Advantiv

Advanced Television Solutions

Enhancing HD system design and the consumer experience, Analog Devices offers its Advantiv® portfolio of video and audio integrated circuit solutions, specifically developed and optimized for advanced television applications.

Advantiv®
Advanced Television Solutions
by Analog Devices

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ANALOG DEVICES

Analog Devices in Advanced TV

Analog Devices offers a broad range of industry-certified solutions for advanced television (ATV) applications, featuring products that enable rewarding experiences for consumers enjoying the latest high definition (HD) TVs, DVD players, digital video recorders, audio/video receivers, video camcorders, and cable and satellite set-top boxes.

Because the signal processing performance requirements for HD video, audio, and display interconnect functions are significantly higher than for standard definition TVs, ADI offers the Advantiv advanced television portfolio to provide cost-effective analog, digital, and mixed-signal solutions to solve the most difficult multiformat advanced television design challenges. Supported by ADI's system-level experts, these customer-driven solutions enable the latest in HD home entertainment systems.

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Advanced Television Systems

Advanced television systems are making ever increasing demands on video and audio signal processing, and Analog Devices provides high performance components required to deliver the very best viewer experience possible.

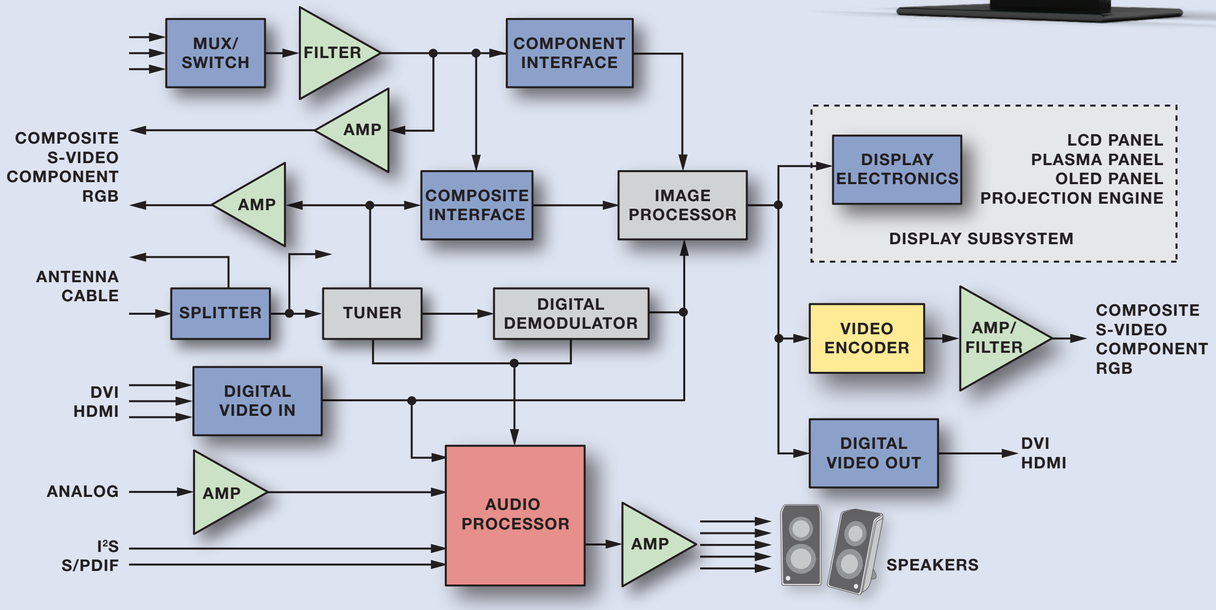
With today's large, high definition displays, excellent processing of legacy signals is essential to ensure that customers are delighted with their expensive new purchase. ADI's video decoders and digitizers fit the bill with superb, oversampled, 12-bit processing of composite, S-Video, and component signals.

HDMI inputs are ubiquitous in today's television systems. ADI offers a broad line of receivers supporting a variety of speeds, color depths, and numbers of inputs. When even more inputs are needed, our HDMI switches provide limitless flexibility. Providing a front-panel input that can pass HDMI certification testing presents unique challenges—solved with our AD8195 HDMI buffer.

Driving the display is the final link in the video signal processing chain, and it presents its own special requirements. For high temperature polysilicon projection panels, ADI's *Dec*Driver® technology is unmatched in dc and ac performance.

Sound quality is becoming an important differentiator in advanced television products. ADI's family of TV-specific audio codecs, sound processors, and DSPs offer a wide range of performance and feature options to address the entire range of television products. With the limited space and thermal dissipation options in flat panel displays, our Class-D amplifiers provide a great solution, especially when coupled with our audio processors, which ensure a listening experience free of any extraneous noise.

ADI is the world's leading supplier of amplifiers and converters with industry-leading technology, creating the broadest range of signal processing building blocks available. Whatever unique challenges you face in your system architecture, our applications engineers will be pleased to work with you to design an optimal solution.



