	Propagation Delay, tpd (typ) (ns)	Output Drive (mA)	Input Tolerance (V)	IOFF Protection
AUC	0.8 to 2.7	1.8	2.0	8	3.6	Yes
AUP	0.8 to 3.6	3.3	3.5	4	3.6	Yes
LVC	1.65 to 5.5	3.3	3.5	24	5.5	Yes
AHC	2.0 to 5.5	5.0	5.0	8	5.5	No
AHCT	4.5 to 5.5	5.0	5.0	8	5.5	No
CBT	4.5 to 5.5	5.0	0.25[1]	–[2]	5.5	Yes
CBTD	4.5 to 5.5	5.0	0.25[1]	–[2]	5.5	Yes
CBTLV	2.3 to 3.6	3.3	0.25[1]	–[2]	3.6	Yes

[1]The propagation delay is the calculated RC time constant of the typical on-state resistance of the switch and the specified load capacitance, when driven by an ideal voltage source (zero output impedance). The value listed is a maximum.

[2]The FET switch has no output drive. The drive current at the output terminal is determined by the drive current of the device connected at the input terminal of the FET switch.

Space-Saving Little Logic Packages



Amplifiers—Video, Microphone Pre-Amplifiers, Digital Amplifier Power Stages

Video Amplifiers

Device	Description	Ch.	SHDN	Supply Voltage (V)	–3dB at G = +2 Bandwidth (MHz)	0.1dB Gain Flatness (MHz)	Differential Gain (%)	Differential Phase (°)	Slew Rate (µV/s)	Offset Voltage (mV)(max)	IQ Per Ch. (mA) (typ)	Input Voltage Range (V)	RRO	Package(s)	Price[1]
OPAy690	VFB	1, 2, 3	Y	±5, +5	220	30	0.06	0.03	1800	4	5.5	±3.5	N	SOT23, SOIC	1.35
OPAy355	VFB	1, 2, 3	Y	2.5 to 5.5	200	75	0.02	0.05	300	9	8.3	–0.1 to 3	Y	SOT23, SOIC, MSOP, TSSOP	0.90
OPAy356	VFB	1, 2	N	2.5 to 5.5	200	75	0.02	0.05	300	9	8.3	–0.1 to 3	Y	SOT23, SOIC, MSOP	0.90
OPAy354	VFB	1, 2, 4	N	2.5 to 5.5	100	40	0.02	0.09	150	8	4.9	–0.1 to 5.4	Y	SOT23, SOIC, MSOP, TSSOP	0.75
OPAy357	VFB	1, 2	Y	2.5 to 5.5	100	40	0.02	0.09	150	8	4.9	–0.1 to 5.4	Y	SOT23, SOIC, MSOP	0.75
OPAy358	VFB	1	Y	2.7 to 3.3	40	12	0.3	0.7	55	6	5.2	–0.1 to 2.3	Y	SC-70	0.45
OPA360	VFB, G = 2, SAG correction, low-pass filter	1	Y	2.7 to 3.3	N/A	5	0.5	1	N/A	N/A	6	1.8	Y	SC-70	0.49
OPA361	VFB, G = 5.22, LPF for use with OMAP2420	1	Y	2.7 to 3.3	N/A	5	0.5	1	N/A	N/A	6	0.58	Y	SC-70	0.49
OPA656	VFB	1	N	±5	200	30	0.02	0.05	290	1.8	14	–4/+2.5	N	SOT23, SOIC	3.35
OPA842	VFB, CCD video	1	N	±5, +5	150	56	0.003	0.008	400	1.2	20.2	±3.2	N	SOT23, SOIC	1.55
SN10501/2/3	VFB	1, 2, 3	N	3 to 15	100	50	0.007	0.007	900	13	14	1.1 to 13.9	Y	SOT23, SOIC, MSOP	0.70
OPA695	CFB	1	Y	±5, +5	1400	320	0.04	0.007	4300	3	12.9	±3.3	N	SOT23, SOIC	1.35
THS3201	CFB	1	N	±5, +7.5	850	380	0.008	0.007	6200	3	14	±2.5	N	SOT23, SOIC, MSOP	1.60
THS3202	CFB	2	N	±5, +7.5	975	380	0.008	0.03	4400	3	14	±2.6	N	SOIC, MSOP	2.90
OPAy694	CFB	2	N	±5	690	—	0.03	0.015	1700	4.1	5	±2.5	N	SOIC, SOT23	1.25
OPAy691	CFB	1, 2, 3	Y	±5, +5	225	90	0.07	0.02	2100	2.5	5.1	±3.5	N	SOT23, SOIC	1.45
OPAy684	CFB	1, 2, 3, 4	Y	±5, +5	160	19	0.04	0.02	820	3.5	1.7	±3.75	N	SOT23, SOIC	1.35
OPAy683	CFB	1, 2	Y	±5, +5	150	37	0.06	0.03	540	1.5	0.9	±3.75	N	SOT23, SOIC	1.20
OPA693	CFB, G = 2	1	Y	±5, +5	700	200	0.03	0.01	2500	2	13	±3.4	N	SOT23, SOIC	1.30
OPAy692	CFB, G = 2	1, 3	Y	±5, +5	240	120	0.07	0.02	2000	2.5	5.1	±3.5	N	SOT23, SOIC	1.15
OPAy820	VFB	1, 4	N	±.5, ±5	230	—	0.01	0.03	240	0.75	5.6	0.9 to 4.5	N	SO-8, SOT23	0.90
OPAy830	VFB	1, 2, 4	N	+2.8, ±5.5	110	—	0.07	0.17	600	7	4.25	–0.45 to 1.2	Y	SO-8, SOT23	0.75
OPAy832	VFB, fixed gain	1, 2, 3	N	+2.8, ±5	80	—	0.1	0.16	350	7	4.25	–0.5 to 1.5	Y	SO-8, SOT23	0.70
THS7303	Low power	3	Y	2.7 to 5.5	N/A	7.7	0.3	007	300	25	5	0 to 1.6	Y	TSSOP-20, QFN	1.65
THS7313	3-channel	3	N	2.7 to 5	N/A	7.6	0.1	0.1	300	25	7.2	0.01 to 2.45	Y	TSSOP-20, QFN	1.55
THS7353	Low power	3	N	2.7 to 5.5	N/A	7.6	0.15	0.3	300	20	16.2	0 to 2.1	Y	TSSOP-20	1.65

[1]*Suggested resale price in U.S. dollars in quantities of 1,000.*

*New products appear in **bold red**.*

Microphone Pre-Amplifiers

Device	Channels	Shutdown	VS (min) (V)	VS (max) (V)	IQ per channel (max) (mA)	GBW (typ) (MHz)	Slew Rate (typ) (V/µs)	Vn @ 1 kHz (nV/Hz)	Single Supply	Rail-Rail	Packages[2]	Price[1]
TLV2461	1, 2, 4	Y	2.7	6	0.575	5.2	1.6	11	Y	In/Out	A,B,C,D	0.53
OPA363	1, 2	Y	1.8	5.5	0.75	7	5	17	Y	In/Out	A,B,C	0.55
LMV321	1, 2, 4	N	2.7	5.5	0.17	1	1	39	Y	Out	A,B,C,D,E	0.25
OPA348	1, 2, 4	N	2.1	5.5	0.065	1	0.5	35	Y	In/Out	A,B,C,D,E	0.43

[1]*Suggested resale price in U.S. dollars in quantities of 1,000.*
[2]*A = SOT23, B = SOIC, C = MSOP, D = TSSOP, E = SC-70*

Digital Amplifier Power Stages

Device	Power	Channels	Sample Frequency	Dyn. Range	THD+N	Package	Price[1]
TAS5122	30 W (6 R)	2	32 to 102	102	< 0.1	56 TSOP	See web
TAS5142	100 W (6 R)	2	32 to 102	102	< 0.1	56 TSOP	See web

[1]*Suggested resale price in U.S. dollars in quantities of 1,000.*

Audio Power Amplifiers—Digital Audio Processors—Video Phase-Locked Loops

Audio Power Amplifiers

Device	Description	Stereo/ Mono Speaker Drive	Stereo/ Mono Head-phone Drive	Output Power (W)	V_{CC} (V) (min)	V_{DD} (V) (max)	THD+N at 1 kHz (%)	PSRR (dB)	IQ Per Ch. (mA) (typ)	ISD (µA)	Load Impe-dance (Ω)	Depop	Mute	SHDN (Active Low/ High)	Int. Gain	DC Volume Control	Package(s)	Package Symbol-ization	Price[1]
TPA3001D1	Mono, Class-D, Differential Input	M	—	20	8	18	0.1	73	8	1	4	✔	—	L	✔	—	TSSOP	TPA3000D1	2.82
TPA3002D2	Stereo, Class-D, Differential Input	S	—	9	8.5	14	0.06	80	10	4	8	✔	—	L	—	✔	PHP	TPA3002D2	3.49
TPA3004D2	Stereo, High Power, Class-D with Volume Control	S	—	12	8.5	18	0.1	80	8	1	4	✔	—	L	—	✔	PHP	TPA3004D2	3.60
TPA6110A2	Stereo, Headphone, Pin Compatible with LM4881	—	S	0.15	2.5	5.5	0.25	83	0.75	10	16	✔	—	H	—	—	MSOP	AIZ	0.39
TPA6030A4	Stereo, Headphone Driver, High Supply Voltage	S	S	3	7	15	0.06	60	18	1	16	✔	—	L	—	✔	TSSOP	TPA6030A4	1.33
TPA3008D2	Stereo, Medium Power, Class-D Amplifier	S	—	10	8.5	18	0.1	80	11	1.6	8	✔	—	L	✔	—	HTQFP	TPA3008D2	3.10
TPA3005D2	Stereo, Medium Power, Class-D	S	—	6	8.5	18	0.1	80	10	1	8	✔	—	L	✔	—	PHP	TPA3005D2	3.00
TPA2008D2	Stereo, High Power, 5 V, Filter-Free Class-D with Volume Control	S	—	3	4.5	5.5	0.05	70	7	0.05	3	✔	—	L	—	✔	TSSOP	TPA2008D2	1.80
TPA6011A4	Stereo, Class-AB with Volume Control and Stereo Headphone Drive	S	S	2.6	4.0	5.5	0.06	70	3.8	1	3	✔	—	L	—	✔	TSSOP	TPA6011A4	1.20
TPA4411	Cap-Free Stereo Headphone Amplifier	—	S	0.08	1.8	4.5	0.08	80	3.5	0.1	16	✔	—	L	✔	—	WCSP QFN	AKT AKQ	0.70
TPA3100D2	20-W Stereo Class-D Audio Power Amplifier	S	—	20	10	26	0.1	80	20	300	4	✔	✔	L	✔	—	QFN	TPA3100D2	3.50
TPA3101D2	10-W Stereo Class-D Audio Power Amplifier	S	—	10	10	26	0.1	80	20	300	4	✔	✔	L	✔	—	GFN	TPA3101D2	TBD
TPA3200D1	Mono, High Power, Digital Input, Class-D Audio Amplifier	M	—	20	8	18	0.1	73	8	1	4	✔	✔	L	✔	—	HTSSOP	TPA3200D1	2.95
TPA3300D2	20W Stereo Digital Amplifier Power Stage	S	—	20	10	26	TBD	TBD	TBD	TBD	4	Yes	—	Yes	—	No	QFP	TPA3300D2	TBD

[1] *Suggested resale price in U.S. dollars in quantities of 1,000.*

*Preview products appear in **bold blue**.*

*New products appear in **bold red**.*

Adjustable Digital Delay ICs

Device	Digital Ports	Audio Channels	Max Delay Time p/Channel	Control	V_{CC} (V) (typ)	Package	Pins	Package Symbolization
TPA5050	1	2	170	I^2C	3.3	QFN	16	TPA5050
TPA5051	2	4	85	I^2C	3.3	QFN	16	TPA5051
TPA5052	1	2	170	Pin Selectable	3.3	QFN	16	TPA5052

*Preview products appear in **bold blue**.*

Digital Audio Processors

Device	MIPs	Processing Channels	Processing Bits/ Accumulator	I/O Resolution	Dynamic Range	Bi-Quads per Channel	Compression/ Limiting	Loudness	Package	Price[1]
TAS3004	100	2	32/56	16 to 24	100 dB	7	Yes	Yes	PQFP-48	3.55
TAS3103A	540	3	48/76	16 to 32	N/A	20	Yes	Yes	PSOP-32	4.15

[1] *Suggested resale price in U.S. dollars in quantities of 1,000.*

Digital Audio PWM Processors

Device	Channels	Sample Frequencies	Dynamic Range	Audio Controls	THD+N (%, System Performance)	Bits	Package	Price[1]
TAS5504	4	32 to 192	100	Volume, Audio Filters	<0.01	16, 20, 24	PQFP-64	See web
TAS5010	2	32 to 192	96	—	< 0.08	16, 20, 24	PQFP-48	3.00
TAS5012	2	32 to 192	102	—	< 0.08	16, 20, 24	PQFP-48	5.55

[1] *Suggested resale price in U.S. dollars in quantities of 1,000.*

Video Phase-Locked Loops (PLLs)

Part Number	Status	Supply Voltage(s) (V)	5-V Lock Frequency x1 Output (MHz)	5-V Lock Frequency x1/2 Output (MHz)	3-V Lock Frequency x1 Output (MHz)	3-V Lock Frequency x1/2 Output (MHz)	Pins/ Package	Price[1]	Description
TLC2932A	Active	3 or 3.3 or 5	15 to 55	7.5 to 27.5	13 to 32	6.5 to 16	14 TSSOP	1.50	Phase-Locked Loop Systems
TLC2933A	Active	3 or 3.3 or 5	43 to 110	21.5 to 55	30 to 55	15 to 27.5	14 TSSOP	1.50	Phase-Locked Loop

[1] *Suggested resale price in U.S. dollars in quantities of 1,000.*

*New products appear in **bold red**.*

Clock Drivers

Device	Description	# Pins/Pkg	I/O Levels (Input/Output)	Frequency (MHz)	V_{CC} (V)	SSC	Jitter (Cycle-to-Cycle)	Pulse Skew tsk(p) (max) (ns)	Output Skew tsk(o) (max) (ns)	Char Temp (°C)	Price[1]
Clock Synthesizer/Drivers for Motherboard Applications											
CDC924	PC MB CLK synthesizer/driver, 133-MHz max. freq w/ spread spectrum clock tracking	56/SSOP	LVTTL/LVTTL	14.318, 16.67, 33.3, 48, 50, 66, 100, 133	2.5/3.3	Y	700 ps (REF, fcpu = 100 or 133 MHz)	4 (PCI, PCIF, fPCI = 33 MHz)	0.3	0–85	2.11
CDC925	PC MB clk synthesizer/driver, SSC	56/SSOP	LVTTL/LVTTL	14.318, 16.67, 33.3, 48, 50, 66, 100, 133	2.5/3.3	Y	700 ps (REF, fcpu = 100 or 133 MHz)	4 (PCI, PCIF, fPCI = 33 MHz)	0.3	0–85	2.41
CDC930	PC MB differential syn/dri w/133-MHz freq max. w/ spread spectrum	56/SSOP	LVTTL/HCSL, LVTTL	14.318, 33.3, 48, 50, 66, 100, 133	3.3	Y	500 ps (PCI fPCI = 33.3 MHz)	—	0.5	0–85	1.46
CDC950	133-MHz diff clock syn/dri for PC motherboards w/ 3-state outputs, SSC	48/TSSOP	LVTTL/HCSL, LVTTL	14.318, 33.3, 48, 100, 133	3.3	Y	See data sheet	—	0.07 (typ)	0–85	1.50
Device	Description	# Pins/Pkg	I/O Levels (Input/Output)	Frequency (MHz)	V_{CC} (V)	SSC	Jitter (Cycle-to-Cycle)		Output Skew tsk(o) (max) (ns)	Char Temp (°C)	Price[1]
Video Clock Drivers											
CDC2509C	1:9 PLL clock driver w/ spread spectrum clock tracking	24/TSSOP	LVTTL/LVTTL	25 to 125	3.3	Y	max |100| ps (66–100 MHz)		0.2	0–85	2.28
CDC2510C	1:10 PLL clock driver w/ spread spectrum clock tracking	24/TSSOP	LVTTL/LVTTL	25 to 125	3.3	Y	max |100| ps (66–100 MHz)		0.2	0–85	2.27
CDCV850	1:10 PLL clock driver for DDR SDRAM application, SSC compatible w/ two-line serial interface	48/TSSOP	HCSL, universal (except ECL)/ SSTL-II	60 to 140	2.5/3.3	Y	±30 ps min/max (100, 133 MHz)		0.075	0–85	2.25
CDCV855	1:4 (plus feedback pair) PLL differential clock driver for DDR applications, SSC	28/TSSOP	SSTL-II/SSTL-II, LVTTL	60 to 180	2.5	Y	±180 ps min/max (66 MHz) ±75 ps min/max (100–167 MHz)		0.075	0–85	1.77
CDCVF2505	1:5 PLL clock driver for general purpose, SSC	8/TSSOP/ SOIC	LVTTL/LVTTL	24 to 200	3.3	Y	70 ps typ and 150 ps max (66–200 MHz) 200 ps typ and 400 ps max (24–50 MHz)		0.15	–40–85	0.88
CDCR61A	400-MHz Direct Rambus® clock generator-lite, SSC	16/TSSOP	CMOS/RSL	300, 400	1.8/3.3	—	—		—	0–85	1.79
CDCR83A	400-MHz Direct Rambus clock generator, SSC	24/SSOP	CMOS/RSL	267 to 400	3.3	Y	—		—	0–85	2.53
CDCFR83A	533-MHz Direct Rambus clock generator, SSC	24/SSOP	CMOS/RSL	287 to 533	3.3	Y	—		—	0–85	2.92
CDCM1802	Clock buffer w/ programmable divider, LVPECL I/O + additional LVCMOS output	16/QFN	LVDS, LVPECL, LVTTL/ LVCMOS, LVPECL	800	3.3	—	—		—	0–85	5.00
CDCM1804	1:3 LVPECL clock buffer & addl LVCMOS output & programmable divider	24/QFN	CML, HSTL, LVDS, LVPECL,SSTL-II,VML/ LVCMOS, LVPECL	800	3.3	—	—		—	0–85	7.50
CDCM7005	3.3-V high-performance clock synchronizer and jitter cleaner	48/QFN 64/BGA	LVCMOS/LVPECL	0 to 1500	3.3	—	< 1 ps rms		0.06	–40–85	10.75
CDCD5804	Rambus® XDR™ clock generator	28/TSSOP	SSTL-2/SSTL-2	400 to 800	2.5		30 ps (636 to 800 MHz); 40 ps (400 to 635 MHz)		TBD	0–70	TBD
CDCE906	Programmable 3-PLL clock synthesizer/ multiplier/divider	20/TSSOP	LVCMOS/LVCMOS	54 to 167	3.3	Y	60 ps		150	0–70	2.60
CDCVF857	2.5-V phase-lock loop DDR clock driver	40/QFN, 48/TSSOP, 56/BGA	SSTL-II, SSTL-II	60 to 220	2.3–2.7	Y	50		—	0–85	3.15
CDC5806	6-output PLL frequency generator	20/TSSOP	LVTTL/LVTTL	12 to 74	3–3.6	—	—		—	0–85	2.15
CDC7005	High-performance, low-phase noise, low skew clock synchronizer	64/BGA	LVCMOS /LVPECL	10 to 800	3.3	—	< 1 ps rms		0.05	–40–85	10.00

[1] *Suggested resale price in U.S. dollars in quantities of 1,000.*

Note: See data sheets for rise and fall times.

