MT1389HD

Preliminary

Specifications are subject to change without notice

High-Definition DVD Player SOC with MPEG-4 Video

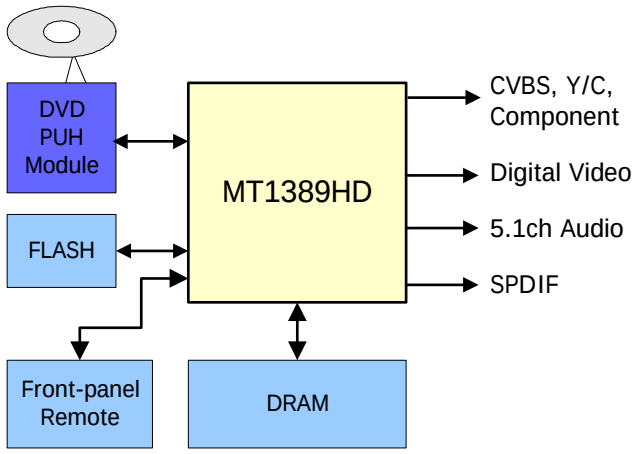
MediaTek MT1389HD is a DVD system-on-chip (SOC) which incorporates advanced features like MPEG-4 video decoder, high quality TV encoder, USB, CF/SM/MS/SD/MMC/xD reader, and state-of-art de-interlace processing. The MT1389HD enables consumer electronics manufacturers to build high quality, feature-rich DVD players, portable DVD players or any other home entertainment audio/video devices.

World-Leading Technology: Based on MediaTek's world-leading DVD player SOC architecture, the MT1389HD is the 3rd generation of the DVD player SOC. It integrates the MediaTek 2nd generation front-end analog RF amplifier and the Servo/MPEG AV decoder.

Rich Feature for High Valued Product: To enrich the feature of DVD player, the MT1389HD equips a MPEG-4 video decoder supporting the MPEG-4/DivX[1] advanced simple profile (ASP). It makes the MT1389HD-based DVD player be capable of playback MPEG-4 content which become more and more popular. Furthermore, MT1389HD has high-definition video/image playback ability, which supports 720p/1080i. An embedded video scaler can convert standard-definition video/image to high-definition ones.

Incredible Audio/Video Quality: The progressive scan of the MT1389HD utilized MediaTek's MDDi™ advanced motion-adaptive de-interlace algorithm to achieve the best movie/video playback. It also supports a patent-pending edge-preserving algorithm to remove the saw-tooth effect. The 108MHz/12-bit video DAC provides users a whole new viewing experience. Built-in 5.1ch audio DACs could give the cost-efficient solution.

Home Entertainment Center: As the core of home entertainment center, DVD players need more capability to support current multimedia contents. The MT1389HD provides the interface for the 6-in-1 card reader, which supports Compact Flash, SmartMedia, Memory-Stick, Secure Digital Memory Card, MultiMediaCard, and xD Card, to connect with the mainstream digital camera FLASH cards. Further more, the MT1389HD supports the USB for future connective requirement such as modem, Ethernet, or WLAN.



DVD Player System Diagram Using MT1389HD

Key Features

- RF/Servo/MPEG integration
- DivX/MPEG-4 ASP Video decoder
- High Performance Audio Processor
- 6-channel audio DACs
- MDDi: Motion-Adaptive, Pure Edge™ De-interlacing
- 108MHz/12-bit, 6ch TV Encoder
- 480i/576i/480p/576p/720p/1080i output
- High-definition JPEG output
- USB 1.1
- 6-in-1 CF/SM/MS/SD/MMC/xD reader

Applications

- Standard DVD Players
- Portable DVD Players
- TV/DVD Combo Systems

[1] DivX is a trademark of DivXNetworks, Inc.

