Mediamatics™

Next-Generation DVD-on-a-chip Product Family

Mediamatics™ Next-Generation DVD-on-a-chip Products

Comprehensive System Solutions

National Semiconductor's Mediamatics DVD-on-a-chip products provide comprehensive solutions for consumer electronics vendors' DVD products. More than just a single solution, National Semiconductor provides a family of single-chip solutions for the design and manufacture of DVD players.

Dramatic Market Acceptance

Industry leading DVD player marketers such as JVC, Hiteker, and other leading consumer electronics manufacturers in Japan, China, Korea, and Europe are incorporating the Mediamatics family of ICs in next-generation DVD devices, dramatically reducing time-to-market while lowering parts count and increasing capability. In fact, the Mediamatics family is presently recognized worldwide as the best family of single-chip solutions to DVD consumer products.

Comprehensive Answers for all Market Segments

NDV8501, NDV8601, NDV8611, NDV8602, NDV8603, NDV8613

Mediamatics' next-generation DVD-on-a-chip product family offers consumer electronics manufacturers flexible, single-chip solutions for every market segment: high-end performance driven to low-end cost driven DVD players. Mediamatics' solutions include single and multiple tray disk systems, and innovative iDVD players among others.

Rapid Product Development

The Mediamatics family's development environment includes pin-out compatibility within all member-products, along with fully compatible, comprehensive software development kits. The result is faster time-to-market, lower overall costs and higher product performance. That's not just another claim. It's a fact.

The Platform

The Mediamatics product family provides next-generation features and cost-effective system integration for Universal DVD players/recorders and Internet-connected players/recorders. An industry standard RISC processor architecture allows system developers to combine the ease of C-based applications coding with flexible system extensions unavailable on other platforms. The processor may be equally applied to DVD-Video and DVD-Audio playback, DVD-recordable solutions, hard disk drive-based solutions and Internet appliance (iDVD) products.

Audio Processing

The Mediamatics product family provides unequalled audio processing quality and flexibility. It provides wide support for all common disk-based formats and for many Internet-based formats. A custom DSP provides a powerful solution for the latest compute-intensive audio algorithms. Support for DVD-Video, Video CD and CD formats has been retained from previous generation devices. Additionally, the devices now provide on-chip decoding support for DVD-Audio, DTS, MPEG2 multi-channel, Dolby® Prologic, HDCD and MP3. Full karaoke processing and royalty-free 3D stereo surround are also provided. Flexible audio structure allows audio data to originate from disk-based media, external digital audio streams or via the Internet. Full 5.1 channel output with simultaneous 2-channel down-mix and IEC958/1937 output is standard for the family.

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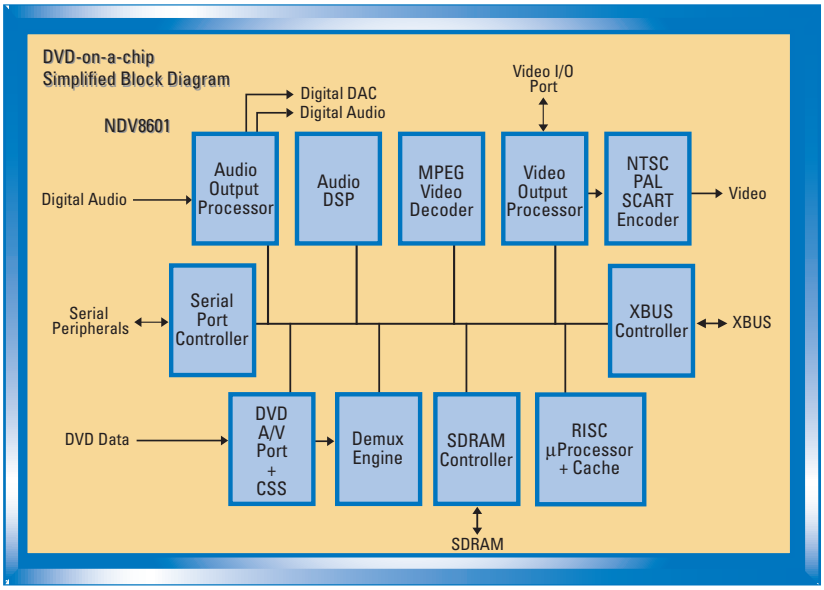
Simplified Block Diagram

The following diagram is a high-level simplified block diagram of a representative design of the Mediamatics next-generation DVD-on-a-chip product family. The exact elements and details vary among the different products and are custom tailored in the most efficient cost versus quality balanced way.