New products appear in ***bold red****.*

Data Converters

High-Speed Analog-to-Digital Converters (ADCs)

Device	Resolution (bits)	Sample Rate (MSPS)	Supply (V)	Analog Inputs	Power (typ) (mW)	Analog Input BW (MHz)	DNL (max) (±LSB)	INL (max) (±LSB)	SNR (dB)	Output Format	Packaging	Price[1]
TLV5535	8	35	3.3	1	90	600	1.3	1.5	46		TSSOP	2.40
ADS5103	10	40	1.8	1	105	950	0.6	2	59		TQFP	5.25
ADS5102	10	65	1.8	1	160	950	1	2	58		TQFP	7.10
ADS828	10	75	5	1	315	300	1	3	58		SSOP	8.70
ADS5410	12	80	1.8, 3.3	1	360	1000	1	2	65		TQFP	19.00
ADS931	8	30	3 to 5	1	69	100	1	2.5	48		SSOP	2.20
ADS930	8	30	3 to 5	1	66	100	1	2.5	46		SSOP	2.27
ADS5240	12	40	3.3	4	593	300	—	—	70.5	Serial LVDS	HTQFP-64	25.00
ADS5242	12	65	3.3	4	683	300	—	—	70.5	Serial LVDS	HTQFP-64	32.50
ADS5522	12	80	3.3	1	660	750	0.3	0.9	70	Parallel	HTQFP-48	16.70
ADS5542	14	80	3.3	1	670	750	0.6	2.5	72	Parallel	HTQFP-48	25.00
ADS5545	14	170	3.3	1	1100	—	—	—	73.5	DDR LVDS & Parallel	48-QFN	62.50
ADS5546	14	190	3.3	1	1130	—	—	2.5	73.2	DDR LVDS & Parallel	48-QFN	72.50

[1]*Suggested resale price in U.S. dollars in quantities of 1,000.*

*New products appear in **bold red**.*

High-Speed Digital-to-Analog Converters (DACs)

Device	Resolution (bits)	Supply (V)	Rate (MSPS)	Time (ns)	Number of DACs	Power (typ) (mW)	DNL (max) (±LSB)	INL (max) (±LSB)	SNR dB	Packaging	Price[1]
DAC908	8	3 to 5	165	30	1	170	0.5	0.5	—	28 SOIC, 28 TSSOP	2.90
DAC900	10	3 to 5	165	30	1	170	0.5	1	—	28 SOIC, 28 TSSOP	4.20
DAC2932	12	3	40	25	2	29	0.5	2	62	48 TQFP	8.35
DAC5662	12	3.0 to 3.6	200	20	2	330	2	2	73	48 TQFP	10.70
DAC2900	10	3.3 or 5	125	30	2	310	1	1	62	48 TQFP	6.00
DAC5662	10	3.0 or 3.6	200	20	2	290	1	0.5	63	48 TQFP	7.60

[1]*Suggested resale price in U.S. dollars in quantities of 1,000.*

*New products appear in **bold red**.*

Video ADCs

Part Number	Status	Resolution (bits)	Sample Rate (MSPS)	Supply (V)	Analog Voltage Range (V)	Analog Inputs	Power (typ) (mW)	DNL (Max) (±LSB)	INL (Max) (±LSB)	Digital Clamp	Flexible IP Range	Int/ Ext Ref	PGA	PLL	Power Down	SE/ DIF	Video Formatter	Pin/ Package	Price[1]	Description
THS8083A	Active	8	80	3.3	1.2	3	1470	1.5	2	Yes	Yes	Yes	Yes	Yes	Yes		Yes	100 HTQFP	7.45	Triple 8-bit, 80-MSPS 3.3-V YUV/RGB video & graphics digitizer w/ integ. digital PLL
TLV5734	Active	8	30	3.3	1	3	250	0.5	0.75	Yes		Yes				Yes	Yes	64 TQFP	4.75	8-bit 30-MSPS ADC triple ch., digital clamp for YUV/NTSC/ PAL, output data format MUX, low power
TVP7000	Active	10, 8	110, 150	1.8, 3.3	0.5 to 2	3	1142	1	4	Yes	Yes	Yes	Yes	Yes	Yes		Yes	100 HTQFP	4.25	10-bit, 110-MSPS triple video ADC

[1]*Suggested resale price in U.S. dollars in quantities of 1,000.*

*New products appear in **bold red**.*

Touch Screen Controllers

Device	Touch Pane	Res. (Bits)	Sample Rate (kSPS)	Interface	Features	Audio I/O	V_{REF}	Supply Voltage (V)	Package(s)	Price[1]
Touch Screen Only Parts										
ADS7843	4-Wire	12 (8)	Up to 125	Serial, SPI	X, Y, Aux	—	Ext	2.7 to 5.25	SSOP-16	1.70
ADS7845	5-Wire	12 (8)	Up to 125	Serial, SPI	X, Y, Aux	—	Ext	2.7 to 5.25	SSOP-16	4.20
ADS7846	4-Wire	12 (8)	Up to 125	Serial, SPI	X, Y, Pressure, Aux, V_{BAT}, Temp	—	Int	2.7 to 5.25	SSOP-16, TSSOP-16, QFN-16, BGA-48	2.05
TSC2000	4-Wire	8, 10, 12	Up to 125	Serial, SPI	Processor, X, Y, Pressure, V_{BAT}, Temp, Aux, DAC	—	Int	2.7 to 3.6	TSSOP-20	2.35
TSC2003	4-Wire	12 (8)	Up to 125	Serial, I^2C	X, Y, Pressure, V_{BAT}, Aux, Temp	—	Int	2.7 to 5.25	TSSOP-16	2.25
TSC2005	4-Wire	12	Up to 125	Serial, SPI	Processor, X, Y, Pressure, V_{BAT}, Temp, Aux	—	Int	1.6 to 3.6	QFN-20	TBD
TSC2006	4-Wire	12	Up to 125	Serial, I^2C	Processor, X, Y, Pressure, V_{BAT}, Temp, Aux	—	Int	1.6 to 3.6	QFN-20	TBD
TSC2046	4-Wire	12, (8)	Up to 125	Serial, SPI	X, Y, Pressure, V_{BAT}, Aux, Temp	—	Int	Analog: 2.2 to 5.25 Logic: 1.5 to 5.25	TSSOP-16, QFN-16, BGA-48	1.80
TSC2200	4-Wire	8, 10, 12	Up to 125	Serial, SPI	Processor, X, Y, Pressure V_{BAT}, Temp, KP, Aux, DAC	—	Int	2.7 to 3.6	TSSOP-28, QFN-32	2.40

Device	Description	Resolution (Bits) (max)	Dynamic Range (dB)	Sampling Rate (kHz) (max)	Configuration	Audio Data Format[1]	Power Supply (V)	Package(s)	Price[2]
CODECs + Touch Screen Controller									
TSC2100	Low-Power, Low-Cost CODEC, Amp & Touch-Screen Controller	24	97	53	Mono/Stereo	Normal, I^2S™, DSP	+2.7 to 3.6	QFN-32, TSSOP-32	3.95
TSC2101/11	Low-Power CODEC w/ HP/Spkr Amp & Touch-Screen Controller	24	95	53	Mono/Stereo	Normal, I^2S, DSP	+2.7 to 3.6	QFN-48	4.95
TSC2102	Low-Power, Low-Cost DAC, Amp & Touch-Screen Controller	24	97	53	Stereo	Normal, I^2S, DSP	+2.7 to 3.6	TSSOP-32	3.70
TSC2301	Low-Power CODEC w/ Headphone Amp & Touch-Screen Controller	20	98	48	Stereo	Normal, I^2S	+2.7 to 3.6	TQFP-64, BGA-120	4.95
TSC2302	Low-Power CODEC w/ Headphone Amp & Touch-Screen Controller	20	98	48	Stereo	Normal, I^2S	+2.7 to 3.6	QFN-48	4.50

[1]L = left justified; R = right justified; Normal = L & R.

[2]Suggested resale price in U.S. dollars in quantities of 1,000.

*Preview products are listed in **bold blue**.*

Audio ADCs

Device	Description	Resolution (Bits) (max)	Dynamic Range (dB)	Sampling Rate (kHz) (max)	Configuration	Audio Data Format[1]	Power Supply (V)	Package(s)	Price[2]
PCM1850	Stereo Audio ADC w/ 2x6 input MUX	24	100	96	Stereo	Normal, I^2S™	+3.3 and +5	TQFP-32	4.80
PCM1801	Low-Cost Audio ADC	16	93	48	Stereo	Normal, I^2S	+5	SO-14	2.27
PCM1800	CMOS, Multilevel ΔΣ	20	95	48	Stereo	Normal, I^2S	+5	SSOP-24	2.98
PCM1807	ΔΣ Audio ADC	24	99	96	Stereo	I^2S, L	+3.5 and +5	TSSOP-14	1.00
PCM1802	ΔΣ Audio ADC	24	100	96	Stereo	Normal, I^2S	+3.3 and +5	SSOP-20	3.95
PCM1803A	ΔΣ Audio ADC	24	103	96	Stereo	Normal, I^2S	+3.5 and +5	SSOP-20	1.10
PCM1804	ΔΣ Audio ADC	24	110	192	Stereo	Normal, I^2S, DSD	+3.3 and +5	SSOP-28	4.95
PCM4201	Single-Channel Low-Power ADC	24	112	100	Mono	DSP	+3.3 and +5	TSSOP-16	3.50
PCM4202/04	High-Performance Audio ADC	24	118	192	Stereo	I^2S, DSD	+3.3 and +5	SSOP-28	7.95
DACs									
PCM1780/81/82	Low-cost audio DAC w/ volume control	24	105	192	Stereo	Normal, I^2S	+5	SSOP-16	1.10

[1]L = left justified; R = right justified. *[2]Suggested resale price in U.S. dollars in quantities of 1,000.*

*Preview products are listed in **bold blue**.*

Voice and Audio CODECs

Voice CODECs

Device	CODEC Ch.	Sample Rate (kSPS)	SNR (dB)	Interface DSP	Host Interface	Analog Outputs Ω (# of Outputs)	Core Power Supply (Digital/Analog) (V)	Logic I/O (V)	Power Dissipation (w/o Spkr) (mW)	Package	Price[1]
AIC111	1	40	84	Pulse FS	SPI™/DSP	60 (1)	1.1 to 1.5	1.1 to 3.6	0.4	QFN-32, FlipChip	3.95
TLV320AIC12K	1	26	90	Pulse FS, SMARTDM™	I^2C, S^2C	600 (1), 16 (2)	1.8 / 2.7 to 3.6	2.7 to 3.6	10	TSSOP-30	2.75
TLV320AIC14K	1	26	90	Pulse FS, SMARTDM	I^2C, S^2C	600 (1)	1.8 / 2.7 to 3.6	2.7 to 3.6	10	TSSOP-30	2.35
TLV320AIC20K	2	26	90	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	TQFP-48	3.50
TLV320AIC24K	2	26	90	Pulse FS, SMARTDM	I^2C, S^2C	600 (1), 150 (2)	1.8 / 2.7 to 3.6	2.7 to 3.6	20	TQFP-48	3.40
TLV320AIC25	2	26	90	Pulse FS, SMARTDM	I^2C, S^2C	600 (1), 150 (2)	1.8 / 2.7 to 3.6	1.1 to 3.6	20	TQFP-48	3.60
TLV320AIC10	1	22	84	Frame, Pulse FS	S^2C	600 (2)	3 to 5.5	3 to 5.5	39	TQFP-48, VFBGA-80	2.11
TLV320AIC11	1	22	84	Frame, Pulse FS	S^2C	600 (2)	3 to 5.5	1.1 to 5.5	39	TQFP-48	2.11
TLC320AD545	1	11	82	Pulse FS	—	600 (1), 8 (1)	3.3 to 5	3.3 to 5	120	TQFP-48	2.97
TLV320AIC1103	1	8	45	Pulse FS, A/μ-LAW	I^2C	16 (2)	2.7 to 3.3	2.7 to 3.3	16.2	TQFP-32, VFBGA-80	2.65
TLV320AIC1106	1	8	45	Pulse FS, μ-LAW	—	8 (1)	2.7 to 3.3	2.7 to 3.3	16.2	TSSOP-20	2.55
TLV320AIC1107	1	8	45	Pulse FS, A-LAW	—	8 (1)	2.7 to 3.3	2.7 to 3.3	16.2	TSSOP-20	2.55
TLV320AIC1109	1	8	45	Pulse FS, A/μ-LAW	I^2C	16 (2)	2.7 to 3.3	2.7 to 3.3	16.2	TQFP-32	2.65
TLV320AIC1110	1	8	45	Pulse FS, A/μ-LAW	I^2C	8 (2)	2.7 to 3.3	2.7 to 3.3	16.2	TQFP-32, VFBGA-80	2.70

[1] *Suggested resale price in U.S. dollars in quantities of 1,000. For current pricing, visit www.ti.com or dataconverter.ti.com*

Audio CODECs

Device	Description	Resolution (Bits) (max)	Dynamic Range (dB)	Sampling Rate (kHz) (max)	Configuration	Audio Data Format[1]	Power Supply (V)	Package(s)	Price[2]
PCM3008	Low-Power, Low-Voltage CODEC	16	88	48	Stereo	L, R	+2.1 to 3.6	TSSOP-16	3.10
PCM3500/1	Voice/Modem Mono CODEC	16	88	26	Mono	DSP, TDM	+2.7 to 3.6	SSOP-24	2.65
PCM3006	Stereo Audio CODEC	16	93	48	Stereo	L, R	+2.7 to 3.6	SSOP-24	3.45
PCM3002/03	Low-Power CODEC	20	94	48	Stereo	I^2S, L, R	+2.7 to 3.6	SSOP-24	3.45
PCM3792A	Portable Stereo CODEC	24	95	50	Stereo	I^2S, L, R	+2.7 to 3.6	BGA-96	3.60
TLV320AIC26	Low-Power, Low-Cost CODEC w/ Headphone/Speaker Amp	24	97	53	Mono/Stereo	I^2S, L, R, DSP	+2.7 to 3.6	QFN-32	3.25
TLV320AIC28/29	Low-Power CODEC w/ Headphone/Speaker Amps	24	98	53	Mono/Stereo	I^2S, L, R, DSP	+2.7 to 3.6	QFN-48	3.95
PCM3052A	High-Performance Stereo CODEC w/ Mic Preamp, MUX, Vol Ctrl	24	104	96	Stereo	I^2S	+3.3 and +5	VQFN-32	3.20
TLV320AIC23B	Low-Power CODEC w/ Headphone Amp	24	100	96	Stereo	I^2S, L, R	+2.7 to 3.6	VFBGA-80, TSSOP-28, QFN-28	3.00
TLV320AIC31/32	Low-Power Stereo CODEC w/ Headphone/Speaker Amps	32	100	96	Stereo	I^2S, L, R, DSP, TDM	+2.7 to 3.6	QFN-32	3.45
TLV320AIC33	Low-Power Stereo CODEC w/ Headphone/Speaker Amps	32	103	96	Stereo	I^2S, L, R, DSP, TDM	+2.7 to 3.6	QFN-48, BGA-80	3.95
PCM3010	High-Performance Stereo CODEC	24	104	96/192	Stereo	I^2S, L, R	+3.3 and +5	SSOP-24	4.00

[1] *L = left justified; R = right justified; Normal = L & R.*
[2] *Suggested resale price in U.S. dollars in quantities of 1,000.*
[3] *Mono Mode.*

*Preview products are listed in **bold blue**.*
*New products are listed in **bold red**.*

DaVinci™ Digital Media Processors

Device	CPU	Frequency (MHz)	L1/ SRAM (Bytes)	L2/ SRAM (Bytes)	ROM (Bytes)	External Memory I/F	EDMA	Video Ports (Configurable)	Serial I/F	Connectivity I/F	Program/ Data Storage	Voltage (V) Core	Voltage (V) I/O	Packaging	Price[1]
TMX320**DM6446**ZWT	1 C64x+, 1 ARM9, DaVinci Video	594 (DSP) 297 (ARM)	112 K (DSP) 40 K (ARM)	64 K (DSP)	16 K (ARM)	1 16-/8-Bit EMIFA 1 32-/16-Bit DDR2	64 Ch	1 Input, 1 Output	ASP, I²C, SPI, 3 UARTs	USB 2.0, VLYNQ, 10/100 EMAC	Async SRAM, DDR2 SDRAM, NAND Flash, SmartMedia/xD	1.2	1.8/ 3.3	361 BGA, 16 × 16 mm	39.49
TMX320**DM6446**AZWT	1 C64x+, 1 ARM9, DaVinci Video	594 (DSP) 297 (ARM)	112 K (DSP) 40 K (ARM)	64 K (DSP)	16 K (ARM)	1 16-/8-Bit EMIFA 1 32-/16-Bit DDR2	64 Ch	1 Input, 1 Output	ASP, I²C, SPI, 3 UARTs	USB 2.0, VLYNQ, 10/100 EMAC	Async SRAM, DDR2 SDRAM, NAND Flash, SmartMedia/xD	1.2	1.8/ 3.3	361 BGA, 16 × 16 mm	39.49
TMX320**DM6443**ZWT	1 C64x+, 1 ARM9, DaVinci Video	594 (DSP) 297 (ARM)	112 K (DSP) 40 K (ARM)	64 K (DSP)	16 K (ARM)	1 16-/8-Bit EMIFA 1 32-/16-Bit DDR2	64 Ch	1 Output	ASP, I²C, SPI, 3 UARTs	USB 2.0, VLYNQ, 10/100 EMAC	Async SRAM, DDR2 SDRAM, NAND Flash, SmartMedia/xD	1.2	1.8/ 3.3	361 BGA, 16 × 16 mm	33.84
TMX320**DM6443**AZWT	1 C64x+, 1 ARM9, DaVinci Video	594 (DSP) 297 (ARM)	112 K (DSP) 40 K (ARM)	64 K (DSP)	16 K (ARM)	1 16-/8-Bit EMIFA 1 32-/16-Bit DDR2	64 Ch	1 Output	ASP, I²C, SPI, 3 UARTs	USB 2.0, VLYNQ, 10/100 EMAC	Async SRAM, DDR2 SDRAM, NAND Flash, SmartMedia/xD	1.2	1.8/ 3.3	361 BGA, 16 × 16 mm	33.84

[1] *Prices are quoted in U.S. dollars and represent year 2006 suggested resale pricing. All prices are subject to change. Customers are advised to obtain the most current and complete pricing information from TI prior to placing orders. TI may verify final pricing prior to accepting any order.*

New devices are listed in red.

