Product Bulletin

DaVinci™ TMS320DM6441 Processor Enables New Levels of Digital Video Performances in the Portable Space

DaVinci technology makes breakthrough innovation possible in digital media devices for the hand, home and car. DaVinci is the first integrated portfolio of digital signal processing SoCs, software, tools and support optimized for digital video systems. These integrated components are the industry's first complete offering of an open platform.

Operating Systems and Device Drivers • MontaVista Linux LSP
Multimedia Application Programming Interfaces (APIs) • Industry-recognized APIs • DaVinci APIs
Middleware • CODEC abstraction • Interprocessor communication • Audio/Video frameworks
Multimedia CODECs • AAC • AAC+ • G.711 • G.723.1 • G.728 • G.729ab • H.263 • H.264 • JPEG • MP3 • MPEG-2 • MPEG-4 • WMA8 • WMA9 • WMV9/VC1

Table 1. DaVinci Software – Optimized for Simplified and Efficient Innovation

Sampling Today, DaVinci Processors Reduce System Cost

The portfolio of DaVinci technology based processors leverage TI's newest TMS320C64x+™ DSP core and consist of scalable, programmable digital signal processing SoCs, accelerators and peripherals that are optimized to match the price, performance and feature requirements for a broad spectrum of digital video end equipments.

Because of the array of software and support surrounding it, DaVinci technology brings together what had been poles apart: the optimized, off-the-shelf capabilities of fixed-function devices like ASICs or SoCs and the flexibility and adaptability of open-ended programmable devices such as DSPs, general-purpose CPUs and FPGAs. In the end, manufacturers want the best of both worlds. They want the fast time-to-market of fixed-function devices without giving up the differentiated, competitive functionality derived from programmable technology. DaVinci technology provides both.

The four pillars of DaVinci technology – software, hardware, development tools and support – deliver differentiated and compelling digital video capabilities like never before: quickly, efficiently and cost effectively.

Key Features

- Integrated portfolio of digital signal processing SoCs, software, tools and support
- Optimized for digital video systems, DaVinci technology accelerates innovation
- A complete portfolio of TI-developed digital media software is now widely available to further simplify design

Complete System Tools and Support Get You to Market Faster

Developers can get started today with DaVinci-based software and development tools tailored to simplify design in video applications, including these TMS320DM644x development tools:

- **Digital Video Evaluation Module –** Composed of both hardware and software, this tools enables developers to start instantaneous evaluation of DaVinci processors and begin building digital video applications.
- **Digital Video Software Development Kit (DVSDK) –** The DVSDK is designed to tune complex DaVinci-based digital video systems quickly and efficiently. The DVSDK significantly improves software integration and system visibility by incorporating tools such as:
  - The eXpressDSP™ Configuration Kit
  - The TMS320DM644x SoC Analyzer
  - MontaVista's Linux Operating System

- **Digital Media Software –** To simplify development and reduce cost in your digital media application, a complete portfolio of TI-developed digital media software is now widely available.
- **TMS320DM644x Development Tools –** A development platform leveraging the entire DaVinci™ technology ecosystem – including the codec engine, eXpressDSP™ data visualization technology and digital media software for the TMS320DM644x devices.

DaVinci products are backed by TI's Third Party Network, which offers video system expertise to customers worldwide. In addition to DaVinci products, TI offers a complete portfolio of high-performance analog products for video applications.

Software: Simple Yet Powerful

The DaVinci software infrastructure transforms what could be an inherently complex challenge into a simple process without sacrificing any of the underlying power, performance and functionality. Manufacturers remain focused on the digital video features and content of their products and don't become mired in the intricacies of optimizing codecs.

Starting with a solid foundation of full-featured operating systems and basic device drivers, DaVinci technology can call on a wide selection of ready-to-implement video codecs supporting a comprehensive range of functionality. Popular OSs, beginning with MontaVista™ Linux and others soon to follow, reduce any learning curve and give engineers an environment they are familiar with.