System Efficiency

The Mediamatics next-generation DVD-on-a-chip product family provides the highest level of integration, with a minimum of external components needed. This integration of processing/control elements into silicon has been carefully developed with system level efficiencies in mind, both from a cost and quality standpoint. The different family member products offer these carefully tailored solutions as seamless integrated products.

The DVD interface has been defined to work with all common A/V style DVD optical disc control chip sets and the available processing power of the on-chip RISC processor can be used as the controller for these chip sets. This interface supports both the CSS (DVD-Video) and CPPM (DVD-Audio) decryption/descrambling requirements.

General Purpose Input/Output (GPIO) options have been expanded on this generation to supply up to 14 control lines at all times, an additional 10 GPIO lines when the video I/O port is disabled and up to an additional 17 GPIO lines multiplexed with other functions.

A flexible 32-bit microprocessor bus allows system customization through the addition of 8, 16, or 32-bit peripherals. Code storage on the microprocessor bus allows for execution directly from 8, 16, or 32-bit wide FLASH/ROM or allows for extraction of compressed code from a minimum FLASH/ROM arrangement with decompression via the RISC and execution directly out of SDRAM.

Two UARTS and two 3-wire synchronous serial ports allow system extensions via low cost peripherals.

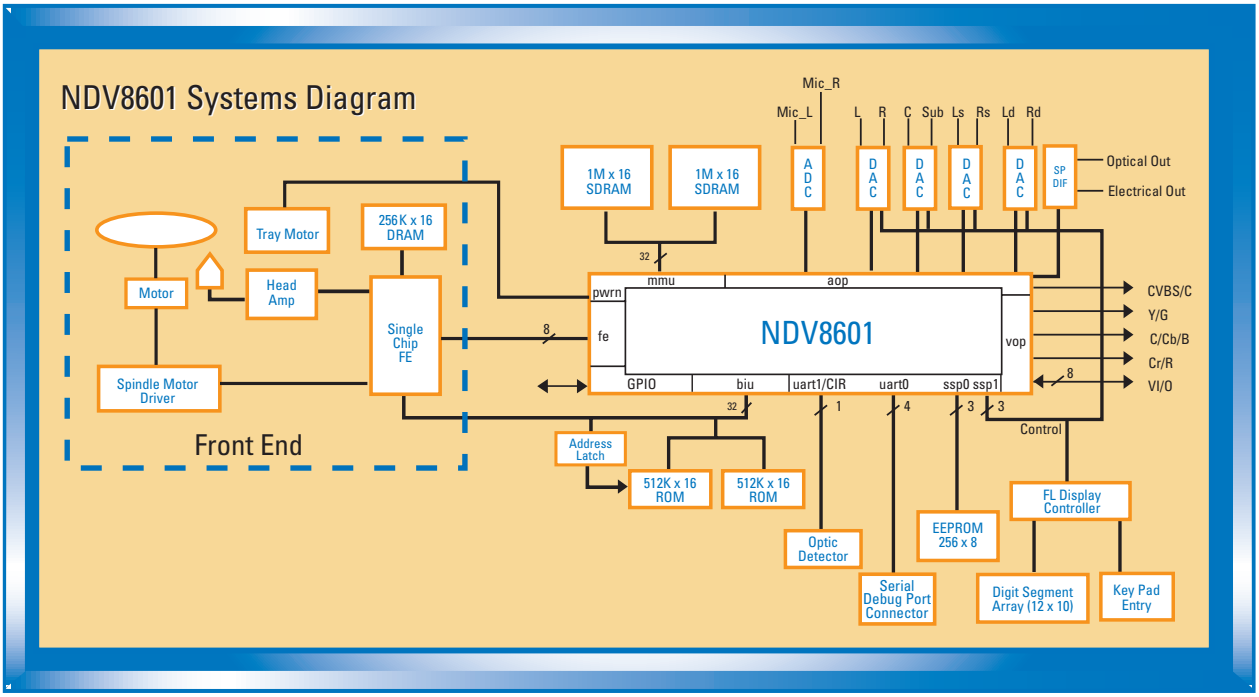
The SDRAM interface allows direct connection of either 16-Mbit or 64-Mbit memories in either 16-bit or 32-bit wide configurations. For maximum performance the 32-bit wide configuration is required.

The on-chip PLL clocking structure provides for extremely high quality video/audio processing with only a single crystal.

Mediamatics Product Family Features

Overall features of the Mediamatics next-generation product family are as follows. Refer to the Product Feature Table for details of each individual DVD-on-a-chip solution.