TMS320DM64x™ DSP Generation – Video Application-Specific Fixed-Point DSPs

Part Number	Internal RAM (Bytes) L1 Program Cache/ L1 Data Cache/ L2 Unified RAM/Cache	Video Ports	McBSP	Enhanced DMA (Channels)	COM[2]	Timers	MHz	MIPS	Power (W) CPU and L1[3]	Power (W) Total[4]	Voltage (V) Core	Voltage (V) I/O	Packaging	1 KU ($U.S.)[1]
Video Application Specific														
TMS320**DM640**AGDK4[7]	16K/16K/128K	1 8-bit	2	64	EMAC	3	400	3200	0.66	1.15	1.2	3.3	548 BGA, 23 mm	21.41
TMS320**DM640**AGNZ4[7,8]	16K/16K/128K	1 8-bit	2	64	EMAC	3	400	3200	0.66	1.15	1.2	3.3	548 BGA, 27 mm	21.41
TMS320**DM641**AGDK5[7]	16K/16K/128K	2 8-bit	2	64	HPI 16/EMAC	3	500	4000	0.66	1.30	1.2	3.3	548 BGA, 23 mm	29.23
TMS320**DM641**AGNZ5[7]	16K/16K/128K	2 8-bit	2	64	HPI 16/EMAC	3	500	4000	0.66	1.30	1.2	3.3	548 BGA, 27 mm	29.23
TMS320**DM641**AGDK6[7]	16K/16K/128K	2 8-bit	2	64	HPI 16/EMAC	3	600	4800	0.93	1.90	1.4	3.3	548 BGA, 23 mm	32.15
TMS320**DM641**AGNZ6[7]	16K/16K/128K	2 8-bit	2	64	HPI 16/EMAC	3	600	4800	0.93	1.90	1.4	3.3	548 BGA, 27 mm	32.15
TMS320**DM643**AGDK5[7]	16K/16K/256K	2 20-bit	1	64	HPI 32/EMAC[6]	3	500	4000	0.66	1.30	1.2	3.3	548 BGA, 23 mm	32.50
TMS320**DM643**AGNZ5[7]	16K/16K/256K	2 20-bit	1	64	HPI 32/EMAC[6]	3	500	4000	0.66	1.30	1.2	3.3	548 BGA, 27 mm	32.50
TMS320**DM643**AGDK6[7]	16K/16K/256K	2 20-bit	1	64	HPI 32/EMAC[6]	3	600	4800	0.93	1.90	1.4	3.3	548 BGA, 23 mm	35.55
TMS320**DM643**AGNZ6[7]	16K/16K/256K	2 20-bit	1	64	HPI 32/EMAC[6]	3	600	4800	0.93	1.90	1.4	3.3	548 BGA, 27 mm	35.55
TMS320**DM642**AGDK5[7,8]	16K/16K/256K	3 20-bit	2[5]	64	PCI/HPI 32/EMAC[6]	3	500	4000	0.66	1.30	1.2	3.3	548 BGA, 23 mm	38.60
TMS320**DM642**AGNZ5[7,8]	16K/16K/256K	3 20-bit	2[5]	64	PCI/HPI 32/EMAC[6]	3	500	4000	0.66	1.30	1.2	3.3	548 BGA, 27 mm	38.60
TMS320**DM642**AGDK6[7,8]	16K/16K/256K	3 20-bit	2[5]	64	PCI/HPI 32/EMAC[6]	3	600	4800	0.93	1.90	1.4	3.3	548 BGA, 23 mm	42.47
TMS320**DM642**AGNZ6[7,8]	16K/16K/256K	3 20-bit	2[5]	64	PCI/HPI 32/EMAC[6]	3	600	4800	0.93	1.90	1.4	3.3	548 BGA, 27 mm	42.47
TMS320**DM642**AGDK7[7]	16K/16K/256K	3 20-bit	2[5]	64	PCI/HPI 32/EMAC[6]	3	720	5760	0.93	2.15	1.4	3.3	548 BGA, 23 mm	59.65
TMS320**DM642**AGNZ7[7]	16K/16K/256K	3 20-bit	2[5]	64	PCI/HPI 32/EMAC[6]	3	720	5760	0.93	2.15	1.4	3.3	548 BGA, 27 mm	59.65

[1] *Prices are quoted in U.S. dollars and represent year 2006 suggested resale pricing. All prices are subject to change. Customers are advised to obtain the most current and complete pricing information from TI prior to placing orders. TI may verify final pricing prior to accepting any order.*
[2] *HPI is selectable, 32-bit or 16-bit.*
[3] *Assumes 60% CPU utilization.*
[4] *Assumes 60% CPU utilization, 50% EMIF utilization (133 MHz for 1.4 V, 100 MHz for 1.2 V), 50% writes, 64-bits, 50% bit switching, 2 2-MHz McBSP at 100% utilization, and 2 50-MHz timers at 100% utilization. See SPRA962.*
[5] *The DM642 can be configured to have up to three serial ports in various video/McASP/McBSP combinations.*
[6] *The DM640 has an Ethernet MAC. The DM641 can be configured to have either a 16-bit HPI or Ethernet MAC. The DM643 can be configured to have either a 32-bit HPI or a 16-bit HPI and Ethernet MAC. The DM642 can be configured to have either a 32-bit PCI or 32-bit HPI or a 16-bit HPI and Ethernet MAC.*
[7] *Also available with lead-free balls option.*
[8] *Also available as extended temperature version.*
Note: Enhanced plastic and Military DSP versions are available for selected DSPs.

Digital Signal Processors

TMS320C64x™ DSP Generation – Performance Value Fixed-Point DSPs

Part Number	Internal RAM (Bytes) L1 Program Cache/ L1 Data Cache/ L2 Unified RAM/Cache	McBSP	Enhanced DMA (Channels)	COM[3]	Timers	MHz	MIPS	Power (W)[2] CPU and L1	Power (W)[2] Total	Voltage (V) Core	Voltage (V) I/O	Packaging	1 KU ($U.S.)[1]
Performance Value													
TMS320**C6410**GTS400[4]	16K/16K/128K	2	64	HPI 32/16	3	400	3200	0.58	1.0	1.2	3.3	288 BGA, 23 mm	16.89
TMS320**C6410**ZTSA400[8,9]	16K/16K/128K	2	64	HPI 32/16	3	400	3200	0.58	1.0	1.2	3.3	288 BGA, 23 mm	16.89
TMS320**C6413**GTS500[4,5]	16K/16K/256K	2	64	HPI 32/16	3	500	4000	0.58	1.1	1.2	3.3	288 BGA, 23 mm	27.06
TMS320**C6412**AGDK5[4,5]	16K/16K/256K	2	64	PCI/HPI/EMAC[6]	3	500	4000	0.66	1.3	1.2	3.3	548 BGA, 23 mm	39.88
TMS320**C6412**AGNZ5[4,5]	16K/16K/256K	2	64	PCI/HPI/EMAC[6]	3	500	4000	0.66	1.3	1.2	3.3	548 BGA, 27 mm	39.88
TMS320**C6412**AGDK6[4,5]	16K/16K/256K	2	64	PCI/HPI/EMAC[6]	3	600	4800	0.93	1.9	1.4	3.3	548 BGA, 23 mm	43.91
TMS320**C6412**AGNZ6[4,5]	16K/16K/256K	2	64	PCI/HPI/EMAC[6]	3	600	4800	0.93	1.9	1.4	3.3	548 BGA, 27 mm	43.91
TMS320**C6412**AGDK7[4]	16K/16K/256K	2	64	PCI/HPI/EMAC[6]	3	720	5760	0.93	2.15	1.4	3.3	548 BGA, 23 mm	68.69
TMS320**C6412**AGNZ7[4]	16K/16K/256K	2	64	PCI/HPI/EMAC[6]	3	720	5760	0.93	2.15	1.4	3.3	548 BGA, 27 mm	68.69
TMS320**C6418**GTS600[4]	16K/16K/512K	2	64	HPI 32/16	3	600	4800[7]	0.82	1.7	1.4	3.3	288 BGA, 23 mm	50.34
TMS320**C6418**ZTSA500[8,9]	16K/16K/512K	2	64	HPI 32/16	3	500	4000[7]	0.58	1.1	1.4	3.3	288 BGA, 23 mm	50.34

[1] Prices are quoted in U.S. dollars and represent year 2006 suggested resale pricing. All prices are subject to change. Customers are advised to obtain the most current and complete pricing information from TI prior to placing orders. TI may verify final pricing prior to accepting any order.
[2] Assumes 60% CPU utilization, 50% EMIF utilization (133 MHz for 1.4 V, 100 MHz for 1.2 V), 50% writes, 64-bits, 50% bit switching, 2 2-MHz McBSP at 100% utilization, and 2 75-MHz timers at 100% utilization. See SPRAA59 for the TMS320C6410 and TMS320C6413 DSPs. See SPRA967 for the TMS320C6412A DSP. See SPRAA60 for the TMS320C6418 DSP.
[3] HPI is selectable, 32-bit or 16-bit.
[4] Also available with lead-free balls option.
[5] Also available as extended temperature version.
[6] The C6412 can be configured to have either a 32-bit PCI or 32-bit HPI, or a 16-bit HPI with Ethernet MAC.
[7] Plus on-chip VITERBI (VCP) coprocessor.
[8] Lead-free balls version.
[9] Extended temperature version.
Note: Enhanced plastic and Military DSP versions are available for selected DSPs.

TMS320C64x™ DSP Generation – Highest-Performance Fixed-Point DSPs

Part Number	Internal RAM (Bytes) L1 Program Cache/ L1 Data Cache/ L2 Unified RAM/Cache	McBSP	Enhanced DMA (Channels)	COM[3]	Timers	MHz	MIPS	Power (W)[2] CPU and L1	Power (W)[2] Total	Voltage (V) Core	Voltage (V) I/O	Packaging	1 KU ($U.S.)[1]
Highest Performance													
TMX320**C6455**ZTZ[4]	32K/32K/2M	2+Utopia[7]	64	Serial RapidIO/HPI/ PCI/Gigabit EMAC	2[9]	1000	8000[10]	TBD	TBD	1.2	3.3, 1.8, 1.5, 1.2	697 BGA, 24 mm	292.67
TMX320**C6455**ZTZ8[4]	32K/32K/2M	2+Utopia[7]	64	Serial RapidIO/HPI/ PCI/Gigabit EMAC	2[9]	850	6800[10]	TBD	TBD	1.2	3.3, 1.8, 1.5, 1.2	697 BGA, 24 mm	247.47
TMX320**C6455**ZTZ7[4]	32K/32K/2M	2+Utopia[7]	64	Serial RapidIO™/HPI/ PCI/Gigabit EMAC	2[9]	720	5760[10]	TBD	TBD	1.2	3.3, 1.8, 1.5, 1.2	697 BGA, 24 mm	202.27
TMS320**C6416T**GLZ1[6]	16K/16K/1M	2+Utopia[8]	64	PCI/HPI 32/16	3	1000	8000[10]	0.44	1.65	1.2	3.3	532 BGA, 23 mm	234.99
TMS320**C6416T**GLZ8[5,6]	16K/16K/1M	2+Utopia[8]	64	PCI/HPI 32/16	3	850	6800[10]	TBD	TBD	1.2	3.3	532 BGA, 23 mm	173.92
TMS320**C6416T**GLZ7[5,6]	16K/16K/1M	2+Utopia[8]	64	PCI/HPI 32/16	3	720	5760[10]	0.44	1.36	1.2	3.3	532 BGA, 23 mm	118.05
TMS320**C6416T**GLZ6[5]	16K/16K/1M	2+Utopia[8]	64	PCI/HPI 32/16	3	600	4800[10]	0.39	1.1	1.1	3.3	532 BGA, 23 mm	94.43
TMS320**C6415T**GLZ1[6]	16K/16K/1M	2+Utopia[8]	64	PCI/HPI 32/16	3	1000	8000	0.44	1.65	1.2	3.3	532 BGA, 23 mm	209.13
TMS320**C6415T**GLZ8[5,6]	16K/16K/1M	2+Utopia[8]	64	PCI/HPI 32/16	3	850	6800	TBD	TBD	1.2	3.3	532 BGA, 23 mm	158.11
TMS320**C6415T**GLZ7[5,6]	16K/16K/1M	2+Utopia[8]	64	PCI/HPI 32/16	3	720	5760	0.44	1.36	1.2	3.3	532 BGA, 23 mm	107.32
TMS320**C6415T**GLZ6[5]	16K/16K/1M	2+Utopia[8]	64	PCI/HPI 32/16	3	600	4800	0.39	1.1	1.1	3.3	532 BGA, 23 mm	85.85
TMS320**C6414T**GLZ1[6]	16K/16K/1M	3	64	HPI 32/16	3	1000	8000	0.44	1.65	1.2	3.3	532 BGA, 23 mm	198.68
TMS320**C6414T**GLZ8[5,6]	16K/16K/1M	3	64	HPI 32/16	3	850	6800	TBD	TBD	1.2	3.3	532 BGA, 23 mm	150.20
TMS320**C6414T**GLZ7[5,6]	16K/16K/1M	3	64	HPI 32/16	3	720	5760	0.44	1.36	1.2	3.3	532 BGA, 23 mm	101.95
TMS320**C6414T**GLZ6[5,6]	16K/16K/1M	3	64	HPI 32/16	3	600	4800	0.39	1.1	1.1	3.3	532 BGA, 23 mm	81.55

[1] Prices are quoted in U.S. dollars and represent year 2006 suggested resale pricing. All prices are subject to change. Customers are advised to obtain the most current and complete pricing information from TI prior to placing orders. TI may verify final pricing prior to accepting any order.

New devices are listed in red.

[2] Assumes 60% CPU utilization, 50% EMIF utilization (133 MHz for 1.4 V, 100 MHz for 1.2 V), 50% writes, 64-bits, 50% bit switching, 2 2-MHz McBSP at 100% utilization, and 2 75-MHz timers at 100% utilization. See SPRAA45 for TMS320C6414T, TMS320C6415T and TMS320C6416T DSPs.

[3] HPI is selectable, 32-bit or 16-bit.

[4] Lead-free balls version.

[5] Also available as extended temperature version.

[6] Available with lead-free balls option.

[7] UTOPIA pins muxed with a second McBSP.

[8] UTOPIA pins muxed with a third McBSP.

[9] 64-bit configurable timers.

[10] Plus on-chip Turbo (TCP) and VITERBI (VCP) coprocessors.

Note: Enhanced plastic and Military DSP versions are available for selected DSPs.