General Feature List

- Super Integration DVD Player Single Chip
  - High performance analog RF amplifier
  - Servo controller and data channel processing
  - MPEG-1/MPEG-2/JPEG video
  - MPEG-4 ASP video
  - Dolby AC-3/DTS/DVD-Audio
  - Unified memory architecture
  - USB interface
  - CF/SM/MS/SD/MMC/xD interface
  - Versatile video scaling & quality enhancement
  - OSD & sub-picture
  - 2-D graphic engine
  - Built-in clock generator
  - Built-in high quality SD/HD TV encoder
  - Built-in progressive video processor
  - Built-in video scaler to generate HD video
  - Audio effect post-processor
  - Audio input port
  - Built-in 5.1ch audio DACs
- High Performance Analog RF Amplifier
  - Programmable fc
  - Dual automatic laser power control
  - Defect and blank detection
  - RF level signal generator
- Speed Performance on Servo/Channel Decoding
  - DVD-ROM up to 4XS
  - CD-ROM up to 24XS
- Channel Data Processor
  - Digital data slicer for small jitter capability
  - Built-in high performance data PLL for channel data demodulation
  - EFM/EFM+ data demodulation
  - Enhanced channel data frame sync protection & DVD-ROM sector sync protection
- Servo Control and Spindle Motor Control
  - Programmable frequency error gain and phase error gain of spindle PLL to control spindle motor on CLV and CAV mode
  - Built-in ADCs and DACs for digital servo control
  - Provide 2 general PWM
  - Tray control can be PWM output or digital output
- Embedded Micro Controller
  - Built-in 8032 micro controller
  - Built-in internal 373 and 8-bit programmable lower address port
  - 1024-bytes on-chip RAM
  - Up to 4M bytes FLASH-programming interface
  - Supports 5/3.3-Volt. FLASH interface
  - Supports power-down mode
  - Supports additional serial port
- DVD-ROM/CD-ROM Decoding Logic
  - High-speed ECC logic capable of correcting one error each P-codeword or Q-codeword
  - Automatic sector mode and form detection
  - Automatic sector header verification
  - Decoder Error Notification Interrupt that signals various decoder errors
  - Provide error correction acceleration
- Buffer Memory Controller
  - Supports 16Mb/32Mb/64Mb/128Mb SDRAM
  - Supports 16-bit SDRAM data bus
  - Provides the self-refresh mode SDRAM
  - Block-based sector addressing
- Video Decode
  - Decodes MPEG1 video and MPEG2 main level, main profile video (720x480 and 720x576)
  - Decodes MPEG-4 Advanced Simple Profile
  - Support DivX 3.11/4.x/5.x/6.x
  - Support Nero-Digital
  - Smooth digest view function with I, P, and B picture decoding
  - Baseline, extended-sequential and progressive JPEG image decoding
  - Support CD-G titles
- Video/OSD/SPU/HLI Processor
  - Arbitrary ratio vertical/horizontal scaling of video, from 0.25X to 256X
  - Scaler for standard-definition to high-definition conversion
  - 65535/256/16/4/2-color bitmap format OSD
  - Automatic scrolling of OSD image
  - Slide show transition as DVD-Audio Specification
  - Digital video output

- 2-D Graphic Engine
  - Support decode Text and Bitmap
  - Support line, rectangle, and gradient fill
  - Support bitblt
  - Chroma key copy operation

- Audio Effect Processing
  - Dolby Digital (AC-3)/EX decoding
  - DTS/DTS-ES decoding
  - MLP decoding for DVD-Audio
  - MPEG-1 layer 1/layer 2 audio decoding
  - MPEG-2 layer1/layer2 2-channel audio
  - High Definition Compatible Digital (HDCD)
  - Windows Media Audio (WMA)
  - Advanced Audio Coding (AAC)
  - Dolby ProLogic II
  - Concurrent multi-channel and downmix out
  - IEC 60958/61937 output
    - PCM / bit stream / mute mode
    - Custom IEC latency up to 2 frames
  - Pink noise and white noise generator
  - Karaoke functions
    - Microphone echo
    - Microphone tone control
    - Vocal mute/vocal assistant
    - Key shift up to +/- 8 keys
    - Chorus/Flanger/Harmony/Reverb
  - Channel equalizer
  - 3D surround processing including virtual surround and speaker separation