- Full DVD decode/display support: DVD-Video, DVD-Audio, DVD-RAM, DVD-RW and DVD+RW
- Other optical format support: CD-Digital Audio, CD DTS, MP3, Video CD and all Video CD derivatives
- Embedded 32-bit RISC processor delivering up to 125 MIPs, for general computing and platform applications
- Embedded 24-bit audio DSP delivering up to 125 MIPs, with standard decoder support for all noted formats plus karaoke processing
- Main profile/main level MPEG-2 video decoder
- Premium video processing/filtering with Zoom Scaler
- Integrated NTSC/PAL/SCART video encoder with four integrated 10-bit 2X oversampling video DACs
- Progressive video support for ANSI/SMPTE standard 293M-1996 (720 x 483 @ 59 Hz)
- Macrovision copy protection version 7.1
- Graphics support with independent Sub Picture & OSD units with 2, 4, 8, or 16-bit support and alpha blending
- Bi-directional video I/O port for input of external video sources and access to the internal video stream
- Universal A/V interface to common DVD front end solutions
- Triple phase lock loop design for high-quality/low-cost clock control
- Integrated CSS decryption/descrambling for DVD-Video content
- Integrated CPPM decryption/descrambling for DVD-Audio content
- Flexible high bandwidth 16-Mbit and 64-Mbit SDRAM controller with 16 or 32-bit interface
- Multiplexed 8, 16, or 32-bit microprocessor bus for peripheral attachment and storage
- Capable of Internet access with modem or broadband solutions
- Substantial "Trick Mode" features such as multi-angle viewing, digesting, strobing, and 1X reverse playback
- Full operation of all chip features at 1W to 1.5W power consumption (depending upon product system-configuration combination)
- 240-pin PQFP package (32 x 32 x 3.4 mm body size)
- 0.1µm, 1.8V core, 3.3V I/0 National Semiconductor state-of-the-art process technology



Product Family Positioning

Product	Product Positioning
NDV8501	Early enabler product, high-end systems
NDV8601	High-end systems with highest end video & audio features support
NDV8611	Identical to NDV8601, but with on-chip CPPM support for DVD-Audio
NDV8602	Entry-level systems with very competitive features for basic systems
NDV8603	Mid-level systems with high-end audio features support
NDV8613	Identical to NDV8603, but with on-chip CPPM support for DVD-Audio

MPEG Decoding

Mediamatics family architecture provides a flexible MPEG2 Main Profile @ Main Level video decoding engine in addition to two processors dedicated to audio processing and top-level control. MPEG1 or MPEG2 encoded video streams are decoded at the slice level in the Demux engine. Efficient partitioning of the video decode process provides flexible control for unique trick modes, playability of defective media and the ability to work with video formats outside the standard DVD definition.

Video Processing

The Mediamatics product family is the first integrated DVD solution with full progressive scan support.

With the advent of progressive scan television, DVD became the premium source for progressive film-based material, maximizing progressive scan display technology. Mediamatics' single-chip solutions provide

Product Family Features Differentiation

Feature	NDV8501	NDV8601	NDV8611	NDV8602	NDV8603	NDV8613
Progressive Out	■	■	■			
Interlaced Out	■	■	■	■	■	■
Point Transforms	■	■	■			
Video I/O Port	■	■	■			
DVD-Audio Decode	■	■	■		■	■
DVD-Audio Decode with CPPM			■			■
DTS Decode	■	■	■		■	■
HDCD Decode	■	■	■		■	■
Track Buffer Support		■	■	■	■	■
Programmable GPIO Support		■	■	■	■	■
Power Management Features		■	■	■	■	■

support for the ANSI/SMPTE standard 293M-1996 throughout the entire video-processing pipeline. On-chip video processing elements include zoom scaling, anti-flicker filters, rate conversion, video trick modes, contrast/saturation/hue/gamma correction and extensions to graphics processing including support for 16-bit-per-pixel formats. All are fully available for both interlaced and progressive output. There are no compromises due to data processing or memory implications.

Integrated within these products is a high-quality NTSC/PAL/SCART video encoder with four 10-bit video DACs. The flexible four-DAC arrangement provides universal implementation of NTSC, PAL and SCART-based systems.

A unique input mode on the video I/O port has been added to this design to provide feeds for ITU-R636 external video. This allows conversion of interlaced video to progressive output. The output mode on this video I/O port also provides access to digital video streams in either progressive or interlaced format. This allows system configurations beyond those driving standard analog television inputs.

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