Interface

1394

Device	Family Name	Voltage (V)	Data Rate (Mbps)	FIFOs	Package	Description	Price[1]
1394 Integrated Devices							
TSB43A82/A	iShynx2	3.3	up to 400	4.7	144 LQFP, 176 MicroStar BGA™	2-port high-performance integrated PHY and link-layer device for PC peripherals	8.30
TSB43AB21A	iOHCI-Lynx	3.3	up to 400	9	128 TQFP	OHCI 1.1, 1394a link layer controller integrated with 1394a, 400-Mbps, 1-port PHY	4.35
TSB43AB22A	iOHCI-Lynx	3.3	up to 400	9	128 TQFP	OHCI 1.1, 1394a link layer controller integrated with 1394a, 400-Mbps, 2-port PHY	4.55
TSB43AB23	iOHCI-Lynx	3.3	up to 400	9	128 TQFP 144 LQFP	OHCI 1.1-compliant 1394 link layer controller and 1394a-2000 compliant 1-, 2- and 3-port PHY, 9-K FIFO	4.90
TSB43CA42	iceLynx-Micro	3.3	up to 400	16.5	176 BGA	iceLynx-Micro integrated 1394a link/2-port PHY with ARM microprocessor and program memory, 5C support for consumer applications, MPEG2, DV and audio formats	10.60
TSB43CA43A	iceLynx-Micro	3.3	up to 400	16.5	176 BGA 176 LQFP	iceLynx-Micro integrated 1394a link/3-port PHY with streaming audio and 5C content protection	12.60
TSB43CB43A	iceLynx-Micro	3.3	up to 400	16.5	176 LQFP	iceLynx-Micro integrated 1394a link/3-port PHY with streaming audio	11.40
TSB43DA42	—	3.3/1.5	up to 400	21	196 MicroStar BGA	Integrated 1394a link/2-port PHY for consumer applications, supports 5C copy protection, PCI I/F, 3 high-speed data I/F	8.25
TSB43DA43	—	3.3/1.5	up to 400	21	256 MicroStar BGA	Integrated 1394a link/2-port PHY for consumer applications, supports 5C copy protection, PCI I/F, 3 high-speed data I/F	8.95
1394 Link-Layer Controllers							
TSB12LV01B	—	3.3	up to 400	2	100 TQFP	High-performance link layer with 32-bit I/F. May be cycle master; has 2-KB FIFO. PHY-link timing compliant with 1394a-2000 for data and control bus applications in backplane and cable	8.90
TSB12LV21B	PCILynxII	3.3	up to 400	4	176 LQFP	High-performance link for host or peripheral applications. 32-bit PCI I/F, 4-K FIFO, handles asynch streaming and DV applications (not supported by Microsoft® Windows®)	9.60
TSB12LV26	OHCI-Lynx™	3.3	up to 400	9	100 TQFP	OHCI 1.0-compliant 1394a-2000 link layer controller. 32-bit PCI I/F, 9-K FIFO, pin-compatible w/TSB12LV23	3.95
TSB12LV32	GP2Lynx	3.3	up to 400	4	100 LQFP	1394a-2000 compliant link layer for camera, printer or scanner applications. 8/16-bit host I/F, 2-K FIFO, high-speed data I/F	5.15
TSB42AC3	—	3.3	up to 400	10	100 TQFP	High-performance link layer featuring a 32-bit, 50-MHz host interface and integrated 10-Kbyte FIFO. PHY-link timing compliant with 1394a-2000	8.90
TSB82AA2	OHCI-Lynx	3.3	up to 800	11	144 LQFP	High-performance 1394b 3.3-V OHCI 1.1+ compliant	7.80

Device	Ports	Voltage (V)	Data Rate (Mbps)	Package	Description	Price[1]
1394 Physical Layer Controllers						
TSB41AB1	1	3.3	up to 400	48 HTQFP, 64 HTQFP	IEEE 1394a 1-port cable transceiver/arbiter	1.50
TSB41AB2	2	3.3	up to 400	64 HTQFP	IEEE 1394a 2-port cable transceiver/arbiter	1.85
TSB41AB3	3	3.3	up to 400	80 HTQFP	IEEE 1394a 3-port cable transceiver/arbiter	3.00
TSB43BA3B	3	3.3	up to 400	80 TQFP	1394b-2002 3-port physical layer device	6.50
TSB41LV04A	4	3.3	up to 400	80 HTQFP	IEEE 1394a 4-port cable transceiver/arbiter	6.50
TSB41LV06A	6	3.3	up to 400	100 HTQFP	IEEE 1394a 6-port cable transceiver/arbiter	6.40
TSB81BA3	3	1.8, 3.3	up to 800	80 HTQFP	High-performance 1394b s800 3-port cable transceiver/arbiter	7.80

[1] *Suggested resale price in U.S. dollars in quantities of 1,000.*

PanelBus™ (DVI) Transmitters and Receivers

Device	Voltage (V)	Recvr./Trans. Channels	Parallel Outputs	Data Speed (Mbps)	I_{CC} (mA)	Package	Description	Price[1]
TFP401	3.3	3	48	495	400	100 HTQFP	DVI receiver, 165 MHz	5.00
TFP401A	3.3	3	48	495	400	100 HTQFP	DVI receiver, 165 MHz, HSYNC jitter immunity	5.00
TFP403	3.3	3	48	495	400	100 HTQFP	DVI receiver	6.83
TFP410	3.3	3	6	495	250	64 HTQFP	DVI transmitter, 165 MHz	3.50
TFP501	3.3	3	48	495	400	100 HTQFP	DVI receiver, 165 MHz plus HDCP	Call
TFP503	3.3	3	48	495	400	100 HTQFP	DVI receiver, 165 MHz plus HDCP and embedded HDCP keys	Call
TFP510	3.3	3	6	495	250	64 HTQFP	DVI transmitter, 165 MHz plus HDCP	Call
TFP513	3.3	3	6	495	250	64 HTQFP	DVI transmitter, 165 MHz plus HDCP and embedded HDCP keys	Call

[1] *Suggested resale price in U.S. dollars in quantities of 1,000.*

USB

Device	Speed	Ports	I^2C	Voltage (V)	Package	Description	Price[1]
USB Hub Controllers							
TUSB2036	Full (1.1)	2/3	No	3.3	32 LQFP	2/3-port hub for USB with optional serial EEPROM interface	1.15
TUSB2046B	Full (1.1)	4	No	3.3	32 LQFP	4-port hub for USB with optional serial EEPROM interface	1.20
TUSB2077A	Full (1.1)	7	No	3.3	48 LQFP	7-port USB hub with optional serial EEPROM interface	1.95
TUSB2136	Full (1.1)	1/2	Yes	3.3	64 LQFP	2-port hub with integrated general-purpose function controller	3.25
TUSB5052	Full (1.1)	1-5	Yes	3.3	100 LQFP	5-port hub with integrated bridge to two serial ports	5.10

Device	Speed	Voltage (V)	Remote Wakeup	Package	Description	Price[1]
USB Peripherals						
TUSB3210	Full	3.3	Yes	64 LQFP	USB full-speed general-purpose device controller	2.50
TUSB3410	Full	3.3	Yes	32 LQFP	USB-to-serial converter (RS-232, RS-485)	2.25
TUSB6250	Full, High	3.3	Yes	80 TQFP	USB 2.0 high-speed, low-power ATA/ATAPI bridge solution	2.80

Device	Speed	Voltage (V)	Package	Local Bus Interface	Description	Price
USB On-The-Go (OTG) Devices						
TUSB6010	High	1.5, 1.8 and 3.3	80 MicroStar BGA™	16-Bit Muxed NOR	USB 2.0 high-speed on-the-go to local bus interface controller	Call

[1] *Suggested resale price in U.S. dollars in quantities of 1,000.*

*Preview products appear in **bold blue**.*

XIO

Device	Voltage	PCI Express	PCI Bus Masters	Temp Range	Pin/ Packages	Description	Price[1]
XIO2000	3.3/1.5	x1	6	0 to 70°C	201 MicroStar BGA	Fully compliant single-function PCI Express to PCI translation bridge	14.95
XIO2200	3.3/1.5	x1	N/A	0 to 70°C	176 MicroStar BGA	Single-function PCI Express to PCI translation bridge where the PCI bus interface is internally connected to a 1394a open host controller link-layer controller with a two-port 1394a PHY	15.05

[1] *Suggested resale price in U.S. dollars in quantities of 1,000.*

Interface

PCI

Device	Intel-Compatible Part No.	Speed (MHz)	Expansion Interface (bits)	Hot-Swap	MicroStar BGA™ Packaging	Voltage (V)	Package(s)	Description	Price[1]
PCI Bridges									
PCI2040	—	33	—	—	Yes	3.3, 5	144 BGA, 144 LQFP	PCI-to-DSP bridge controller, compliant with Compact PCI Hot-Swap Specification 1.0	10.55
PCI2050B	21150bc	66	32	Yes	Yes	3.3, 5	208 LQFP, 208 QFP, 257 BGA	32-bit, 66-MHz, 9-master PCI-to-PCI bridge	9.50
PCI2250	21152ab	33	32	Friendly	No	3.3, 5	176 LQFP, 160 QFP	32-bit, 33-MHz PCI-to-PCI bridge, Compact PCI hot-swap friendly, 4-master	6.10
PCI2060	—	66	32	Yes	Yes	3.3, 5	257 BGA	32-bit, 66-MHz, 9-master, asynchronous PCI-to-PCI bridge	9.50

[1]Suggested resale price in U.S. dollars in quantities of 1,000.

Device	Voltage (V)	D3 Cold Wake	Integrated 1394	Flash Support	Package(s)	Description	Price[1]
PCI CardBus Controllers							
PCI1620	3.3	Yes	No	Yes[2]	209 BGA, 208 LQFP	PC card, Flash media and SmartCard controller	Web
PCI1520	3.3	Yes	No	No	209 BGA, 208 LQFP	2-slot PC CardBus controller	Web
PCI4520	3.3	Yes	Yes	No	257 BGA	2-slot PC and integrated 1394a-2000 OHCI two-port PHY/link-layer controller	Web
PCI7610	3.3	Yes	Yes	Yes[2]	209 BGA, 208 LQFP	Integrated PC card, SmartCard, Flash media, 1394a-2000 OHCI 2-port PHY/link-layer controller	Web
PCI7510	3.3	Yes	Yes	No	209 BGA, 208 LQFP	Integrated PC card, SmartCard and 1394 controller	Web
PCI7410	3.3	Yes	Yes	Yes[2]	209 BGA, 208 LQFP	PC card, SmartCard, Flash media, integrated 1394a-2000 OHCI 2-port PHY/link-layer controller	Web
PCI4510	3.3	Yes	Yes	No	209 BGA, 208 LQFP	PC card and Integrated 1394a-2000 OHCI two-port PHY/link-layer controller	Web
PCI1510	3.3	Yes	No	No	144 BGA, 144 LQFP	Single-Slot PC CardBus controller	Web
PCI7620	3.3	Yes	Yes	Yes[3]	288 BGA	Integrated 2-slot PC card w/SmartCard, Flash media, 1394a-2000 OHCI 2-port PHY/link-layer controller	Web
PCI7420	3.3	Yes	Yes	Yes[3]	288 BGA	Integrated 2-slot PC card, dedicated Flash media socket and 1394a-2000 OHCI 2-port PHY/link-layer controller	Web
PCI6620	3.3	Yes	No	Yes[3]	288 BGA	Integrated 2-slot PC card with SmartCard and dedicated Flash media controller	Web
PCI6420	3.3	Yes	Yes	Yes[3]	288 BGA	Integrated 2-slot PC card and dedicated Flash media controller	Web
PCI7621	3.3	Yes	Yes	Yes[4]	288 BGA	Integrated 2-slot PC card, dedicated Flash media socket and 1394a-2000 OHCI 2-port PHY/link-layer controller	Web
PCI7421	3.3	Yes	Yes	Yes[4]	288 BGA	Integrated 2-slot PC card, dedicated Flash media socket and 1394a-2000 OHCI 2-port PHY/link-layer controller	Web
PCI6621	3.3	Yes	No	Yes[4]	288 BGA	Integrated 2-slot PC card with SmartCard and dedicated Flash media controller	Web
PCI6421	3.3	Yes	No	Yes[4]	288 BGA	Integrated 2-slot PC card and dedicated Flash media controller	Web
PCI7611	3.3	Yes	Yes	Yes[4]	288 BGA	Integrated PC card, SmartCard, Flash media, 1394a-2000 OHCI 2-port PHY/link-layer controller	Web
PCI7411	3.3	Yes	Yes	Yes[4]	288 BGA	PC card, Flash media, Integrated 1394a-2000 OHCI 2-port PHY/link-layer controller	Web
PCI6611	3.3	Yes	No	Yes[4]	288 BGA	Integrated 1-slot PC card with SmartCard and dedicated Flash media controller	Web
PCI6411	3.3	Yes	No	Yes[4]	288 BGA	Integrated 1-slot PC card and dedicated Flash media controller	Web
PCI4510R	3.3	Yes	Yes	No	288 BGA	PC card and integrated 1394a-2000 OHCI 2-port PHY/link-layer controller	Web
PCI1510R	3.3	Yes	No	No	288 BGA	Single-slot PC CardBus controller	Web
PCI7515	3.3	Yes	Yes	No	257 BGA	Integrated 1-slot PC card controller with1 1394a-2000 OHCI port and 1 dedicated SmartCard interface	Web
PCI6515	3.3	Yes	No	No	257 BGA	Integrated 1-slot PC card and 1 dedicated SmartCard interface	Web
PCI4515	3.3	Yes	Yes	No	257 BGA	Integrated 1-slot PC card controller with 1 1394a-2000 OHCI port	Web
PCI1515	3.3	Yes	No	No	257 BGA	Integrated 1-slot PC card controller, pin compatible with PCI4515, PCI6515 and PCI7515	Web

Note: *Parts highlighted in the same color are pin compatible.*

*[1]Please check **www.ti.com** for the most current pricing information.*
[2]SD/MMC MemoryStick™/MemoryStick Pro SmartMedia™ xD.
[3]SD/MMC MemoryStick/MemoryStick Pro.
[4]SD/MMC SDIO MemoryStick/MemoryStick Pro SmartMedia xD.

Video Switches

Device	V_{CC}	Signal Type	Configuration	R_{ON}	Bandwidth	XTALK
TS3DV416	3.3 V	Digital Video (DVI, HDMI)	4-channel differential SPDT	8	800 MHz (1.8 Gbps)	–41 dB
TS3DV520	3.3 V	Digital Video (DVI, HDMI)	5-channel differential SPDT	8	1.2 GHz (2.4 Gbps)	–41 dB
TS3V330	3.3 V	Analog Composite, Component Video	4-channel SPDT	10	300 MHz	–80 dB
TS3V340	3.3 V	Analog Composite, Component Video	4-channel SPDT	6	500 MHz	–80 dB
TS5V330	5 V	Analog Composite, Component Video	4-channel SPDT	10	300 MHz	–63 dB
TL52055	5 V	Analog Composite, Component Video	3-channel SPDT buffered	Push-pull type output	40 MHz	–75 dB

I^2C

					Additional Features					I/O Type	
Device	Max Frequency (kHz)	I^2C Address	V_{CC} Range (V)	Bit or Channel Width	Low Power	Interrupt	Reset	Configuration Registers	5-V Tolerant I/O	Totem Pole	Open Drain
I/O Expanders											
PCF8574	100	0100 xxx	2.5 to 6.0	8 bits		✔				✔	
PCF8574A	100	0111 xxx	2.5 to 6.0	8 bits		✔				✔	
PCF8575	400	0100 xxx	2.5 to 5.5	16 bits		✔				✔	
PCF8575C	400	0100 xxx	4.5 to 5.5	16 bits		✔					✔
PCA9535	400	0100 xxx	2.3 to 5.5	16 bits	✔	✔		✔	✔	✔	
PCA9539	400	1110 1xx	2.3 to 5.5	16 bits	✔	✔	✔	✔	✔	✔	
PCA9555	400	0100 xxx	2.3 to 5.5	16 bits		✔		✔	✔	✔	
Multiplexers											
PCA8550	400	1001 110	3.0 to 3.6	5 bits						✔	
PCA9544A	400	1110 xxx	2.3 to 5.5	4 channels		✔			✔		✔
PCA9545A	400	1110 0xx	2.3 to 5.5	4 channels		✔	✔		✔		✔
PCA9546A	400	1110 xxx	2.3 to 5.5	4 channels			✔		✔		✔
Buffers											
PCA9306	400	None	0 to 5.0	1 channel					✔		✔

Level Translation

	Bit	V_{CC} Min. to Max. (V)		V_{CCA} (V)							V_{CCB} (V)							
Device	Width	V_{CCA}	V_{CCB}	1.2	1.5	1.8	2.5	2.7	3.3	5	1.2	1.5	1.8	2.5	2.7	3.3	5	Smallest Package
SN74AVC1T45[1]	1	1.2 to 3.6	1.2 to 3.6	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔		6-ball NanoStar™/NanoFree™
SN74LVC1T45	1	1.65 to 5.5	1.65 to 5.5			✔	✔	✔	✔	✔			✔	✔	✔	✔	✔	6-ball NanoStar/NanoFree
SN74AVC2T45[1]	2	1.2 to 3.6	1.2 to 3.6	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔		8-ball NanoStar/NanoFree
SN74LVC2T45	2	1.65 to 5.5	1.65 to 5.5			✔	✔	✔	✔	✔			✔	✔	✔	✔	✔	8-ball NanoStar/NanoFree
SN74AVC4T245[1]	4	1.2 to 3.6	1.2 to 3.6	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔		16-pin QFN
SN74AVC8T245[1]	8	1.2 to 3.6	1.2 to 3.6	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔		24-pin QFN
SN74LVC8T245[1]	8	1.65 to 5.5	1.65 to 5.5			✔	✔	✔	✔	✔			✔	✔	✔	✔	✔	24-pin QFN
SN74LVCC3245A	8	2.3 to 3.6	3.0 to 5.5				✔	✔	✔							✔	✔	24-pin TSSOP
SN74LVC4245A	8	4.5 to 5.5	2.7 to 3.6							✔					✔	✔		24-pin TSSOP
SN74LVCC4245	8	4.5 to 5.5	2.7 to 5.5							✔					✔	✔	✔	24-pin TSSOP
SN74AVC16T245[1]	16	1.2 to 3.6	1.2 to 3.6	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔		56-ball VFBGA
SN74AVCA164245[1]	16	1.4 to 3.6	1.4 to 3.6		✔	✔	✔	✔	✔			✔	✔	✔	✔	✔		56-ball VFBGA
SN74AVCB164245[1]	16	1.4 to 3.6	1.4 to 3.6		✔	✔	✔	✔	✔			✔	✔	✔	✔	✔		56-ball VFBGA
SN74LVC16T245[1]	16	1.65 to 5.5	1.65 to 5.5			✔	✔	✔	✔	✔			✔	✔	✔	✔	✔	56-ball VFBGA
SN74AVC20T245[1]	20	1.2 to 3.6	1.2 to 3.6	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔		56-ball VFBGA
SN74AVC24T245[1]	24	1.2 to 3.6	1.2 to 3.6	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔		83-ball LFBGA
SN74AVC32T245[1]	32	1.2 to 3.6	1.2 to 3.6	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔		96-ball LFBGA
SN74AVCB324245[1]	32	1.4 to 3.6	1.4 to 3.6		✔	✔	✔	✔	✔			✔	✔	✔	✔	✔		96-ball LFBGA