A robust layer of software composed application programming interfaces (APIs) as well as middleware frameworks insulate developers from the minutiae of low-level programming tasks. For example, any of the ready-to-use multimedia codecs can be readily changed without modifying application code. DaVinci technology features its own powerful API in addition to industry-recognized programming interfaces. The middleware software layer facilitates interprocessor communications between the dual cores, ensuring that all of the hardware and software elements integrated into the DaVinci architecture work together effectively and efficiently without extra tuning by developers.

The APIs and middleware frameworks let developers program DaVinci technology at a high level and as a whole rather than as two distinct processing elements. Developers need not concern themselves with which processing core a task is executing on. They simply take advantage of the DaVinci ARM®/DSP integrated development environment (IDE) and focus on the value-added features of their product or system. At the same time, should direct access to the power of the DSP or ARM be required, developers have at their disposal all of tools of the platform's OS as well as TI's award-winning DSP programming tools, including the powerful Code Composer Studio™ IDE.

To further simplify development and reduce cost in your digital media application, a complete portfolio of TI-developed digital media software is now widely available.

The DaVinci™ software empowers manufacturers to concentrate on the factors that have direct bearing on the success of their products – those differentiating capabilities that make successful products stand out over their competition.

Hardware for Digital Video

The TMS320DM6441 DaVinci technology-based processor is a System on a Chip specifically equipped with the resources, processing capabilities and power-saving features required to innovate new and compelling portable video applications. The DM6441 processor is based on TI's performance-leading TMS320C64x+™ DSP core and an ARM926 processor and includes video accelerators, networking peripherals and external memory/storage interfaces all specifically tuned for video.

The highly integrated DM6441 supports several portable media player peripherals, including USB 2.0 high-speed device and host,

The Digital Video Evaluation Module Includes:

Software

- Codec demos including: H.264, MPEG-4, MPEG-2, AAC, G.711
- Multimedia APIs and frameworks
- MontaVista 2.6.10 Linux support package

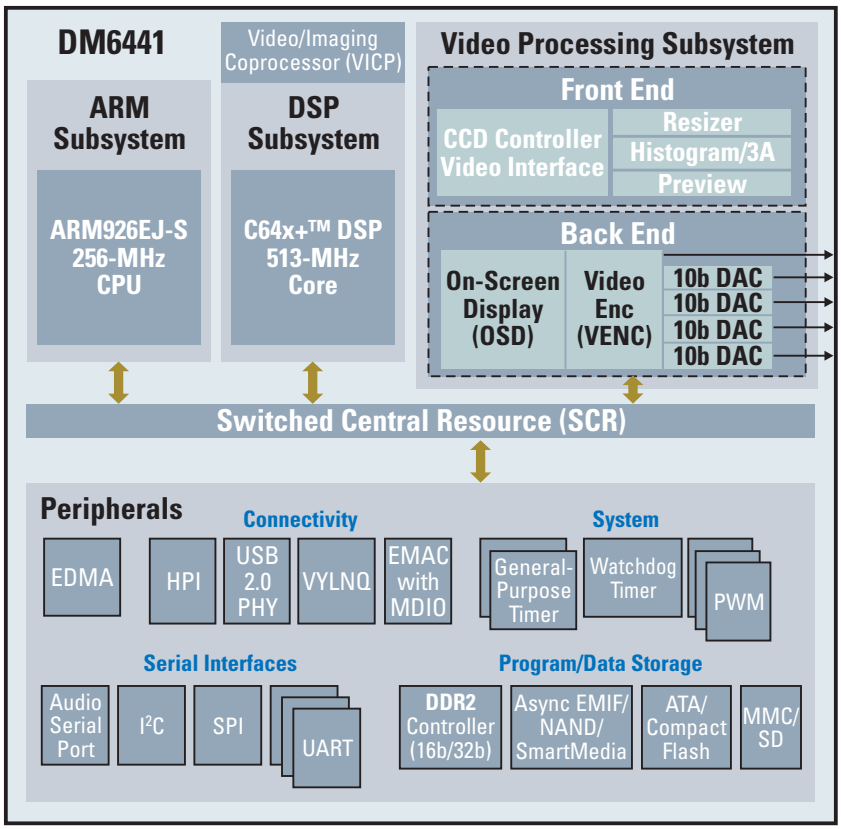
Connectivity

- Connectivity capabilities: USB 2.0, 10/100 EMAC
- Multiple on-board memory types: CompactFlash™, ATA, SD, DDR
- Video input via NTSC/PAL
- Video output via NTSC/PAL and YPbPr/RGB
- CD-quality audio input and output
- Daughter card connections to most peripheral interfaces