Audio/Video Receivers

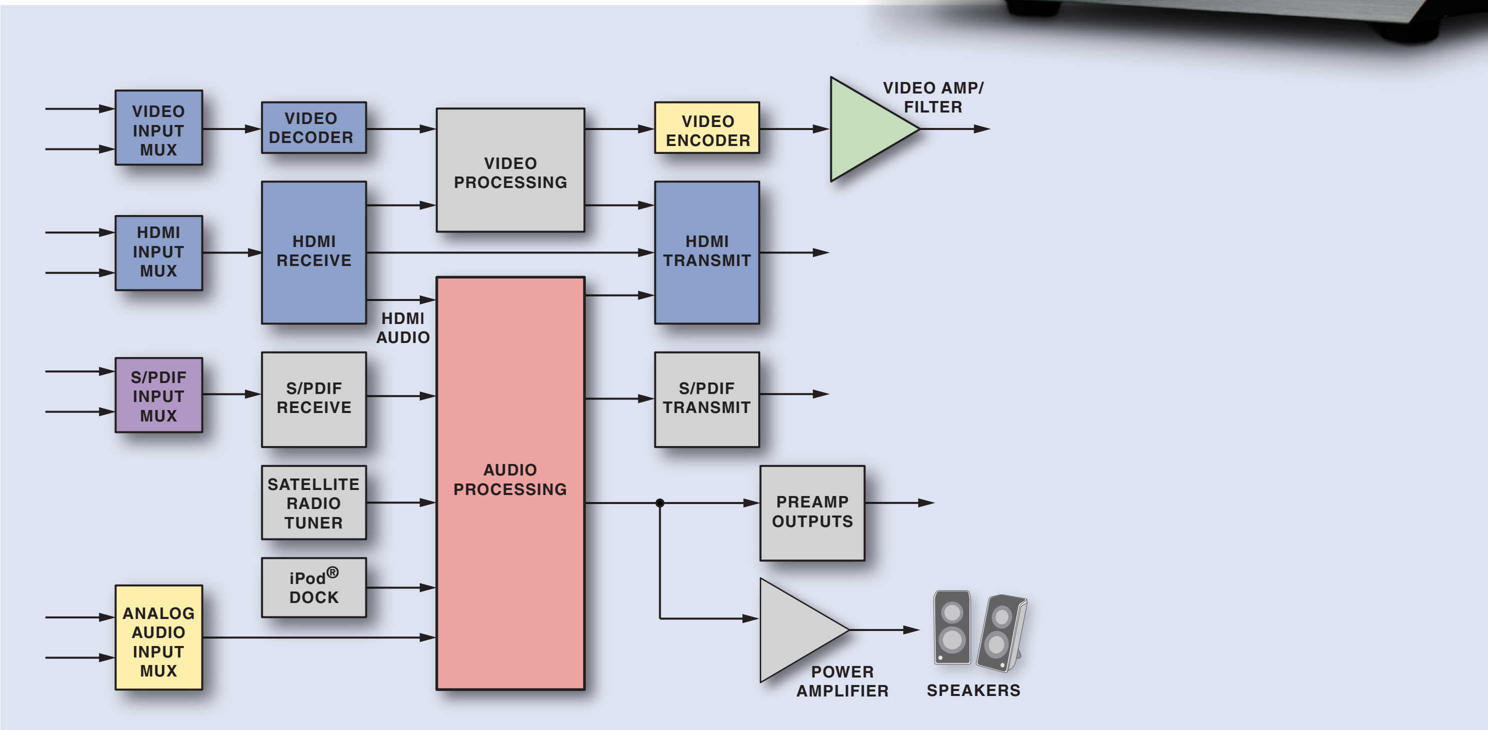
Audio/video receivers are rapidly becoming the hub of modern entertainment centers. Originally simple audio switchers and processors, newer generations also switch video inputs to the display device. With the recent adoption of HDMI as a digital interconnect technology, the video processing challenge has grown to equal the audio demands.

Analog Devices has long been a leader in audio technology with our SHARC® family of digital signal processors. Add our Blackfin® processors for cost-sensitive applications and added microcontroller functionality, and we have a full range of solutions available. Our audio codecs and DACs provide a comprehensive range of options in terms of both fidelity and flexibility.

Consumers who include an audio/video receiver in their entertainment system expect the best viewing experience possible. Our video digitizers and decoders bring legacy sources into the system with the highest possible fidelity, ready for scaling and other processing.

Our HDMI receivers and switches offer unlimited system input flexibility. ADI's attention to standards, along with our worldwide network of fully equipped precertification facilities, assures the shortest possible time to market. The link to the display is equally important. Like our receivers, our HDMI transmitters support the latest revisions of the HDMI specification, including the most popular options. Our NSV® video processing optimally couples sources of one color depth to displays of another.

Not to overlook legacy displays—our video encoders have long been recognized as the premier NTSC/PAL processors for high end DVD players. With up to 14-bit, 16 times oversampled NSV processing, the video is as good as the standard allows.