[1] *Bus hold option available.*

Interface

LAN Switches

Device	V_{CC}	Signal Type	Configuration	R_{ON}	Bandwidth	XTALK
TS3L100	3.3 V	10/100 Base-T	4-channel SPDT	5	350 MHz	–68 dB
TS3L110	3.3 V	10/100 Base-T	5-channel SPDT	4	500 MHz	–30 dB
TS3L301	3.3 V	10/100/1000 Base-T	4-channel differential SPDT	4	900 MHz	–41 dB
TS3L500	3.3 V	10/100/1000 Base-T	4-channel differential SPDT	3	>1000 MHz	–37 dB
TS5L100	5 V	10/100 Base-T	4-channel SPDT	10	300 MHz	–60 dB

Analog MUX

Device	R_{ON} (Ω)	Normally Closed	Normally Open	Enable Pin	Break Before Make	Make Before Break	Over-/ Undershoot Protection	I_{OFF}
SPST								
TS5A1066	10		✔					
TS5A3166	1		✔					✔
TS5A3167	1	✔						✔
TS5A4594	8		✔					
TS5A4595	8	✔						
TS5A4596	8		✔					
TS5A4597	8	✔						
SPSTx2								
TS5A2066	10		✔					
TS5A23166	1		✔					✔
TS5A23167	1	✔						✔
SPDT								
TS5A2053	10			✔				
TS5A3153	1			✔	✔			✔
TS5A3154	1			✔		✔		✔
TS5A3159	1				✔			
TS5A3159A	1				✔			✔
TS5A3160	1					✔		✔
TS5A63157	15				✔		✔	✔
SPDTx2								
TS5A23160	1					✔		
TS5A23159	1				✔			✔
TS5A23157	10				✔			
SPDTx4								
TS3A5018	10			✔				
SP3T								
TS5A3357	5				✔			
TS5A3359	1				✔			✔
SP4Tx2								
TS3A5017	14			✔				

*New products are listed in **bold red**.*

MSP430 Ultra-Low-Power Microcontrollers

Flash/ROM-Based x1xx Family and 16-Bit Watchdog (V_{CC} 1.8–3.6 V)

Device (C) ROM (F) Flash	Program (kB)	SRAM (B)	I/O	16-Bit Timers A	16-Bit Timers B	USART	I^2C	DMA	SVS	Brown-Out Reset	MPY	Comp_A	Temp Sensor	ADC Ch/Res	Additional Analog	Package(s)	Price[1]
MSP430F1101A	1	128	14	3	–	–	–	–	–	–	–	✔	–	Slope	–	20 DGV, DW, PW, 24 RGE	0.99
MSP430C1101	1	128	14	3	–	–	–	–	–	–	–	✔	–	Slope	–	20 DW, PW, 24 RGE	0.60
MSP430F1111A	2	128	14	3	–	–	–	–	–	–	–	✔	–	Slope	–	20 DGV, DW, PW, 24 RGE	1.35
MSP430C1111	2	128	14	3	–	–	–	–	–	–	–	✔	–	Slope	–	20 DW, PW, 24 RGE	1.10
MSP430F1121A	4	256	14	3	–	–	–	–	–	–	–	✔	–	Slope	–	20 DGV, DW, PW, 24 RGE	1.70
MSP430C1121	4	256	14	3	–	–	–	–	–	–	–	✔	–	Slope	–	20 DW, PW, 24 RGE	1.35
MSP430F1122	4	256	14	3	–	–	–	–	–	✔	–	–	✔	5/10	–	20 DW, PW, 32 RHB	2.00
MSP430F1132	8	256	14	3	–	–	–	–	–	✔	–	–	✔	5/10	–	20 DW, PW, 32 RHB	2.25
MSP430F1222	4	256	22	3	–	1	–	–	–	✔	–	–	✔	8/10	–	28 DW, PW, 32 RHB	2.40
MSP430F1232	8	256	22	3	–	1	–	–	–	✔	–	–	✔	8/10	–	28 DW, PW, 32 RHB	2.50
MSP430F122	4	256	22	3	–	1	–	–	–	–	–	✔	–	Slope	–	28 DW, PW, 32 RHB	2.15
MSP430F123	8	256	22	3	–	1	–	–	–	–	–	✔	–	Slope	–	28 DW, PW, 32 RHB	2.30
MSP430C1331	8	256	48	3	3	1	–	–	–	–	–	✔	–	Slope	–	64 PM	2.00
MSP430C1351	16	512	48	3	3	1	–	–	–	–	–	✔	–	Slope	–	64 PM	2.30
MSP430F133	8	256	48	3	3	1	–	–	–	–	–	✔	✔	8/12	–	64 PM, PAG, RTD	3.00
MSP430F135	16	512	48	3	3	1	–	–	–	–	–	✔	✔	8/12	–	64 PM, PAG, RTD	3.60
MSP430F147	32	1024	48	3	7	2	–	–	–	–	✔	✔	✔	8/12	–	64 PM, PAG, RTD	5.05
MSP430F148	48	2048	48	3	7	2	–	–	–	–	✔	✔	✔	8/12	–	64 PM, PAG, RTD	5.75
MSP430F149	60	2048	48	3	7	2	–	–	–	–	✔	✔	✔	8/12	–	64 PM, PAG, RTD	6.05
MSP430F1471	32	1024	48	3	7	2	–	–	–	–	✔	✔	–	Slope	–	64 PM, RTD	4.60
MSP430F1481	48	2048	48	3	7	2	–	–	–	–	✔	✔	–	Slope	–	64 PM, RTD	5.30
MSP430F1491	60	2048	48	3	7	2	–	–	–	–	✔	✔	–	Slope	–	64 PM, RTD	5.60
MSP430F155	16	512	48	3	3	1	✔	✔	✔	✔	–	✔	✔	8/12	(2) DAC12	64 PM, RTD	4.95
MSP430F156	24	1024	48	3	3	1	✔	✔	✔	✔	–	✔	✔	8/12	(2) DAC12	64 PM, RTD	5.55
MSP430F157	32	1024	48	3	3	1	✔	✔	✔	✔	–	✔	✔	8/12	(2) DAC12	64 PM, RTD	5.85
MSP430F167	32	1024	48	3	7	2	✔	✔	✔	✔	✔	✔	✔	8/12	(2) DAC12	64 PM, RTD	6.75
MSP430F168	48	2048	48	3	7	2	✔	✔	✔	✔	✔	✔	✔	8/12	(2) DAC12	64 PM, RTD	7.45
MSP430F169	60	2048	48	3	7	2	✔	✔	✔	✔	✔	✔	✔	8/12	(2) DAC12	64 PM, RTD	7.95
MSP430F1610	32	5120	48	3	7	2	✔	✔	✔	✔	✔	✔	✔	8/12	(2) DAC12	64 PM, RTD	8.25
MSP430F1611	48	10240	48	3	7	2	✔	✔	✔	✔	✔	✔	✔	8/12	(2) DAC12	64 PM, RTD	8.65
MSP430F1612	55	5120	48	3	7	2	✔	✔	✔	✔	✔	✔	✔	8/12	(2) DAC12	64 PM, RTD	8.95

Flash-Based F2xx Family With 16 MIPS and 16-Bit Watchdog (V_{CC} 1.8–3.6 V)

Device	Program (kB)	SRAM (B)	I/O	Timers A	Timers B	USCI[2]	SPI, I^2C	DMA	SVS	Brown-Out Reset	MPY	Comp_A+	Temp Sensor	ADC Ch/Res	Additional Analog	Packages	Price[1]
MSP430F2001	1	128	10	2	–	–	–	–	–	✔	–	✔	–	Slope	–	14 PW, N, 16 RSA	0.55
MSP430F2011	2	128	10	2	–	–	–	–	–	✔	–	✔	–	Slope	–	14 PW, N, 16 RSA	0.70
MSP430F2002	1	128	10	2	–	–	✔	–	–	✔	–	–	✔	1/10	–	14 PW, N, 16 RSA	0.99
MSP430F2012	2	128	10	2	–	–	✔	–	–	✔	–	–	✔	1/10	–	14 PW, N, 16 RSA	1.15
MSP430F2003	1	128	10	2	–	–	✔	–	–	✔	–	–	✔	1/16	–	14 PW, N, 16 RSA	1.50
MSP430F2013	2	128	10	2	–	–	✔	–	–	✔	–	–	✔	1/16	–	14 PW, N, 16 RSA	1.65
MSP430F2101	1	128	16	3	–	–	–	–	–	✔	–	✔	–	Slope	–	20 DGV, DW, PW, 24 RGE	0.90
MSP430F2111	2	128	16	3	–	–	–	–	–	✔	–	✔	–	Slope	–	20 DGV, DW, PW, 24 RGE	0.99
MSP430F2121	4	256	16	3	–	–	–	–	–	✔	–	✔	–	Slope	–	20 DGV, DW, PW, 24 RGE	1.35
MSP430F2131	8	256	16	3	–	–	–	–	–	✔	–	✔	–	Slope	–	20 DGV, DW, PW, 24 RGE	1.70
MSP430F2234	8	512	32	3	3	✔	–	–	–	✔	–	–	–	1/10	(2) OPAMP	38 DA, 40 RHA	2.75
MSP430F2254	16	512	32	3	3	✔	–	–	–	✔	–	–	–	1/10	(2) OPAMP	38 DA, 40 RHA	3.10
MSP430F2274	32	1024	32	3	3	✔	–	–	–	✔	–	–	–	1/10	(2) OPAMP	38 DA, 40 RHA	3.55

[1] *Suggested resale price in U.S. dollars in quantities of 1,000.*
[2] *USCI includes UART, IrDA, SPI and I^2C.*

*New products appear in **bold red**.*

Microcontrollers—Tuner MOPs

MSP430 Ultra-Low-Power Microcontrollers (Continued)

Flash/ROM-Based x4xx Family With LCD Controller and 16-Bit Watchdog (V_{CC} 1.8–3.6 V)

Device (C) ROM (F) Flash	Program (kB)	SRAM (B)	I/O	16-Bit Timers A	16-Bit Timers B	USART	USCI[2]	LCD Segments	DMA	SVS	Brown-Out Reset	MPY	Comp_A	Temp Sensor	ADC Ch/Res	Additional Analog	Package(s)	Price[1]
MSP430F412	4	256	48	3		–	–	96	–	✔	✔	–	✔	–	slope	–	64 PM, RTD	2.60
MSP430C412	4	256	48	3		–	–	96	–	✔	✔	–	✔	–	slope	–	64 PM, RTD	1.90
MSP430F413	8	256	48	3		–	–	96	–	✔	✔	–	✔	–	slope	–	64 PM, RTD	2.95
MSP430C413	8	256	48	3		–	–	96	–	✔	✔	–	✔	–	slope	–	64 PM, RTD	2.10
MSP430F415	16	512	48	3, 5		–	–	96	–	✔	✔	–	✔	–	slope	–	64 PM	3.40
MSP430F417	32	1024	48	3, 5		–	–	96	–	✔	✔	–	✔	–	slope	–	64 PM	3.90
MSP430FW423	8	256	48	3, 5		–	–	96	–	✔	✔	–	✔	–	slope	Flow-meter	64 PM	3.75
MSP430FW425	16	512	48	3, 5		–	–	96	–	✔	✔	–	✔	–	slope	Flow-meter	64 PM	4.05
MSP430FW427	32	1024	48	3, 5		–	–	96	–	✔	✔	–	✔	–	slope	Flow-meter	64 PM	4.45
MSP430F4250	16	256	32	3		–	–	56	–	–	✔	–	–	✔	5/16	DAC12	48 DL, RGZ	3.10
MSP430F4260	24	256	32	3		–	–	56	–	–	✔	–	–	✔	5/16	DAC12	48 DL, RGZ	3.45
MSP430F4270	32	256	32	3		–	–	56	–	–	✔	–	–	✔	5/16	DAC12	48 DL, RGZ	3.80
MSP430F423	8	256	14	3		1	–	128	–	✔	✔	✔	–	✔	3/16	–	64 PM	4.50
MSP430F425	16	512	14	3		1	–	128	–	✔	✔	✔	–	✔	3/16	–	64 PM	4.95
MSP430F427	32	1024	14	3		1	–	128	–	✔	✔	✔	–	✔	3/16	–	64 PM	5.40
MSP430FE423	8	256	14	3		1	–	128	–	✔	✔	✔	–	✔	3/16	E meter	64 PM	4.85
MSP430FE425	16	512	14	3		1	–	128	–	✔	✔	✔	–	✔	3/16	E meter	64 PM	5.45
MSP430FE427	32	1024	14	3		1	–	128	–	✔	✔	✔	–	✔	3/16	E meter	64 PM	5.95
MSP430F435	16	512	48	3	3	1	–	128/160	–	✔	✔	–	✔	✔	8/12	–	80 PN, 100 PZ	4.45
MSP430F436	24	1024	48	3	3	1	–	128/160	–	✔	✔	–	✔	✔	8/12	–	80 PN, 100 PZ	4.70
MSP430F437	32	1024	48	3	3	1	–	128/160	–	✔	✔	–	✔	✔	8/12	–	80 PN, 100 PZ	4.90
MSP430FG437	32	1024	48	3	3	1	–	128	✔	✔	✔	–	✔	✔	12/12	(2) DAC12, (3) OPAMP	80 PN	6.50
MSP430FG438	48	2048	48	3	3	1	–	128	✔	✔	✔	–	✔	✔	12/12	(2) DAC12, (3) OPAMP	80 PN	7.35
MSP430FG439	60	2048	48	3	3	1	–	128	✔	✔	✔	–	✔	✔	12/12	(2) DAC12, (3) OPAMP	80 PN	7.95
MSP430F447	32	1024	48	3	7	2	–	128	–	✔	✔	✔	✔	✔	8/12	–	100 PZ	5.75
MSP430F448	48	2048	48	3	7	2	–	128	–	✔	✔	✔	✔	✔	8/12	–	100 PZ	6.50
MSP430F449	60	2048	48	3	7	2	–	128	–	✔	✔	✔	✔	✔	8/12	–	100 PZ	7.05
MSP430FG4616	92	4096	80	3	7	1	✔	160	✔	✔	✔	✔	✔	✔	12/12	(2) DAC12, (3) OPAMP	100 PZ	9.45
MSP430FG4617	92	8192	80	3	7	1	✔	160	✔	✔	✔	✔	✔	✔	12/12	(2) DAC12, (3) OPAMP	100 PZ	9.95
MSP430FG4618	116	8192	80	3	7	1	✔	160	✔	✔	✔	✔	✔	✔	12/12	(2) DAC12, (3) OPAMP	100 PZ	10.35
MSP430FG4619	120	4096	80	3	7	1	✔	160	✔	✔	✔	✔	✔	✔	12/12	(2) DAC12, (3) OPAMP	100 PZ	9.95

[1] *Suggested resale price in U.S. dollars in quantities of 1,000.*
[2] *USCI includes UART, IrDA, SPI and I^2C.*

*New products appear in **bold red**.*

Tuner MOPs

Device	Description	Input Frequency (MHz)	Noise Figure (dB)	Nominal Tuning Voltage (V)	Packaging	Supply Voltage (V)	Power Consumption (mW)	Price[1]
SN761672A	High-performance tuner MOP	900	9.5	30	32-pin TSSOP	5	400	0.50
SN761676	Tuner MOP with DC/DC converter	900	10.5	–0.4 to 7	38-pin TSSOP	5	1100	0.95

[1] *Suggested resale price in U.S. dollars in quantities of 1,000.*

The following devices are suggested for video and imaging applications. For a complete device listing, please visit **power.ti.com** or download/request the latest *Power Management Selection Guide*.