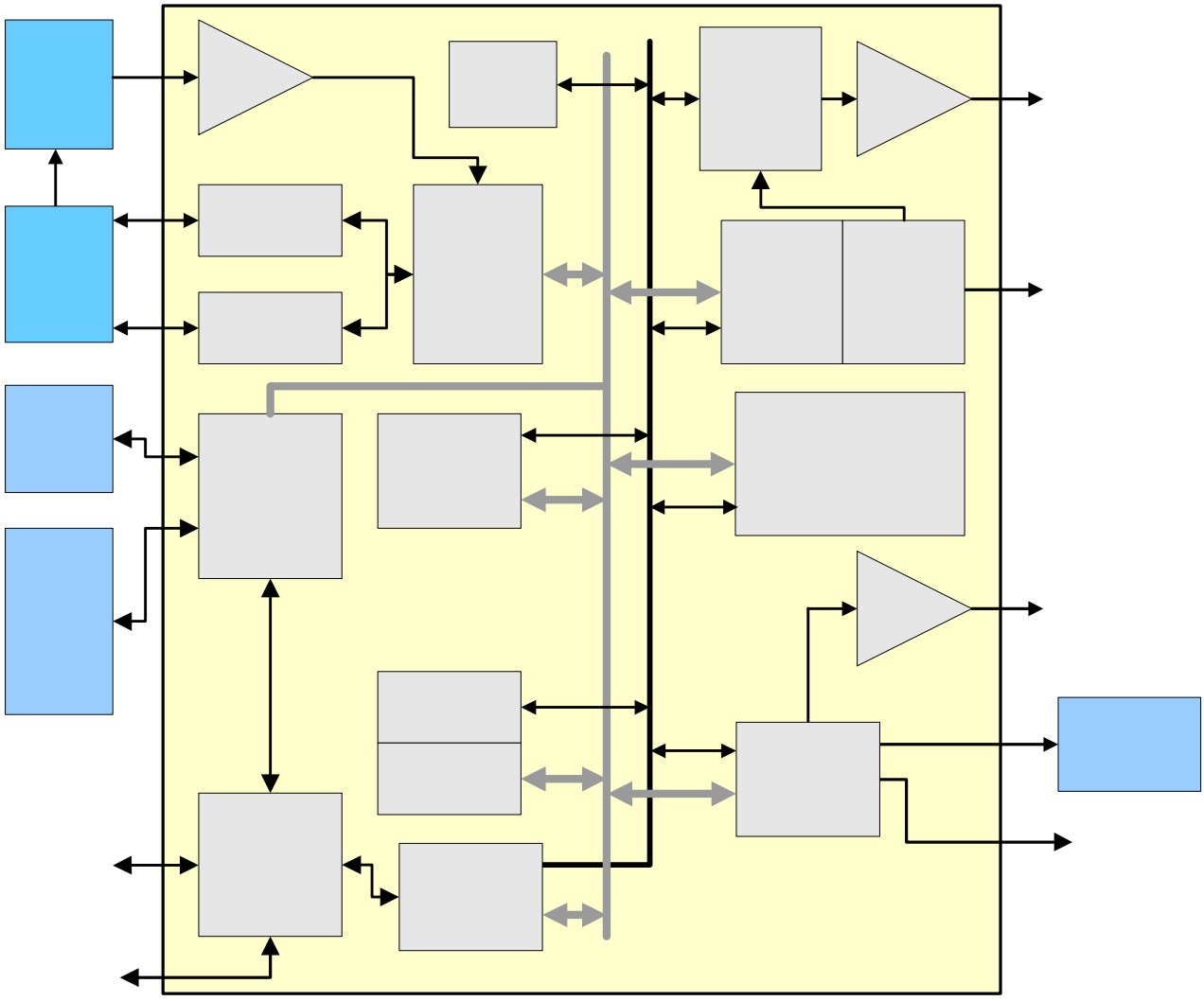
- TV Encoder
  - Six 108MHz/12-bit DACs
  - Support NTSC, PAL-BDGHINM, PAL-60
  - Support 525p, 625p progressive TV format
  - Support 720p, 1080i high-definition TV format
  - Automatically turn off unconnected channels
  - Support PC monitor (VGA)
  - Support Macrovision 7.1 L1, Macrovision 525P and 625P
  - CGMS-A/WSS
  - Closed Caption

- MDDi ™ Progressive Scan Video
  - Automatic detect film or video source
  - 3:2 pull down source detection
  - Advanced Motion adaptive de-interlace
  - PureEdge™ edge preserving technology
  - Minimum external memory requirement

- External Interface
  - USB 1.1 OTG (On-the-Go)
  - Compact Flash, SmartMedia, Memory-Stick, Secure Digital Memory Card, MultiMediaCard, and xD Card Interface

- Outline
  - 256-pin LQFP package
  - 3.3/1.8-Volt. Dual operating voltages

Functional Block Diagram



Electrical Characteristics

Absolute Maximum Rating

Symbol	Parameters	Value	Unit
VDD3	3.3V Supply Voltage	-0.5 to 4.6	V
VDD2	1.8V Supply Voltage	-0.5 to 3.0	V
VDDA	Analog Supply Voltage	-0.5 to 4.6	V
VIN(3.3V)	Input Voltage (3.3V IO)	VSS-1.0 to 3.63	V
VIN(5V-tolerance)	Input Voltage (5V-tolerance IO)	VSS-1.0 to 5.5	V
VOUT	Output Voltage	-0.3 to VDD3+0.3	V
Ts	Storage Temperature	-40 to 150	°C
Ta	Ambient Temperature	0 to 70	°C

DC Characteristics

Symbol	Parameters	Min	Typ	Max	Unit
VIH (1.8V)	Input Voltage High (1.8V IO)	1.05	-	-	V
VIL (1.8V)	Input Voltage Low (1.8V IO)	-	-	0.69	V
VIH (3.3V)	Input Voltage High (3.3V IO)	2.0	-	-	V
VIL (3.3V)	Input Voltage Low (3.3V IO)	-	-	0.8	V
VOH (1.8V)	Output Voltage High (1.8V IO)	1.22	-	-	V
VOL (1.8V)	Output Voltage Low (1.8V IO)	-	-	0.4	V
VOH (3.3V)	Output Voltage High (3.3V IO)	2.4	-	-	V
VOL (3.3V)	Output Voltage Low (3.3V IO)	-	-	0.4	V
Tj	Junction Operation Temperature	0		115	°C
IIH	High Level Input Current			10	µA
IIL	Low Level Input Current	-10			µA
PD	Power Dissipation		1.2		W
P_{Down}	Power Down Mode Power			0.1	W

Appendix I: Power Supply Specification

Recommended Power Range

Source	Voltage Range
3.3V	3.0V ~ 3.6V
1.8V	1.8V ~ 2.0V

Power Sequence

Start up procedure: 3.3V → Bring up 1.8V → Reset#
Signal arriving required level time: 1.8V → 3.3V → Reset#