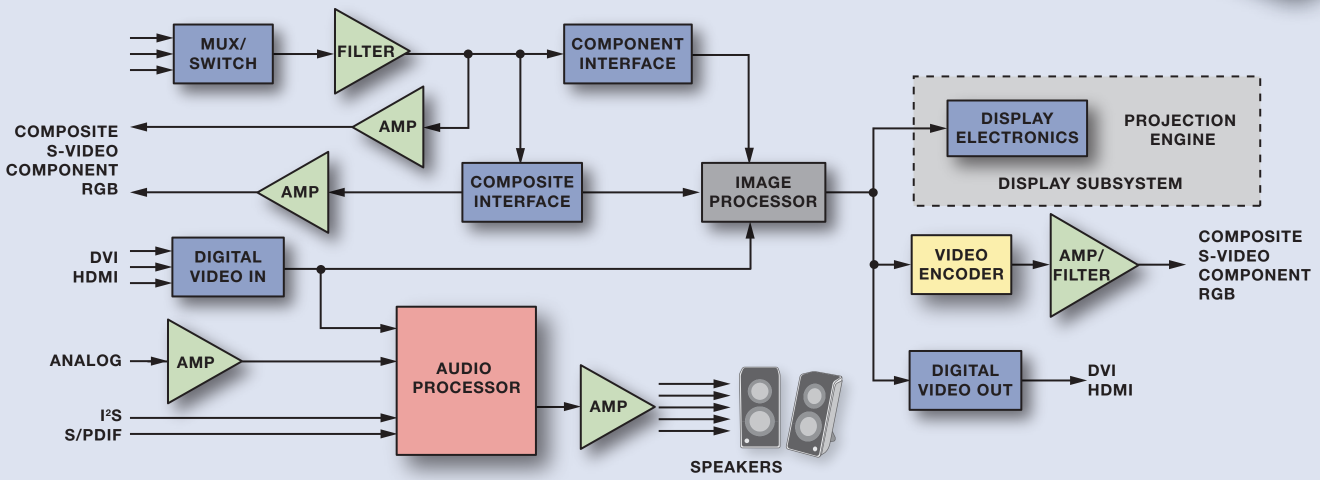
Projectors

Analog Devices has long been the leading provider of RGB and DVI interfaces for projectors. Now that front projection technology is migrating from the conference room to the living room, great video signal processing is critical. ADI's video decoders, digitizers, and DVI/HDMI interfaces optimize the very large images that projectors enable. The adaptive equalization built into our HDMI receivers supports the longest possible cable runs needed for ceiling-mounted installations.

If a cableless connection is required, our Wavescale™ compression technology is at the heart of our HDAnywhere™ A/V Network Link distribution solutions. This visually lossless compression format can be passed over a variety of wireless transports (UWB, Wi-Fi, mmWave), as well as over power lines, phone lines, or coaxial cable.

Audio processing also presents challenges with severely limited space in the projector and a hostile acoustic environment. Our audio processors can be tuned to optimize the performance in any environment, and our Class-D amplifiers provide highly efficient output stages. ADI's family of audio DACs can meet the requirements of recovering audio from the HDMI AV stream.

The ADI *Dec*Driver has long served the needs of projectors employing high temperature polysilicon panels with unsurpassed performance.



DVD Players/DVD Recorders/DVRs

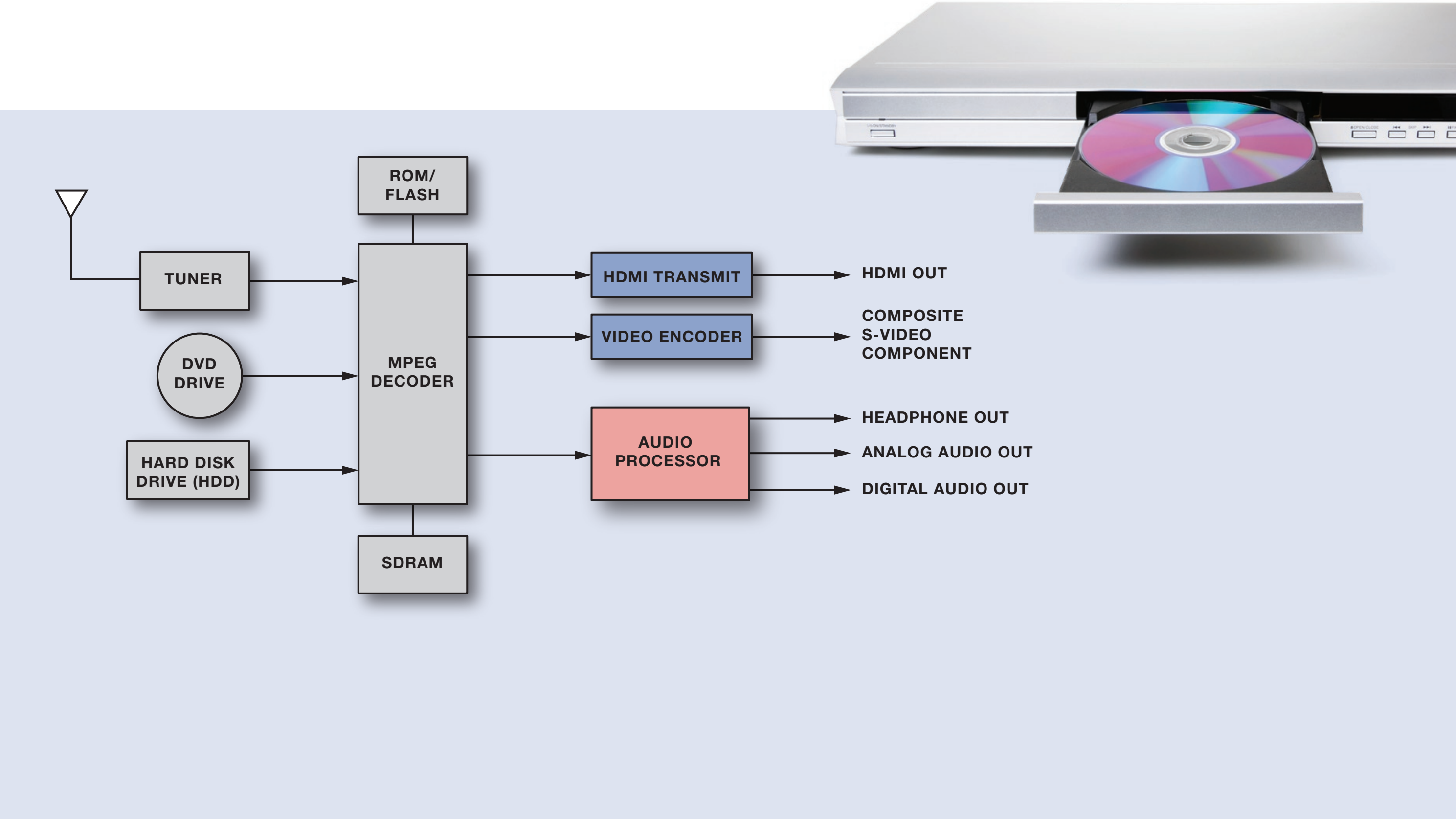
ADI has long supplied the premier video encoders for standard definition DVD players and DVRs. With resolutions up to 14 bits, oversampling by 16×, and NSV video processing, NTSC and PAL have never looked better—not to mention the superb HD analog component video synthesis.