Device	Description	Function	Features	Package
PWM Controllers for Off-Line Supply				
UCC28600	Green mode quasi-resonant PWM controller	< 150 W flyback	Programmable OVP and soft start, green mode status pin to disable PFC	8 SOIC/PDIP
UCC3581	Fixed frequency green mode controller with adj. minimum duty cycle	< 100 W flyback	1 A driver, low 1q, up to 100 kHz	14 SOIC
UCC3813	Low-power economy BiCMOS current-mode PWM	< 200 W flyback/forward	1 A driver, up to 1 MHz, leading edge blanking	8 SOIC/PDIP/TSSOP
UCC2894	Current mode active clamp PWM controller	100 – 600 W forward	2 A drivers, zero voltage transition, low EMI, up to 1 MHz	16 SOIC/TSSOP
UCC3861	Resonant mode half bridge PWM controller	> 200 W resonant	1 A driver, up to 1 MHz, true zero current switching, 1% ref.	16 SOIC/PDIP
Power Factor Correction ICs				
UCC28051	Boundary conduction mode PFC circuit	< 200 W PFC	750 mA driver, zero power detect, variable frequency	8 SOIC/PDIP
UCC2817A/18A	Industry standard continuous conduction mode PFC	> 100 W PFC	1.2 A driver, improved noise immunity, up to 400 kHz	16 SOIC/PDIP/TSSOP
UCC28528	Advanced PFC and standby PWM combo controller	> 200 W PFC and PWM	2 A/3 A drivers, trailing edge PFC and PWM modulation, up to 600 kHz	20 SOIC
Step Down DC/DC Converters (Integrated FETs)[1]				
TPS5430	5.5 V to 36 V input, 1.22 V minimum V_{OUT}, 3 A	Non synchronous	Internal compensation, enable, fixed 500 kHz	8 HSOIC
TPS54317	3 V to 6 V input, 0.9 minimum V_{OUT}, 3 A	Synchronous	PG, enable, sync pin, adj. frequency (to 1.6 MHz), adj. softstart	20 HTSSOP
TPS54350	4.5 V to 20 V input, 0.9 V minimum V_{OUT}, 3 A	Sync or non-sync	PG, enable, sync pin, adj. frequency (to 700 kHz), 180° out-of-phase, low side gate driver	16 HTSSOP
TPS40222	4 V to 7 V input, 0.8 V minimum, 1.5 A	Non synchronous	Internal compensation, 1.25 MHz fixed	6 QFN
TPS62110	3.1 V to 17 V input, 1.2 V minimum V_{OUT}, 1.5 A	Synchronous	PG, enable, sync pin, adj. frequency (to 1.4 MHz), power save mode	16 QFN
TPS62050	2.7 V to 10 V input, 0.7 V minimum V_{OUT}, 800 mA	Synchronous	PG, enable, sync pin, adj. frequency (to 1.2 MHz), power save mode	10 MSOP
Step Down/Step Up Inverting Converters				
MC34063A	3 V to 40 V input, 40 V maximum V_{OUT}, 750 mA	Non synchronous	Up to 100 kHz, 1.5 A peak, buck/boost/ inverting circuit	8 SOIC, 8 PDIP
Step Down DC/DC Converters (External FETs)[1]				
TPS40007/9	2.25 V to 5.5 V input, 0.7 V minimum V_{OUT}	< 15 A synchronous	Adjustable softstart and current limit, fixed 300/600 kHz	10 MSOP
TPS40190	4.5 V to 15 V input, 0.6 V minimum V_{OUT}	< 15 A synchronous	Selectable current limit, 300 kHz fixed	10 QFN
TPS40200	4.5 V to 52 V input, 0.6 V minimum V_{OUT}	< 3 A non synchronous	Prog. I-limit, adj. frequency (35 – 500 kHz)	8 SOIC
TPS40055	8 V to 40 V input, 0.7 V minimum V_{OUT}	< 15 A synchronous	Prog. I-limit, adj. frequency (to 1 MHz), synchronizable	16 HTSSOP
TPS5124	4.5 V to 15 V input, 0.9 V minimum V_{OUT} dual-channel controller	< 15 A each synchronous	180° out-of-phase, up to 500 kHz, sequencing enable, minimum off/on time	30 HTSSOP
TPS64200	1.8 V to 5.5 V input, 1.2 V minimum V_{OUT}	< 3 A non synchronous	Enable, minimum on/off time	6 SOT23
TPS75003	2.2 V to 6.5 V input, 1.2 V minimum V_{OUT}	< 3 A switchers and 300 mA LDO	3 channels, independent enable/softstart, Xilinx Spartan™- 3	20 QFN
Power Interface Products				
TPS2041B	500 mA current limited power switch	USB switch	Thermal and short circuit protection	8 MSOP/SOIC
TPS2223	Dual slot cardbus interface switches	PCMCIA	Thermal and short circuit protection, make before break switching	24 SSOP/HTSSOP

[1] *Software tool available at **power.ti.com***

*Preview products are listed in **bold blue.***

Power Management Solutions

Low Drop Out Regulators				
Device	**Description**	**Function**	**Features**	**Package**
TPS770xx	2.7 V to 10 V input, 1.2 V minimum V_{OUT} 50 mA	LDO	Enable, low Iq	5 SOT23
LP2981	2.2 V to 16V input 0.8 V_{OUT} minimum V_{OUT} 100mA	LDO	Enable, fast transient	5 SOT23
LP2985	2.2 V to 16V input, 2.8 V_{OUT} minimum V_{OUT} 150mA	LDO	Enable, fast transient	5 SOT23, BGA
TPS730xx	2.7 V to 10 V input, 1.2 V minimum V_{OUT} 200 mA	LDO	Bypass pin for low noise, enable, 2.2 µF	SOT23/BGA
TPS776xx	2.7 V to 10 V input, 1.2 V minimum V_{OUT} 200 mA	LDO	Bypass pin for low noise, enable, 2.2 µF	8 SOIC/20 HTSSOP
TLV1117	2.7 V to 15 V input, 1.4 V minimum V_{OUT} 800 mA	LDO	Industry standard	3 TO263/220, 4 SOT23
TPS786xx	2.7 V to 5.5 V input, 1.2 V minimum V_{OUT}, 1.5 A	LDO	Bypass pin for low noise, enable high PSRR	6 SOT23/ 5 DDPAK
TPS51100	3 A source/sink DDR termination regulator	DDR memory LDO	Stable with 20 µF ceramic output capacitor	10 HMSOP
Display Power				
TPS65160	Bias power supply for TV and monitor TFT LCD panels	4 channels (2 charge pumps, 2 DC/DC)	1.8 A step down, 2.8 A step up, overvoltage protection, sequencing, softstart	28 HTSSOP
TL1451A	3.6 V to 50 V input dual channel PWM IC	CCFL backlight inverters	Industry standard	16 SOIC/PDIP/TSSOP
TPS68000	8 V to 30 V input CCFL controller	Full bridge phase shift topologies	Sync pin, analog and burst dimming, prog. phase delays	30 TSSOP

Plug-In Power Modules

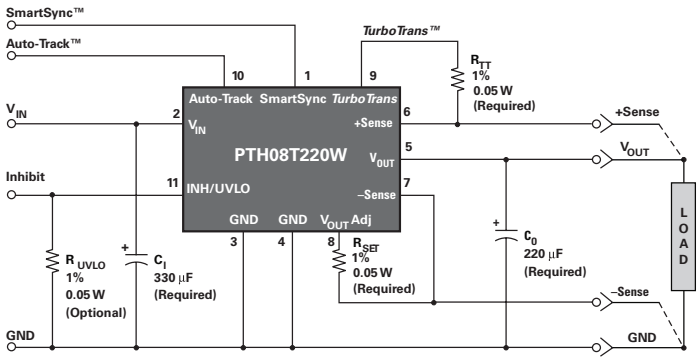
Device[1]	Input Bus Voltage	Description	P_{OUT} or I_{OUT}	V_O Range (V)	V_O Adjustable	Auto-Track™ Sequencing	POLA™	DDR-QDR	Price*
Non-Isolated Single Positive Output									
PTH04000W	3.3 V/5 V	3-V to 5.5-V input 3-A POL with Auto-Track Sequencing	3 A	0.9 to 3.6	✔	✔	✔		4.50
PTH04070W	3.3 V/5 V	3-V to 5.5-V input 3-A POL	3 A	0.9 to 3.6	✔				4.28
PTH05T210W	5 V	5-V input, 30-A T2 2nd gen PTH POL with TurboTrans™	30 A	0.7 to 3.6	✔	✔	✔		18.00
PTH08000W	12 V	8-V to 14-V input, 3-A POL	3 A	0.9 to 5.5	✔	✔	✔		4.50
PTH08080W	5 V/12 V	5-V to 18-V input, 2.25-A POL	2.25 A	0.9 to 5.5	✔				4.28
PTH08T210W	12 V	5.5- to 14-V input, 30-A T2 2nd gen PTH POL with TurboTrans	30 A	0.7 to 3.6	✔	✔	✔		18.00
PTH08T220W	5 V/12 V	4.5- to 14-V input, 16-A T2 2nd gen PTH POL with TurboTrans	16 A	0.7 to 5.5	✔	✔	✔		12.60
PTH08T230W	5 V/12 V	4.5- to 14-V input, 6-A T2 2nd gen PTH POL with TurboTrans	6 A	0.7 to 5.5	✔	✔	✔		7.90
PTH08T240W	5 V/12 V	4.5- to 14-V input, 10-A T2 2nd gen PTH POL with TurboTrans	10 A	0.7 to 5.5	✔	✔	✔		10.80

[1] *See power.ti.com for a complete product offering.*
**Suggested resale price in U.S. dollars in quantities of 1,000.*

16-A, 4.5-V to 14-V Input, POL Module with TurboTrans™
PTH08T220W

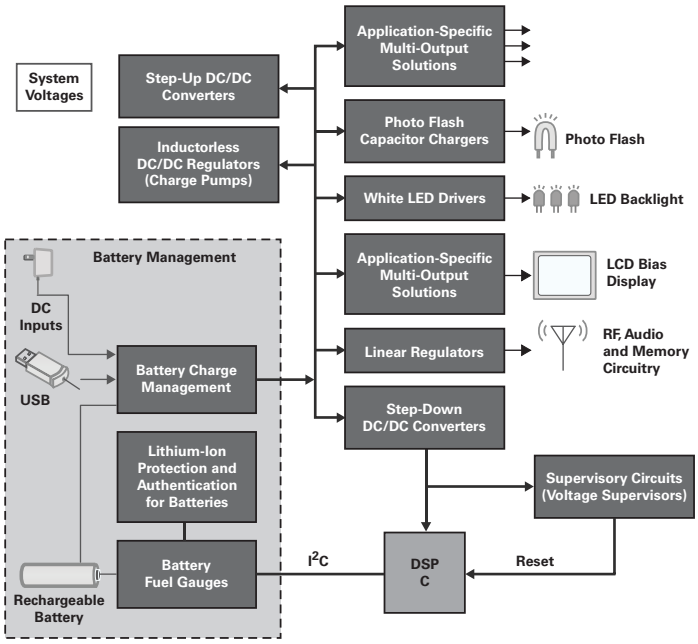
Get samples and datasheets at: **www.ti.com/sc/device/PTH08T220W**

The PTH08T220W is a high-performance, 16-A-rated, T2 point-of-load (POL) power module. Operating from an input voltage range of 4.5 V to 14 V, the PTH08T220W requires a single resistor to set the output voltage to any value over the range of 0.7 V to 5.5 V. The PTH08T220W incorporates TurboTrans technology, SmartSync and Auto-Track sequencing.



Complete Portable Power Solutions

Device	Description
Linear Regulators (LDO)	
TPS79718	10mA, 1.2-µA Micro-Power LDO in SC-70
TPS71533	50mA, 3.2-µA Micro-Power LDO in SC-70
TPS76301	100mA, Low-Cost LDO in SOT-23
TPS72118	150mA, Low-Noise, Low-V_{IN} LDO in SOT-23
TPS79301	200mA, Low-Noise, High PSRR LDO in SOT-23 and WCSP
TPS79901	200mA, Ultra-Low Noise, High PSRR LDO in WCSP
TPS71202	250mA, Dual Output, Ultra-Low Noise, High PSRR LDO
TPS73601	400mA, Cap-Free, Reverse-Leakage Protection LDO in SOT-23 and QFN
TPS79501	500mA, Low-Noise, High PSRR LDO in SOT-223
TPS79601	1A, Low-Noise, High PSRR LDO in SOT-223
LED Backlight and Camera Flash Solutions	
TPS61041	250mA Switch Boost Converter, up to 28V in SOT-23
TPS61042	500mA Switch, Current-Regulated Boost Converter in QFN
TPS61060	375mA Switch, Current-Regulated, Synchronous Boost Converter in QFN and WCSP
REG71055	Low-Cost Charge Pump for up to 3 Parallel White LED in ThinSOT-23
TPS60230	5-Channel, Current-Regulated White LED Charge Pump in QFN
TPS60231	3-Channel, Current Regulated White LED Charge Pump in QFN
TPS65552A	Xenon FLASH Charger for Digital Still Cameras with Integrated IGBT Driver
TPS61058	1.5A Switch Boost Converter in QFN for White LED FLASH
DC/DC Boost (Step-Up) Solutions	
TPS61041	250mA Switch Boost Converter, up to 28V in SOT-23
TPS61040	400mA Switch Boost Converter, up to 28V in SOT-23
TPS61070	600mA Switch Boost Converter in ThinSOT-23 for 1- and 2-cell Alkaline Applications
TPS61010	1A Switch Boost Converter
TPS61020	1.5A Switch Boost Converter in QFN
TPS61030	4A Switch Boost Converter in QFN
Display Power Solutions	
TPS61045	375mA Switch Boost Converter, up to 28V in QFN
TPS65110	3-channel Small Form-Factor LTPS Display Power Supply in QFN
TPS65120	4-channel Small Form-Factor TFT Display Power Supply in QFN
TPS65130	2-channel, Positive/Negative Power Supply for OLED Displays in QFN
TPS65160	Large Form-Factor TFT Display Power Supply
Supply Voltage Supervisors (Quick-Reference Card)	
TPS3836E18	250nA, Supply Voltage Supervisor in SOT-23
TPS3808G01	2.4µA, Programmable Delay Supply Voltage Supervisor in SOT-23
TPS3801-01	9µA, Ultra-Small Supply Voltage Supervisor in SC-70
TPS3110E12	1.2µA, Dual Supply Voltage Supervisor in SOT-23
TPS3806I33	3µA, Dual Supply Voltage Supervisor in SOT-23
Complete Power Management Units	
TPS65010	1-cell Li-Ion Charger, 1.2-A and 400-mA Step-Down Converter, 2 LDO with I^2C in QFN
TPS65020	3 DC/DC Step-Down Converters, 3 LDO, I^2C Interface in QFN
TPS65520	Fully Integrated Digital Still Camera Supply
TPS65800	Li-Ion Charger, 2 DC/DC Step-Down Converters, WLED Driver, 7 LDO, I^2C Interface, A/D in QFN



Complete Portable Power Solutions (Continued)

Device	Description
Battery Chargers	
bq2002	NiMH/NiCd Charger for Current-Limited Power Supplies
bq2057	1- to 2-cell Linear Li-Ion Charge Controller in MSOP
bq24100	1- to 3-cell Li-Ion Fully Integrated Switch-Mode Charger in QFN
bq24200	1-cell Li-Ion Fully Integrated Charger for Current-Limited Power Supplies
bq24010	1-cell Li-Ion Fully Integrated Charger in QFN
bq24020	1-cell Li-Ion Fully Integrated Charger for AC/DC Adapter and USB in QFN
bq24030	1-cell Li-Ion Charger for AC/DC Adapter and USB with Dynamic Power Path Management in QFN
bq25010	Single-Chip Li-Ion Charger with Adjustable DC/DC Converter in QFN
Battery Fuel Gauges	
bq26220	1- to 2-cell Li-Ion Battery Monitor with HDQ Interface
bq27000	1- to 2-cell Li-Ion Battery Fuel Gauge with HDQ in QFN and WCSP
bq27200	1- to 2-cell Li-Ion Battery Fuel Gauge with I^2C in QFN and WCSP
bq20z80	2- to 4-cell Li-Ion SMBus Battery Fuel Gauge with Impedance Track™ Technology
bq2084	2- to 4-cell Li-Ion SMBus Battery Fuel Gauge
Battery Authentication and Protection	
bq26150	CRC-Based Battery Authentication IC
DC/DC Buck (Step-Down) Solutions for Core and I/O	
TPS62200	300mA, 1-MHz Step-Down Converter with 12-µA Quiescent Current in SOT-23
TPS62220	400mA, 1.25-MHz Step-Down Converter with 15-µA Quiescent Current in ThinSOT-23
TPS62300	500mA, 3-MHz High-Accuracy Step-Down Converter with 1-µH inductor in WCSP and QFN
TPS62050	800mA, 10-V Vin Step-Down Converter with 12-µA Quiescent Current in QFN-10
TPS62040	1.2A, 1.25-MHz Step-Down Converter with 18-µA Quiescent Current in QFN-10
TPS62110	1.5A, 17-V V_{IN} Step-Down Converter in QFN
TPS64200	3A Step-Down Controller in SOT-23

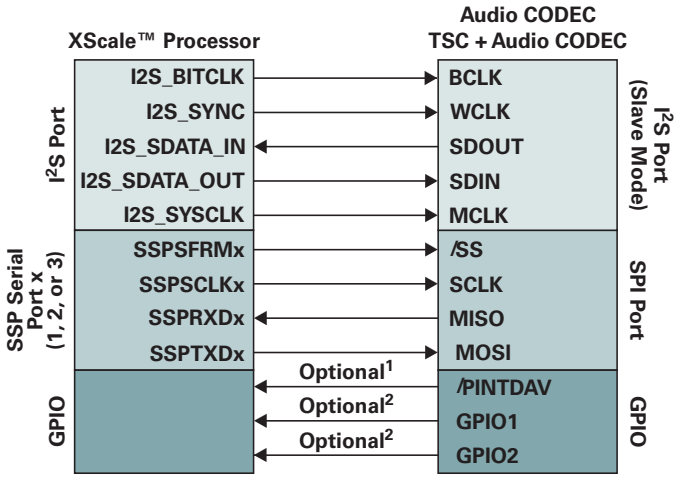
Audio CODEC Resources

Interfacing TI Audio CODECs to Standard Application Processors

TI's broad range of audio CODEC products, including audio DACs, ADCs, CODECs and touch-screen controllers (TSCs) with audio functionality, can interface to a variety of host digital processors like TI's OMAP™ and Intel's XScale® processors.