Hardware

- Evaluation module based on the DM6446 processor
- Additional hardware components:
  - NTSC/PAL video camera
  - LCD screen, speakers and microphone
  - IR remote
  - Hard disk drive (2.5-inch 40 G)

TMS320DM6441 Processor Block Diagram



The TMS320DM6441 Digital Media Processor gives designers the industry's most optimized, flexible and easy-to-use solutions for portable digital video applications.

hard disk drive (HDD) interface, on-screen display capabilities and liquid crystal display (LCD) interface. To help extend battery life, the processor supports multiple levels of core voltages as well as several power domains, allowing the player to lower power consumption by turning off inactive functions.

TMS320DM6441 DaVinci Processor

The DM6441 processor is a scalable solution for encoding and decoding video signals in products like portable media players. The cost-effective DM6441 chip allows manufacturers to integrate additional functionality on the same platform, simplifying design and streamlining production time to build a full line of products.

Fast-Track Deployment

Products that use DaVinci technology have an accelerated path to market thanks to the myriad of development tools that are an integral part of the technology. Chief among these many tools is the Digital Video Evaluation Module (DVEVM). The DVEVM brings together many of the DaVinci development aids in one place so development can begin immediately.

Based on a modular architecture that maintains the flexibility that's imperative during development, the DVEVM comes with everything to begin development immediately, including a video camera, LCD screen, speakers, microphone, a hard disk drive and an IR remote control unit.

The DVEVM software environment includes a demo version of MontaVista Linux 2.6.10. In addition, with demonstration versions of the H.264, MPEG-4, MPEG-2, ACC and G.711 codecs, developers are able to benchmark and evaluate performance parameters. And, of course, the DaVinci software infrastructure with its powerful APIs and software frameworks is integral to the DVEVM.

The many connectivity options of the DVEVM can accommodate practically any peripheral device or configuration alternative. USB 2.0, a 10/100 Ethernet interface and NTSC/PAL video input/output ports are included on the DVEVM. Moreover, the daughtercard connections on the DVEVM give developers the ability to rapidly deploy various configurations for prototyping purposes.

The DVEVM includes three demonstrations and the ability to run five different codec combinations. The demos are:

- Video and audio decode
- Video and audio encode
- Simultaneous video encode/ decode

The codec combos are:

- **Decode combo:** MPEG-2 video decoder, H.264 BP video decoder, MPEG-4 SP video decoder, AAC audio decoder, MPEG-1 Layer 2 audio decoder, G.711 audio decoder
- **Encode combo:** MPEG-4 SP video encoder, G.711 speech encoder, H.264 BP video encoder
- **Simultaneous video encode/ decode combo:** H.264 BP video encoder, H.264 BP video decoder

TI's Digital Video Software Development Kit (DVSDK) is another valuable tool. It's designed to tune complex DaVinci™-based digital video systems quickly and efficiently. The DVSDK significantly improves software integration and system visibility by incorporating tools such as:

- The eXpressDSP Configuration Kit

- The TMS320DM644x SoC Analyzer
- MontaVista™ Linux

Support from Start to Finish

DaVinci™ products are backed by TI's Third Party Network, which offers video system expertise to customers worldwide. In addition to DaVinci products, TI offers a complete portfolio of high-performance analog products for video applications.

For More Information

Contact your local TI Sales Representative about the DM6441 product information. Visit **www.ti.com/davinciproducts** to learn more about DaVinci technology or to discover other products using this technology. You will find:

- Digital video white paper library
- Blog posts such as:
  - *How to Avoid the Video Tower of Babel*
  - *I'm an HD Snob and Proud of It*
- Podcasts such as:
  - DVEVM technical demonstration
  - DSP market trends
- Digital video webcast series
- DaVinci benchmarks
- And more ...

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