With the advent of next-generation optical formats and HD DVRs, the challenges have grown. Legacy outputs are still important: Consumers expect this new technology to look great on any display. But HD presents additional challenges.

The HDMI output must be robust and "bulletproof." Our transmitters not only support the latest HDMI standards and popular options; they integrate HDCP handshaking to minimize system overhead and even include consumer electronic control (CEC) hardware to make the implementation of this new simplified control standard quick and easy.

Audio processing has also become far more complex. With multiple decoder formats (Dolby, DTS, SRS, etc.) required by next-generation optical formats, our SHARC DSPs make a great companion to video processors and controllers. We can implement all of the required format conversions and add a variety of industry-standard enhancement algorithms with power to spare to add customer-developed, proprietary processing. We also offer ADI-developed algorithms that are available to our customers.

Our audio converter products (ADCs, DACs, and codecs) provide flexible and high performance interfaces to connect our high performance audio processors to analog audio components.

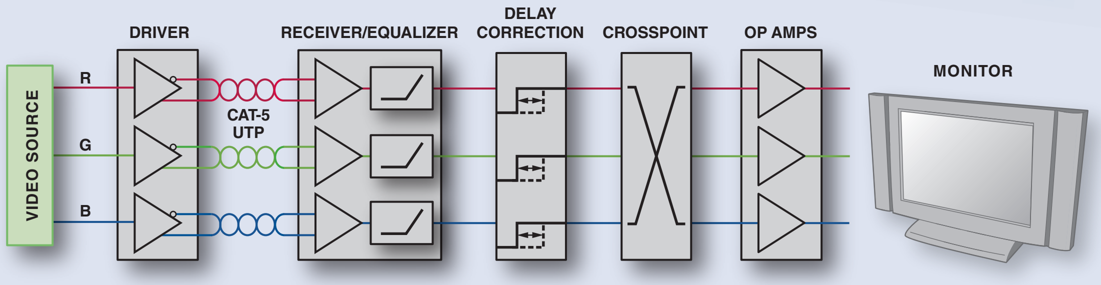


Video Distribution over UTP Cable

The demand for professional displays is growing exponentially with the application of eye-catching digital signage technology in airports, malls, restaurants, hotels, and many other locations. As the distance from the source to the display increases, streaming high definition video content to such displays has become a major logistic, economic, and technical problem.

Many companies in the KVM (keyboard, video, mouse) and video distribution industry have chosen unshielded twisted pair (UTP) cable as a transport medium due to its low cost and ease of installation. Coupled with ADI's high performance video distribution products, analog video over Cat-5 delivers superior video quality to these industrial displays.

For years, ADI has supplied market leaders with high performance line drivers, receivers, equalizers, and crosspoint switches. Recent additions to our portfolio include 700 MHz triple line drivers (AD8146/AD8147/AD8148) and a 55 dB adjustable triple line equalizer (AD8123), which, together, enable streaming UXGA resolution video to displays that are 300 meters from the video source. ADI's latest analog crosspoint switches (AD8177/AD8178) economically add high performance switching flexibility.