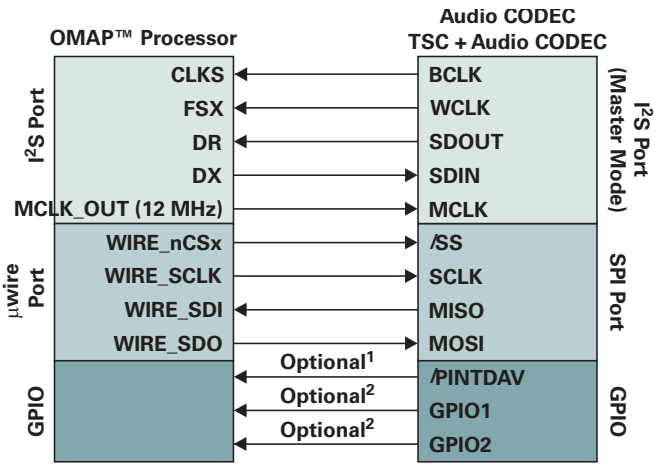
The diagrams below illustrate how both types of application processors can easily be connected to TI's range of audio CODECs and TSCs with audio functionality.

Intel XScale® Processor with TI Audio CODEC or TI Touch-Screen Controller with Audio Functionality



[1]*Needed only for TSC implementation.*
[2]*Needed headset detection and other interrupt functions.*

TI OMAP™ Processor with TI Audio CODEC or TI Touch-Screen Controller with Audio Functionality



[1]*Needed only for TSC implementation.*
[2]*Needed headset detection and other interrupt functions.*

Software Drivers for the Various Hardware and Software Platforms

TI supports many operating systems and continues to develop software drivers for the various hardware and software platforms. These are summarized in the table shown here.

TI Audio CODEC / TI ISC + CODEC	Target Applications Processor	Target OS	
ADS7846 / TSC2046 / ADS7843	Intel SA1110	Microsoft® WinCE 3.0	
ADS7846 / TSC2046 / ADS7843	Intel PXA27x	Microsoft WinCE 5.0	
TSC2100 / TSC2102 / TLV320AIC26 / TLV320DAC26	Intel PXA25x (Cotulla)	Microsoft WinCE 4.x	
	Intel PXA27x (Bulverde)	Microsoft WinCE 4.x	Microsoft WinCE 5.x
TSC2101 / TLV320AIC28/29 / TSC2111	Intel PXA25x (Cotulla)	Microsoft WinCE 4.x	Linux
	Intel PXA27x (Bulverde)	Microsoft WinCE 4.x	Microsoft WinCE 5.0
	TI OMAP1610	Microsoft WinCE 4.x	Microsoft SmartPhone 2003 (Ozone)
		Linux	Symbian 7.x/8.x
TSC2102 / TLV320DAC26	TI OMAP1510	Palm OS	
TSC2200	Intel SA1110	Microsoft WinCE 3.0	
TSC2301 / TSC2000 / TSC2200 / TSC2300 / TSC2302	Intel PXA25x (Cotulla)	Microsoft WinCE 4.x	
	Atmel AT91RM9200	Microsoft WinCE 4.x	
	Intel PXA27x (Bulverde)	Microsoft WinCE 5.x	
TSC2003	Intel PXA27x (Bulverde)	Microsoft WinCE 5.x	
TSC2004	Intel PXA27x (Bulverde)	Microsoft WinCE 5.x	
TSC2005	Intel PXA27x (Bulverde)	Microsoft WinCE 5.x	
TLV320AIC31/32/33	Intel PXA27x (Bulverde)	Microsoft WinCE 5.0	

Notes: Please check with factory for updated driver list and specific driver requests not mentioned above.

Closer, Clearer and Crisper – That's the DaVinci Effect

New DaVinci technology makes breakthrough innovation possible in digital media devices for the hand, home and car. DaVinci is optimized for digital video systems and includes digital signal processor (DSP) based system on chips (SoCs), multimedia CODECs, ASPs and frameworks and development tools. These integrated components are the industry's first complete offering of an open platform. Visit **www.thedavincieffect.com** for more information.

DaVinci Frequently Asked Questions

How does DaVinci technology make video application design easier, faster and more differentiated? Find the answers at the DaVinci FAQs. **www.ti.com/davincifaq**

DaVinci Technical Brief

This technical brief will get you up to speed on DaVinci's advanced technology with background and specifications on DaVinci processors, software and development tools, all of which have been optimized to work interdependently for digital video end equipments. Review this technical brief at **www.ti.com/davincitechbrief**
Find complete DaVinci technical documentation at **www.ti.com/davinci**

Free DaVinci CD

The comprehensive DaVinci technology CD includes white papers, a technical fact sheet, benchmarks, a product bulletin and much more. Go to **www.ti.com/davincicd** to get your free copy today.

Video360 Blog

Read the latest musings from the team of TI's digital video personalities. From Gene Frantz, TI principal fellow, to Jeremiah Golston, senior member technical staff, TIers discuss what drives our product development cycles and what we are learning from our customers.
www.ti.com/davinciblog

Video360 Monthly Podcast and Vidcast on Hot Topics in Digital Video

Join the monthly episodes of the Video360 podcast and vidcast, which feature industry news, roundtable discussions, technology updates and practical tips on the latest innovations in digital video.
www.ti.com/davincipodvidcast

DaVinci Webcast

Discover how the first products based on DaVinci technology will simplify digital media innovation, saving months of development time and lowering overall system costs. TI's DaVinci technology eliminates the complexity of digital video, making it as easy to implement as an off-the-shelf component. Go to **www.ti.com/davinciwebcast** to see the latest breakthroughs of DaVinci technology.

Free Online Training

Learn how to start immediate evaluation of DaVinci processors with the Digital Video Evaluation Module, get more information on the multimedia CODECs, ASPs and frameworks, and access additional resources available to you. **www.ti.com/davincitraining**

Highlighted White Papers and Technical Documents

The Future of Digital Video
The applications for video go far beyond mere playback of existing content. With advanced processing technology, not only is a higher quality user experience possible, but so are a whole new range of innovative applications in which the device is able to intelligently use video to improve quality of service, operating reliability and user safety. Read this white paper and consider the possibilities of a whole new world enabled by digital video technology. **www.ti.com/davinciwhtppr1**

DaVinci Technology for Digital Video
DaVinci technology provides the industry's first completely integrated offering of processors, software and tools to enable customers to develop digital video products that transform the way consumers experience digital video. This paper addresses how this system approach will allow OEMs to innovate with DaVinci technology. Read this white paper and get the inside scoop on DaVinci technology.
www.ti.com/davinciwhtppr2

The DaVinci Effect: Digital Video Without Complexity
Until now, implementing digital video has been a complex, time-consuming and expensive process. As a result, digital video has been unfeasible for the majority of consumer and embedded applications. All this changes with DaVinci technology. Read this white paper and find out how. **www.ti.com/davinciwhtppr3**

Customer Reviews

Hear what customers and partners think about the industry's first completely integrated offering of digital video processors, software and tools. **www.ti.com/davincicustomerreview**

Third Party Support

Many of TI's valued Third Party Network members provide integral components and tools that complement DaVinci technology. These third parties offer various levels of video system integration, optimization and system expertise on DaVinci products worldwide. Visit **www.ti.com/davinci3psupport** and find out how TI's third party support can make your digital video innovations a reality.

DLP® and DSP Development Tools

DMD Discovery™ 1100–DLP® Technology Developer Kit –
The DMD Discovery Developer Kit is designed to enable non-projector applications of Texas Instruments' Digital Micromirror Device (DMD) – the same technology used in DLP TVs and projectors. DMD Discovery products enable the system developer to load binary data into the DMD and create light patterns with high update rates. Discovery products are flexible by design to facilitate exciting new products based on DLP technology. The kit includes an easy-to-use GUI along with comprehensive data sheets and schematics.

For more information contact TI at 1.888.DLP.BYTI or visit **www.dmddiscovery.com**

DMD Discovery Developer Kit, laptop not included

Video and Imaging Hardware and Software Development Tools

Description	Part Number	Price[1]
Hardware Development Tools		
TMS320DM642 Digital Media Development Kit (DM642 DMDK)	TMDSDMK642 (U.S. part number) TMDSDMK642-0E (European part number)	6,495
Video Security over Internet Protocol Development Platform (VSIP) – NTSC format	TMDXVSK642 (U.S. part number)	15,000
VSIP Development Platform – PAL format	TMDXVSK642-0E (European part number)	
VSIP Development Platform with ATEME Emulator – NTSC format	TMDXVSK642-3 (U.S. part number)	16,000
VSIP Development Platform with ATEME Emulator – PAL format	TMDXVSK642-3E (European part number)	
Videophone Development Platform	TMDSVDP64X-2 (U.S. part number)	6,950
Network and Video Development Kit	TMDX3PNV6416S (U.S. part number)	4,495
Network and Video 1-GHz Development Kit	TMDXNVK6415-T (U.S. part number) TMDXNVK6415-TE (European part number)	4,495
Evaluation Module (EVM)		
Digital Video Evaluation Module (DVEVM)	TMDXEVM6446 (U.S. part number) TMDXEVM6446-0E (European part number)	1,995
TMS320DM642 Evaluation Module	TMDSEVM642 (U.S. part number) TMDSEVM642-0E (European part number)	1,995
JTAG Emulators		
XDS560™ PCI-Based High-Performance JTAG Emulator	TMDSEMU560	3,995
XDS560 Blackhawk USB High-Performance JTAG Emulator	TMDSEMU560U TMDSEMU560U-0E (European part number)	2,995
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
Software Development Tools		
Code Composer Studio Platinum Edition Development Tools Bundled with Annual S/W Subscription Supports C6000™, C5000™, C2000™ and OMAP™ platforms	TMDSCCSALL-1	3,595
C6000, C5000, OMAP, C2000 DSP Code Composer Studio™ Development Tools Annual Software Subscription for Version 3.1 and higher	TMDSSUBALL	600
Essential Guide to Getting Started with DSP CD-ROM Includes C6000 DSP Code Composer Studio 120-Day Free Evaluation Tools[2]	SPRC119C (**www.ti.com/freetools**)	Free
TMS320C62x™ DSP Image Library	SPRC093	Free
TMS320C64x™ DSP Image Library	SPRC094	Free

[1] Prices are quoted in U.S. dollars and represent year 2006 suggested resale pricing. All prices are subject to change. Customers are advised to obtain the most current and complete pricing information from TI prior to placing orders. TI may verify final pricing prior to accepting any order.
*New tools are listed in **bold red**.*
[2] Includes full-featured Code Composer Studio Development Tools, code generation tools (C/C++ compiler/assembler/linker) and simulator all limited to 120 days.

Video and Imaging DSP Signal Processing Libraries

Signal Processing Libraries	Web Search Literature #
TMS320C55x™ DSP Imaging Software Library	www.ti.com/c55ximagingdsplib
TMS320C62x™ DSP Image Library	www.ti.com/c62xdsplib
TMS320C64x™ DSP Image Library	www.ti.com/c64ximagelib

Video and Imaging Integrated Solutions

For more information on TI's video and imaging solutions, go to **www.ti.com/videoandimaging**

Digital Video Evaluation Module (DVEVM) – The Digital Video Evaluation Module (part number TMDXEVM6446) enables developers to start immediate evaluation of DaVinci™ processors and begin building digital video applications such as videophones, automotive infotainment, digital still cameras, streaming media, IP set-top boxes, video security systems and digital video products that have yet to be invented. The DVEVM allows developers to write production-ready application code for the ARM® and provides access to the DSP core using DaVinci APIs.

Digital Video Evaluation Module

The DVEVM includes the MontaVista Linux Professional Edition 4.0 and GNU development tools. In addition, with demonstration versions of the H.264, MPEG4, MPEG2, ACC+ and G7.11 CODECs, developers are able to benchmark and evaluate performance parameters.

The many connectivity options of the DVEVM can accommodate most peripheral devices or configuration alternatives. USB 2.0, a 10/100 Ethernet interface and video input/output port are included on the DVEVM. The daughtercard connections on the DVEVM give developers the ability to rapidly deploy various configurations for prototyping purposes.

For additional information, visit **www.ti.com/davinci**

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 100 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

DSP Development Tools

TMS320DM642 Digital Media Development 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 C64x™ DSP core, this development platform supports TI's DM642, 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**

TMS320DM642 Digital Media Development Kit

VSIP Development Platform

Video Security over Internet Protocol (VSIP) Development Platform – The VSIP development platform enables developers to build intelligent security cameras that take advantage of a digital IP network by leveraging the real-time performance and flexibility inherent in DSP technology.

Offering the flexibility of a programmable DSP solution, the VSIP development platform allows developers to change compression standards, add specific processing capabilities and develop different products on the same hardware platform – enabling a wide range of products and creating a future-proof system.

Using the VSIP development platform, developers can leverage advanced digital functionality by incorporating this function directly into a standalone IP camera or by incorporating functionality into a network encoder that supplies digital intelligence for multiple standard analog surveillance cameras. In the latter scenario, developers benefit from the ability to use existing cameras without the expense of replacing them with new ones.

The VSIP includes all the hardware, software and tools needed to create a fully digital system for the encoding and transmission of camera surveillance information.

The development platform is among the first to offer MPEG4 compression, the latest and most efficient of the MPEG video compression algorithms, designed to minimize bandwidth requirements in network video transmission. Since the VSIP is an application-oriented, open platform, it is not necessary for developers to have a deep understanding of DSP programming techniques. Moreover, application software from developers and third parties is easy to integrate, allowing straightforward customization for market differentiation.

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

eXpressDSP™ Software and Development Tools

Standardization and Software Reuse Move DSP Development to a New Level

- 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
- Designed to cut development time by up to 50 percent and increase the modularity

Tools and Standards to Simplify Application Development, Reduce System Cost, Enhance Product Robustness and Innovation and Accelerate Time-to-Market

- Powerful, integrated development environment (Code Composer Studio™ Development Tools)
- Scalable real-time kernel (DSP/BIOS™ Kernel)
- 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

eXpressDSP SOFTWARE & DEVELOPMENT TOOLS

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/dsp**

Code Composer Studio Development Tools

- Comprehensive IDE includes tools for editing, debugging, compiling, code profiling and more
- Free evaluation tools available
- Sophisticated project manager enables team-based development
- Fast simulators provide deeper visibility for quick and precise problem resolution
- Analysis tools boost performance and simplify tedious tasks
- Advanced Code Tuning tools take weeks out of the optimization process

XDS560™ Emulator

- Real-time JTAG-based emulator supporting high-speed RTDX™-enabled devices
- 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 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, RF3, RF5 and RF6)
- Saves time – eliminates design, build and test of low-level parts of DSP solution

eXpressDSP DSP/BIOS Kernel

- No run-time royalty – free with Code Composer Studio Development Tools
- 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

TI DSP Third Party Network

- Get started now and focus on differentiating your product. Over 700 third parties offer hundreds of compliant algorithms, hardware boards, emulators and more
- More than 1,000 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

DSP Software–Third Party Network Vendors

ATEME
S. Europe
www.ateme.com

ATEME is a world-leading provider of advanced video compression technology. Its expertise is available through IP cores for DSP, FPGA and PC libraries, development platforms, production-ready designs and custom services: hardware design, IP customization and software integration. The superior quality of ATEME's encoding IPs and the interoperability of its CODECs have been widely recognized by both independent testing and customers' benchmarks and make them the best choice for video security, streaming media or pro-AV appliances.

Ingenient Technologies
Central USA
www.ingenient.com

Ingenient Technologies offers a wide spectrum of embedded software plus hardware products and system solutions that enable the creation, delivery, management and presentation of rich multimedia content. Ingenient's products are building blocks for the formation of embedded multimedia system solutions spanning a diverse group of commercial markets including consumer electronics, video security and surveillance systems, video servers and video infrastructure equipment.

Ittiam Systems
India
www.ittiam.com

Ittiam Systems, headquartered in Bangalore, is a technology product company singularly focused on DSP systems in media and communications. The company operates through its network of offices and representatives around the world. Ittiam's customers include Fortune 100 companies and their products are distributed across the U.S., Europe, Japan and Asia. In 2004, Ittiam was rated as the "World's Most Preferred DSP IP Supplier" by Forward Concepts. In 2005, Ittiam was nominated to the Red Herring Asia list.

eInfochips
India
www.einfochips.com

eInfochips is a premier TI Third Party having extensive experience with TI's TMS320C64x™ DSP platforms and provides complete solutions from concept to prototype development including hardware design, firmware development and application integration in the areas of audio, video/imaging and communications and a portfolio of OEM-ready solutions. eInfochips' DSP services include algorithm design and development, processor-specific software optimization, board support packages and assistance with choosing the best DSP processor for specific applications, as well as complementary ARM® and FPGA devices.

Emuzed
India
www.Emuzed.com

Emuzed, a Flextronics Company, is a leading supplier of software services and solutions to the mobile and consumer electronics markets. Our products have been integrated into more than 25 million mobile phones. We provide applications such as mobile DTV, streaming video, image, speech and audio recorders/players, along with middleware for networking and application development and encoders/decoders based on the latest standards, such as H.264, MPEG4 and DVB-H. We also provide professional software services to corporations that require customization and integration of mobile applications into their business processes. Our target customers are enterprises, device manufacturers, network operators, semiconductor manufacturers and vertical application developers.

DivX Networks
Western USA
www.divxnetworks.com

DivX, Inc. creates and distributes DivX® video technology, the de facto standard for digital video. The company's latest release is DivX 6, which introduces the DivX Media Format, including DivX video, audio and advanced media features like menus, subtitles and alternate audio tracks for a truly interactive experience. With vast amounts of DivX video content, 200 million users and 50 million DivX-Certified products expected on the worldwide market in 2005, DivX drives an entire ecosystem of interoperable platforms and devices.