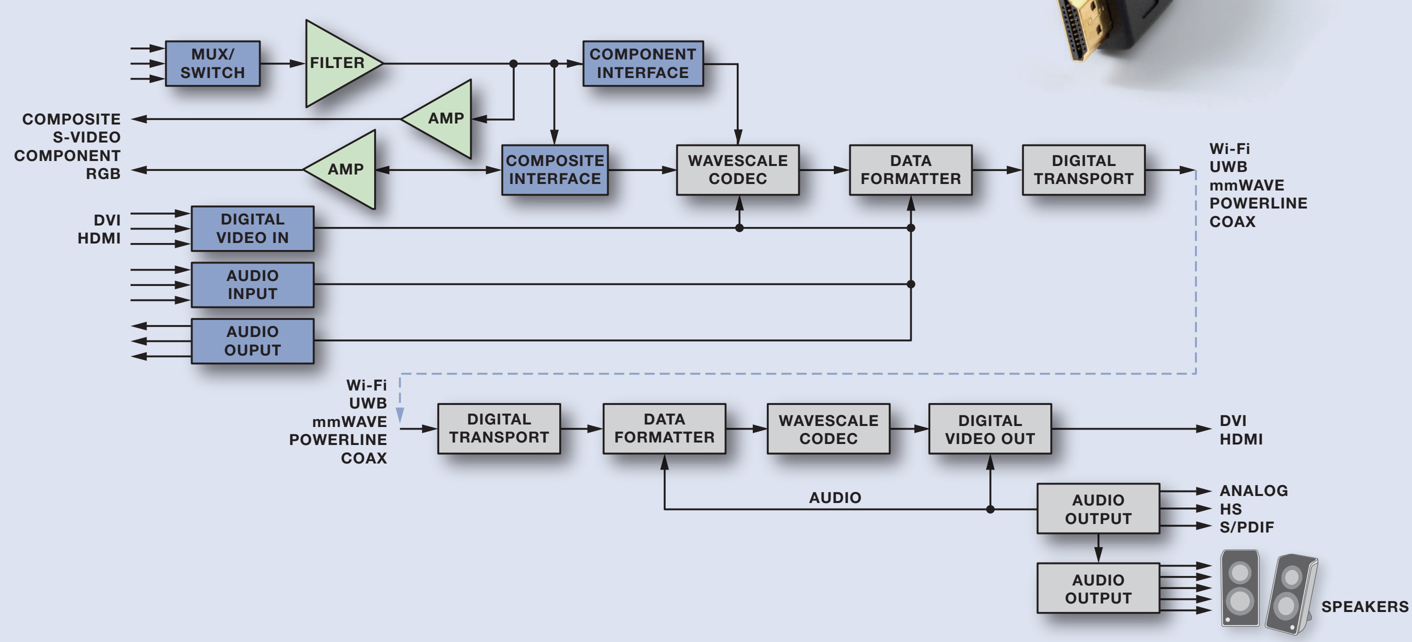


HDAnywhere Networked Entertainment

Consumers today want to enjoy their content anywhere, anytime. With the advent of HD content and content-protected digital connections come unique challenges. Several approaches are being pursued: distribution of precompressed content, transmission of uncompressed material, or compression in real-time using DCT-based interframe codecs. These are limited by cost or application flexibility and may degrade the quality of the HD video. Analog Devices offers the HDAnywhere A/V Network Link, based on our Wavescale compression technology, as a flexible, cost-effective solution that preserves the HD quality expected by the consumer.

Wavescale compression is ADI's implementation of the JPEG2000 compression standard. It offers significant advantages in cost, efficiency, latency, robustness, and scalability over alternative codecs. The HDAnywhere solution accepts HDMI or analog inputs, compresses the stream, and hands it to any of a number of transports, including UWB radio, Wi-Fi, millimeter wave radio, powerline networking, coax transport, or a phone line modem. The process is reversed at the display end, and a visually lossless signal is recreated.

HDAnywhere networks work with any transport that can provide 50 Mbps to 80 Mbps. The Wavescale algorithm can adapt to channel impairments on a frame-by-frame basis, delivering very watchable video at data rates below 10 Mbps, while taking advantage of available bandwidths in the hundreds of Mbps.



Video Interfaces

Analog Inputs

ADI's broad line of analog display interfaces serves a wide range of applications, from television sets to AV receivers to projectors. Fully integrated solutions, like the ADV7441A, handle component, composite, and digital inputs in a single package. We also offer "separates" that are optimized to suit the most cost-sensitive application. Many of our analog interfaces include integrated HDMI/DVI receivers.