ObjectVideo
Eastern USA
www.objectvideo.com

ObjectVideo OnBoard is the product line that delivers functionality from the award-winning software ObjectVideo VEW as an application running on a digital signal processor (DSP). This allows original equipment manufacturers (OEMs) to significantly increase the value and effectiveness of their video solutions by providing devices with intelligent video analytics built-in. Users can specify objects of interest and determine if those objects, for example, cross a video tripwire, enter a specified area of interest or simply appear in the camera view. Rules are processed within the intelligent device for real-time comparison to the video analysis.

DSP Software–Third Party Network Vendors

W&W Communications

Western USA

www.wwcoms.com

W&W Communications' develops a range of Video CODECs optimized for Texas Instruments DSPs. Its H.264 CODEC is the most efficient and flexible H.264 compression solution for full D1 and two-way communication available today. Its H.264 CODEC is focused on the video conferencing, video phone, mobile video and live streaming markets where latency and exceptional video quality are major factors. Its H.264 encodes at full D1 resolution or multiple CIF channels on a single TMS320DM64x™ or TMS320C64x™ DSP-based processor.

Wintech Digital

China

www.wintechdigital.com

Wintech Digital Systems Technology Corp. is an embedded video communication solution and DSP development tool provider. It has developed DSP development platforms, target boards, emulators and DSP application software. It has also developed TMS320DM64x™ DSP-based video communication solutions. Wintech has strong R&D capability and marketing resources. Wintech's management team has experience in development, production and marketing. Wintech owns multiple patents and has developed a series of well-adopted DSP solutions.

eSol

Japan

www.esolglobal.com

eSOL is a leading embedded software developer with core technologies in real-time operating system suites and integrated development environments for TMS320DM644x DSP-based processors – the leading DaVinci™ technology platform from Texas Instruments. With many years of participation in a wide range of RTOS standards such as ITRON and T-Kernel, our solutions offer not only proven RTOS suites, but also a rich set of middleware, drivers and rugged development tools to support the complex development process for RTOS-based applications. Today, thousands of products being sold worldwide, from consumer electronics to industrial automation, incorporate our technology.

Mediaworks

Korea

www.mediaworks.co.kr

Mediaworks Inc. provides multi-CODEC IP set-top-box hardware solutions and development services. Their solutions include MPEG4, MPEG2 and WMV9 algorithms, an MPEG4 encoder/decoder based on the TMS320DM642 digital media processor, MPEG4 16-ch DVR solution and a 4-ch video server solution. Mediaworks now offers total custom solutions based on TI products for IP STB, DVR, web cameras, mobile phones, software transcoders and web broadcasting to meet customers' requirements. Mediaworks has experience with at least one of every major IP STB manufacturer, from development to mass production, and now looks forward to engaging in DaVinci™ technology-based projects.

YMagic Technologies Ltd.

Israel

www.ymagic.com

YMagic Technologies Ltd. is a design house developing Texas Instruments-based platforms for video processing, surveillance and recording applications. YMagic's GALAXIA™ family supports a wide range of video I/Os, Ethernet and serial communication, USB and IDE storage, dry contacts and more, targeted for real-world systems realization. Offering a unique level of integration between hardware, software and system capabilities, GALAXIA platforms allow OEM developers faster design, shorter time-to-market and reduction of overall design costs.

eXpressDSP™-Compliant Third-Party Algorithms

VIDEO & IMAGING ALGORITHMS	
BSAC	MPEG2 PS/TS Demux
DivX	MPEG4
Dolby® Digital	MPEG4 AAC LC
DV25	MPEG4 Simple Profile
H.263	MPEG4 SP Transrater
H.263 Baseline Profile	MPEG4 Advanced Simple Profile
H.264	MPEG4 ASP Transrater
H.264 Baseline Profile CIF	MPEG4 ASP L4&L5 Transrater
H.264 Baseline Profile D1	MPEG4 Fine Granularity Scalable Profile Transrater
H.264 Main Profile	MPEG4 H.264 Transrater
JPEG	MPEG4 AAC/HE
JPEG2000	MPEG4 Simple Scalable Profile
JPEG/GIF/BMP/TIFF	WMV9
MJPEG	WMV Main Profile
MP3	All combinations of MPEG4 to MPEG2 to H.264 to WMV transcoders
MPEG1/2 Layer II	
MPEG2	
MPEG2 AAC LC	

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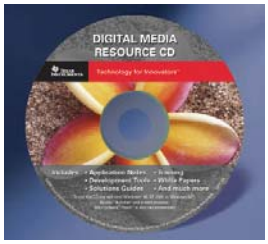

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Download these free white papers and consider the possibilities of a whole new world enabled by digital video technology!

The Future of Digital Video

The applications for video go far beyond mere playback of existing content. With advanced processing technology, not only is a higher quality user experience possible, but so are a whole new range of innovative applications in which the device is able to intelligently use video to improve quality of service, operating reliability and user safety.

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DaVinci™ Technology for Digital Video

This paper addresses how this system approach will allow OEMs to innovate with DaVinci technology. Read this white paper and get the inside scoop on DaVinci technology.

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The DaVinci™ Effect: Digital Video Without Complexity

Until now, implementing digital video has been a complex, time-consuming and expensive process. As a result, digital video has been unfeasible for the majority of consumer and embedded applications. All this changes with DaVinci technology.

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TI DSP Training Options

TI | Developer Conference

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- Control
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Available 24 hours a day, seven days a week, the TI DSP KnowledgeBase is the industry's most complete online 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.

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Support

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Getting Started with TI DSP

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www.ti.com/gettingstarted

The Essential Guide to Getting Started with DSP CD-ROM

This free CD contains links to a variety of getting started resources including documentation and the latest new product information. It also provides you with a guided tour of eXpressDSP™ Software and Development Tools and a 120-day free evaluation of the Code Composer Studio™ Platinum Edition for the TMS320C2000™, TMS320C5000™, TMS320C6000™ DSP and OMAP™ processor platforms. Order your CD-ROM today at

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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.

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Publications

DSP and Analog eNewsletters

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Video Conferencing Infrastructure

	C6455 DSP (1 GHz)	C6415T DSP (1 GHz)
Standalone CODECs		
H.263 (Baseline) Decode	Multi D1	Multi D1
H.263 (Baseline) Encode	Multi D1	Multi D1
H.264 (Baseline) Decode	Multi D1	Multi D1
H.264 (Baseline) Encode	D1	D1
Microsoft® WMV9 Decode	Multi D1	Multi D1
Microsoft WMV9 Encode	D1	D1
Additional Features		
Capture/Display	EMIF/PCI/SRIO	EMIF/PCI
Performance (MIPS)	8000	8000
On-Chip Memory (L1/L2)	64 KB/2048 KB	32 KB/1024 KB
Peripheral Integration	Serial RapidIO™	PCI[1]

Video Conferencing Client Endpoints/Terminals

	DM6446 Digital Media Processor (597 MHz)	DM642 DSP (720 MHz)
Standalone CODECs		
H.263 (Baseline) Decode	Multi D1	Multi D1
H.263 (Baseline) Encode	Multi D1	Multi D1
H.264 (Baseline) Decode	Multi D1	Multi D1
H.264 (Baseline) Encode	D1	D1
Microsoft® WMV9 Decode	Multi D1	Multi D1
Microsoft WMV9 Encode	D1	D1
Additional Features		
Capture/Display	2 Video Ports	3 – 20-Bit Video Ports
Performance (MIPS)	4752	5760
On-Chip Memory (L1/L2)	112 KB/64 KB	32 KB/256 KB
Peripheral Integration	2 Video Ports, 10/100 EMAC, MMC/SD, ASP, I^2C, SPI, VLYNQ, USB 2.0, UART	3 Video Ports, EMAC, PCI[2], HPI

Video Infrastructure Systems

	C6455 DSP (1 GHz)	C6415T DSP (1 GHz)
Standalone CODECs		
MPEG4 SP Decode	Multi D1	Multi D1
MPEG4 SP Encode	Multi D1	Multi D1
MPEG4 ASP Decode	Multi D1	Multi D1
MPEG4 ASP Encode	Multi D1	Multi D1
MPEG2 MP @ ML Decode	Multi D1	Multi D1
MPEG2 MP @ ML Encode	Multi D1	Multi D1
H.264 (Baseline) Decode	Multi D1	Multi D1
H.264 (Baseline) Encode	D1	D1
Microsoft WMV9 Decode	Multi D1	Multi D1
Microsoft WMV9 Encode	D1	D1
Additional Features		
Performance (MIPS)	8000	8000
On-Chip Memory (L1/L2)	64 KB/2048 KB	32 KB/1024 KB
Peripheral Integration	Serial RapidIO	PCI[1]

For more information, please contact your local Product Information Center.
All performance data is for 30 fps YUV 4:2:0 unless otherwise noted.
Note: Performance will vary depending on efficiency of code and data stream used.
Resolution information: D1 (720x480) / CIF (352x288)
[1]33-MHz, 32-bit
[2]66-MHz, 32-bit
SP = Simple Profile / ASP = Advanced Simple Profile / MP @ ML= Main Profile @ Main Level

Commonly Used Terms

Advanced Simple Profile – Similar to Simple Profile but more efficient; requires higher bit rate, but produces better quality video. Useful in broadcast, Internet, software decoding, video telephony and some mobile phones.

Audio Interface – Interfaces with the microphone/speaker and use the CODEC to digitize the audio signal. The digital audio data will be processed along with digital video data by the DSP.

CIF – Common Intermediate Format. Resolution standard. 352 × 288 in PAL and 352 × 240 in NTSC. Popularized due to VCD.

Composite – A video signal where all information (red, green, blue, and sometimes audio) is mixed together. Used for NTSC. Computer monitors tend to use separate RGB signals to achieve better quality.

CVBS – Composite Video Blank and Sync. Analog single-channel video w/o audio. Usually transmitted via BNC or RCA cable.

D1 – Resolution Standard of 720x480 pixels for NTSC and 720x576 in PAL and SECAM.

DaVinci™ – TI's DaVinci technology is a collection of DSP-based system solution components tailored for efficient and compelling digital video – for digital cameras, video security, advanced medical imaging, portable video players or any other video application you can imagine.

DTV – Because digital television allows you to pack much more information into the allotted signal, we can transmit multiple channels on the same bandwidth instead of just one. Digital television set-top boxes are used for satellite, cable, and terrestrial DTV services. They are especially important for terrestrial services because they guarantee viewers free television broadcasting.

H.263 – Low bit-rate (20–30 kbps) CODEC designed for videoconferencing and videophones; main features include motion estimation and motion compensation (estimating where blocks move rather than resending the data).

H.264 – Also known as MPEG AVC; low bit rate but higher video quality than H.263; designed for videoconferencing and videophones; preliminarily used for DVD encoders.

H.323 – Communications protocol over any packet network; popularized by NetMeeting, Voxilla and VoIP.

HD – High Definition. Refers to many different formats over the years for video cameras and camcorders, both analog and digital, that exceeded the resolution of analog TV (NTSC, PAL). In 1998, the U.S. introduced an official set of digital TV standards that included HD.

HDTV – High Definition Television. A set of digital television (DTV) standards that offer the highest resolution and sharpest picture. Resolution display from 720p to 1080i.

I^2C – Inter-IC bus – A two-wire serial bus with speeds up to 400 kbps.

IPTV – Internet Protocol-based Television. Transmitting TV programs from a Web site or from private Internet providers such as cable and telephone companies (cable modems and DSL). Also called "TV over IP," IP TV uses streaming video techniques to deliver scheduled TV programs or video on demand (VOD).

ITU-R BT.601-2 – Formerly known as CCIR 601. An international standard for component digital television; defines the sampling systems, matrix values, and filter characteristics for both Y, B-Y, R-Y and RGB component digital television.

ITU-R BT.656 – Defines the parallel connector pinouts as well as the blanking, sync, and multiplexing schemes used in both parallel and serial interfaces.

Interlaced – Technique to reduce bandwidth by displaying only half the screen at a time. The fps is doubled so when the odd lines are followed by the even lines, remnants on the screen create the appearance of a full frame. Popularized by Television: NTSC interlaces at 60 half-images per second and PAL at 50 half-images per second.

Memory – Stores executing code and data/parameters.

MPEG – Video compression CODEC – abbreviation for Motion Pictures Experts Group.

MPEG4 – Popularized by DivX. Designed for low bandwidth mobile applications. Compression from 20:1 to 300:1.

Network Interface – Transmit and receive voice/video data packets through the IP network.

NTSC – The National Television Standards Committee. Used in North America and Japan. Contains 480 horizontal lines of data and 29.907 frames per second (fps).

PAL – Phase Alternating Line. Standard for Australia and Eurasia. 576 horizontal lines of data and 25 fps.

Power Conversion – Converts the input power from the AC adaptor or from the PoE to run various functional blocks.

QCif – Quarter Common Intermediate Format, a videoconferencing format of 30 fps, each frame containing 144 lines and 176 pixels per line.

S-Video – Super video. Divides information into two signals: color and brightness. Produces sharper images than composite.

SD – Standard Definition. Refers only to the format.

SDTV – Standard definition television (SDTV) is a digital television (DTV) format that provides a picture quality similar to digital versatile disk (DVD). Because a compressed SDTV digital signal is smaller than a compressed HDTV signal, broadcasters can transmit up to five digital SDTV programs simultaneously instead of just one HDTV program. This is multicasting.

SECAM – Systeme Electronique Couleur Avec Memoire. Used in some of Europe and spotted worldwide locations. 625 lines and 25 fps.

Simple Profile – Provides efficient coding of rectangular objects; designed for mobile networks; is error-resilient, has low latency, needs low processor power and is useful in less-than-ideal transmission conditions.

SIP – Session Initiation Protocol; designed for VoIP.

VBI – Vertical blanking interval, the part of a television transmission signal that is blanked, or left clear, of viewable content, to allow time for the television's electron gun to move from the bottom to the top of the screen as it scans images. This blank area is now being used to broadcast closed caption and HTML-formatted information.

Video Decoder – Digitizes, demodulates and decodes the NTSC/PAL/SECAM/S – video to be used by the video processor.

Video Processor – Performs real-time image capture processing, compression and decompression, color space conversion and real-time display, and data packetization for data communication over the IP network.

SIMPLE, AFFORDABLE, HIGH-PERFORMANCE VIDEO PROCESSING IN ANY FORMAT, ON ANY DEVICE.

THAT'S THE DAVINCI EFFECT.

The DaVinci™ technology is a DSP-based system solution tailored for digital video applications that provides optimized software, development tools, integrated silicon and support to simplify design and stimulate innovation in less time. It consists of:

- **OPTIMIZED APPLICATION SOFTWARE:** Interoperable, optimized, off-the-shelf digital video and audio codecs, protocols and user interfaces leveraging integrated accelerators, published APIs and application-specific frameworks that utilize a variety of real-time operating systems for rapid implementation
- **DEVELOPMENT TOOLS:** Complete development systems, reference designs and comprehensive ARM/DSP system-level IDE to speed design
- **INTEGRATED SILICON:** Scalable, programmable DSP-based system-on-chip solutions tailored for digital video applications
- **SUPPORT:** System integrators, hardware and software providers as well as TI and third party comprehensive video system expertise

FOR MORE INFORMATION

Visit www.ti.com/davinciproducts for more information on DaVinci for digital video innovations, such as:

- White Papers
- DaVinci Podcast
- DaVinci Blogs
- Video360 Monthly Podcast and Vidcast on Hot Topics in Digital Video
- DaVinci Webcast
- DaVinci Benchmarks
- DaVinci Frequently Asked Questions
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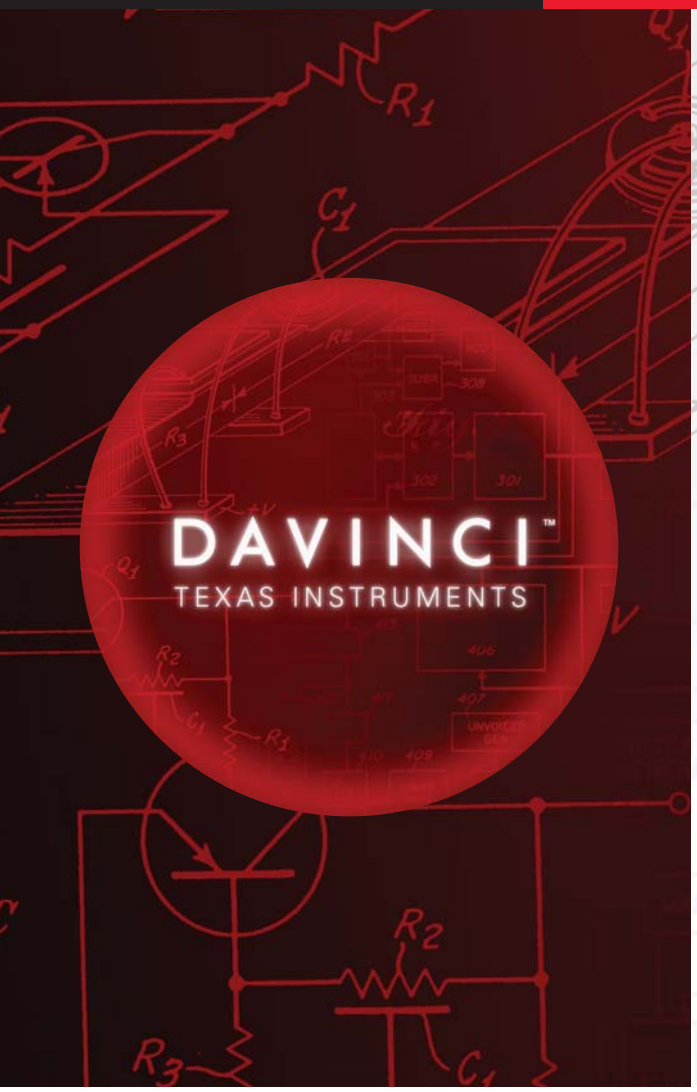

Technical Documentation

eNewsletter

Product Information

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