Part Number	Resolution (Bits)	Sample Rate (MSPS)	Max Display Resolution	Auto-Offset	Auto-Gain	Analog Input Mux	Macrovision Detector	Video Decoder	HDMI Rx	HDMI Input Mux	DVI Rx	HDCP Key Storage	Extended Temp Range	Package
AD9380	8	150	1080p/SXGA	•		2:1	•		•		•	Internal		100-lead LQFP
AD9396	8	150	1080p/SXGA	•		2:1	•				•	External		100-lead LQFP
AD9880	8	150	1080p/SXGA	•		2:1	•		•		•	External		100-lead LQFP
AD9888	8	205	UXGA			2:1								128-lead LQFP
AD9983A	8	170	UXGA	•		2:1	•							80-lead LQFP, 64-lead LFCSP
AD9985A	8	140	SXGA	•									•	80-lead LQFP
AD9388	10	150	1080p/SXGA	•	•	3:1	•		•	2:1	•	Internal	•	144-lead LQFP
AD9388A	10	170	UXGA	•	•	3:1	•		•	2:1	•	Internal	•	144-lead LQFP
AD9984A	10	170	UXGA	•		2:1	•							80-lead LQFP, 64-lead LFCSP
ADV7441	10	150	1080p/SXGA	•	•	3:1	•	•	•	2:1	•	Internal	•	144-lead LQFP
ADV7441A	10	170	UXGA	•	•	3:1	•	•	•	2:1	•	Internal	•	144-lead LQFP
ADV7443	12	150	1080p/SXGA	•	•	3:1	•	•	•	2:1	•	Internal	•	144-lead LQFP

HDMI/DVI Inputs

Our broad line of HDMI/DVI receivers includes both standalone HDMI devices and parts with integrated analog interfaces and video decoders. All of our receivers include HDCP support with the options of internal or external HDCP keys. Internal key versions simplify manufacturing flows but can only be sold to HDCP licensees. External key versions (which can be used without keys) support noncontent-protected applications. Software drivers are provided to simplify and optimize implementation and accelerate time to market.

Part Number	Resolution (Bits)	Sample Rate (MSPS)	Max Display Resolution	Auto-Offset	Auto-Gain	Analog Input Mux	Macrovision Detector	Video Decoder	HDMI Rx	HDMI Input Mux	DVI Rx	HDCP Key Storage	Extended Temp Range	Package
AD9380	8	150	1080p/SXGA	•		2:1	•		•		•	Internal		100-lead LQFP
AD9381	8	150	1080p/SXGA						•		•	Internal		100-lead LQFP
AD9396	8	150	1080p/SXGA	•		2:1	•				•	External		100-lead LQFP
AD9397	8	150	1080p/SXGA								•	Internal		100-lead LQFP
AD9398	8	150	1080p/SXGA						•		•	External		100-lead LQFP
AD9880	8	150	1080p/SXGA	•		2:1	•		•		•	External		100-lead LQFP
AD9887A	8	170	UXGA								•	External		160-lead LQFP
AD9388	10	150	1080p/SXGA	•	•	3:1	•		•	2:1	•	Internal	•	144-lead LQFP
AD9388A	10	170	UXGA	•	•	3:1	•		•	2:1	•	Internal	•	144-lead LQFP
ADV7441	10	150	1080p/SXGA	•	•	3:1	•	•	•	2:1	•	Internal	•	144-lead LQFP
ADV7441A	10	170	UXGA	•	•	3:1	•	•	•	2:1	•	Internal	•	144-lead LQFP
ADV7443	12	150	1080p/SXGA	•	•	3:1	•	•	•	2:1	•	Internal	•	144-lead LQFP

Video Decoders

Analog Devices offers a range of multiformat video decoders to digitize and convert SDTV, EDTV, HDTV, and PC-RGB signals. The ADV718x and ADV74xx families of ICs are proven in handling nonstandard input signal types to overcome the headache of worldwide TV chassis design. For professional and industrial applications, these components meet all the standards required for video transmission, redistribution, editing, and storage.

Part Number	Resolution (Bits)	ADC Speed (MHz)	Output Resolution (Bits)	Input Signal Types	HDMI Rx	Data Output Formats	Number of Input Channels	Application	3D Comb Filter	Package
ADV7180	10	86	8	Composite, Y/C, YPrPb		8- and 16-bit YCrCb 4:2:2	6	Portable		40-lead LFCSP, 64-lead LQFP
ADV7184	10	54	8	Composite, RGB SCART, Y/C, YPrPb		8- and 16-bit YCrCb 4:2:2	12	Connected box, HDTV		80-lead LQFP
ADV7401	10	140	8	Composite, RGB, RGB SCART, Y/C, YPrPb		12-bit RGB DDR 24-bit YCrCb/RGB 4:4:4 8- and 16-bit YCrCb 4:2:2	12	Connected box, HDTV		100-lead LQFP
ADV7441	10	150	10	Composite, RGB, RGB SCART, Y/C, YPrPb, HDMI	•	10- and 20-bit YCrCb 4:2:2 12-bit RGB DDR 24-bit YCrCb/RGB 4:4:4 8- and 16-bit YCrCb 4:2:2	8	Connected box, HDTV		144-lead LQFP
ADV7441A	10	170	10	Composite, RGB, RGB SCART, Y/C, YPrPb, HDMI	•	10- and 20-bit YCrCb 4:2:2 12-bit RGB DDR 24-bit YCrCb/RGB 4:4:4 8- and 16-bit YCrCb 4:2:2	8	Connected box, HDTV		144-lead LQFP
ADV7800	10	150	10	Composite, RGB, RGB SCART, Y/C, YPrPb		10-, 20-, 24-bit YCrCb 4:2:2 12-bit RGB DDR 36-bit YCrCb 12- and 24-bit YCrCb 4:2:2	12	Connected box, HDTV	•	176-lead LQFP
ADV7188	12	54	10	Composite, RGB SCART, Y/C, YPrPb		8- and 16-bit YCrCb 4:2:2	12	Connected box, HDTV		80-lead LQFP
ADV7403	12	140	10	Composite, RGB, RGB SCART, Y/C, YPrPb		10- and 20-bit YCrCb 4:2:2 12-bit RGB DDR 24-bit YCrCb/RGB 4:4:4 8- and 16-bit YCrCb 4:2:2	12	Connected box, HDTV		100-lead LQFP
ADV7443	12	150	10	Composite, RGB, RGB SCART, Y/C, YPrPb, HDMI	•	10- and 20-bit YCrCb 4:2:2 12-bit RGB DDR 24-bit YCrCb/RGB 4:4:4 8- and 16-bit YCrCb 4:2:2	8	Connected box, HDTV		144-lead LQFP
ADV7802	12	150	12	Composite, RGB, RGB SCART, Y/C, YPrPb		10-, 20-, 24-bit YCrCb 4:2:2 12-bit RGB DDR 36-bit YCrCb 12- and 24-bit YCrCb 4:2:2	12	Connected box, HDTV	•	176-lead LQFP

HDMI/DVI Transmitters

Our broad line of HDMI/DVI transmitters includes both high performance, full-featured HDMI solutions for digital home applications and low power HDMI transmitter solutions optimized for portable applications. Many of our transmitters include HDCP support with the option of internal or external HDCP keys. Internal HDCP key transmitters simplify manufacturing flows but can only be sold to HDCP licensees. External/no key versions support noncontent-protected applications. Software drivers are provided for all HDMI/DVI transmitter products to simplify and optimize implementation and accelerate time to market.

Part Number	Resolution (Bits)	Sample Rate (MSPS)	Maximum Display Resolution	HDCP Key Storage	I²S Audio Channels	S/PDIF	Audio Sample Rate (kHz)	CEC Support	Package
AD9389B	8	165	1080p/UXGA	Internal	8	•	192		64-lead LFCSP, 80-lead LQFP
AD9889B	8	165	1080p/UXGA	External	8	•	192		76-lead BGA, 64-lead LFCSP, 80-lead LQFP
ADV7520NK	8	80	720p/1080i	External	8	•	192	•	76-ball BGA
AD9387NK	8	80	720p/1080i	External	8	•	192		80-lead LQFP, 64-lead LFCSP

HDMI/DVI Switches

Analog Devices HDMI/DVI switches and buffers enable designers to easily expand the number of HDMI inputs in their systems. Advanced equalizer technology enables the connection of 1080p Deep Color HD equipment over more than 20 meters of cable. Analog Devices offers the industry's broadest selection of buffered HDMI multiplexers. Low jitter equalizer technology enables a single equalizer setting for all cable lengths from 0 to >40 meters.

Part Number	Number of Input Channels	Number of Output Channels	Maximum Data Rate (Gbps)	Maximum Display Resolution	Input Equalizer (dB)	Output Pre-Emphasis (dB)	Integrated DDC Mux	Front-Panel Buffer	Package
AD8195	1	1	2.25	UXGA/1080p	12	6	Buffered	•	40-lead LFCSP
AD8190	2	1	1.65	UXGA/1080p	12	6	Unbuffered		56-lead LFCSP
AD8192	2	1	2.25	UXGA/1080p	12	6	Buffered	•	56-lead LFCSP
AD8193	2	1	2.25	UXGA/1080p	0	—	—		32-lead LFCSP
AD8194	2	1	2.25	UXGA/1080p	12	—	—		32-lead LFCSP
AD8196	2	1	2.25	UXGA/1080p	12	6	Unbuffered		56-lead LFCSP
ADV3000	3	1	2.25	UXGA/1080p	12	6	Unbuffered		80-lead LQFP
AD8191	4	1	1.65	UXGA/1080p	12	6	Unbuffered		100-lead LQFP
AD8197	4	1	2.25	UXGA/1080p	12	6	Unbuffered		100-lead LQFP

Video Switches

Analog Devices offers the broadest portfolio of video switches, which include support of UXGA resolution. Their high performance, low power, and economical design make them the ideal choice for video multiplexing, routing, and distribution.

Part Number	Switch Type	Supply Voltage (V)	Gain (V/V)	BW @ A_{CL} (MHz)	Crosstalk @ 5 MHz (dB)	0.1 dB Flatness (MHz)	Differential Gain (%)	Differential Phase (°)	I_S Typ (mA)
AD8104/AD8105	32 × 16	±2.5	1/2	600	–80, –70	100	0.05	0.05	340
AD8110/AD8111	16 × 8	±5	1/2	390, 260	–78	80, 57	0.02	0.02	50
AD8112/AD8113	16 × 8, 16 × 16	±12, ±5	2	60	–83*	10	0.1	0.1	60
AD8114/AD8115	16 × 16	±5	1/2	225, 200	–70	25, 40	0.05	0.05	70, 80
AD8117/AD8118	32 × 32	±2.5	1/2	600	–70, –75	100	0.05	0.05	500
AD8175/AD8176	Triple 16 × 9	±2.5	2/4	500, 450	–88, –82	25	—	—	600
AD8177/AD8178	Triple 16 × 5	±2.5	2/4	500, 450	–88, –82	25	—	—	460
AD8180/AD8182	Single/dual 2:1 mux	±5	1	930, 780	–80	100	0.02	0.02	3.8, 6, 8
AD8183/AD8185	Triple 2:1 mux	±5	1/2	590, 360	–84	90, 60	0.01	0.02	25
AD8184	4:1	±5	1	700	–95	75	0.01	0.01	4.4
AD8186/AD8187	Triple 2:1 mux	5	1/2	1000	–84, –78	90, 85	0.05	0.05	18.5, 19.5
AD8188/AD8189	Triple 2:1 mux	5	1/2	350	–84, –78	70	0.05	0.05	18.5, 19.5
ADV3200/ADV3201	32 × 32	±2.5	1/2	250	–55	50	0.1	0.1	270
ADV3202/ADV3203	32 × 16	±2.5	1/2	250	–55	50	0.1	0.1	200

* @ 20 kHz.

RF Splitters and Line Drive Amplifiers

High performance analog circuitry remains critical in advanced television interface applications. Analog Devices continues to be a major supplier for this need with its portfolio of CATV line drivers and active RF splitters. ADI's high performance drivers and splitters enable the implementation of the most advanced cable modems and set-top boxes on the market.

Part Number	I/O Configuration	Inputs/Outputs	1 dB Bandwidth (MHz)	Max Gain (dB)	CSO (dBc)	CTB (dBc)	Noise Figure (dB)	Package
ADA4302-4	Differential	1:4	900	5.7	–73	–66	4.4	20-lead LFCSP
ADA4303-2	Single-ended	1:2	1200	4	–62	–72	4.4	12-lead LFCSP
ADA4304-2	Single-ended	1:2	1000	3	–62	–72	4.6	16-lead LFCSP
ADA4304-3	Single-ended	1:3	1000	3	–62	–72	4.6	16-lead LFCSP
ADA4304-4	Single-ended	1:4	1000	3	–62	–72	4.6	16-lead LFCSP

Video Amplifiers

Analog Devices offers a wide selection of high speed operational amplifiers that provide excellent video performance. Starting at less than $0.30 per amplifier, these op amps are ideal for both consumer and professional video applications.

Part Number				Disable	Supply Voltage (V)		Rail-to-Rail Output	A_{CL} Min	BW @ A_{CL} Min (MHz)	Slew Rate (V/µs)	0.1% Settling Time (ns)	0.1 dB Flatness (MHz)	Differential Gain (%)	Differential Phase (°)	I_S/Amp Typ (mA)	I_{OUT} (mA)
Single	Dual	Triple	Quad		Min	Max										
AD4860-1				•	5	12		1	800	790	8	125	0.02	0.02	6	85
		ADA4861-3		•	5	12		1	730	625	13	100	0.01	0.02	6	100
		ADA4862-3		•	5	12		2	300	750	9	65	0.02	0.03	5.3	65
AD8000				•	5	12		1	1500	4100	12	190	0.02	0.01	13.5	100
		AD8003		•	5	12		1	1650	3800	12	190	0.05	0.01	9.5	100
AD8061/ AD8063				•	2.7	8	•	1	300	650	35	30	0.01	0.04	6.8	50
		AD8073			5	12		1	300	500	25	10	0.05	0.1	3.5	30
ADA4850-1	ADA4850-2			•	2.7	6	•	1	175	220	85	9	0.12	0.09	2.5	94
ADA4851-1	ADA4851-2		ADA4851-4	•	2.7	12	•	1	130	200	55	11	0.08	0.11	2.5	90
ADA4853-1	ADA4853-2	ADA4853-3		•	2.65	5	•	1	100	120	54	22	0.022	0.10		

Video Filters

Analog Devices offers comprehensive, integrated filtering products that easily filter and buffer all types of analog video signals, including HDTV, SDTV, S-Video, and composite video. With resolutions up to 1080i, the filters are well-suited for HD consumer applications. The products are ideal as reconstruction filters at the DAC outputs of video encoders but can also be used as antialias filters. Using two logic pins, the cutoff frequencies (36 MHz, 18 MHz, 9 MHz) of the sixth-order filters can be tuned for any HDTV or SDTV video signal. The filters take up less board space and have more functionality than discrete solutions. In addition, the video filters' low cost makes them ideal for such consumer applications as set-top boxes, DVD players and recorders, and high definition televisions.

Part Number	Standards	Resolution	Gain	Input Mux	Positive Supply (V)	Supply Current (mA)	Operating Temp Range (°C)	Package
ADA4410-6	CV, RGB, SD, Y/C, YPrPb, YUV	1080i, 720p	2×; 4×	2:1	4.5 to 12	92	–40 to +85	32-lead LFCSP
ADA4411-3	RGB, SD, Y/C, YPrPb, YUV	1080i, 720p	2×; 4×	2:1	4.5 to 12	60	–40 to +85	24-lead QSSOP
ADA4412-3	RGB, SD, Y/C, YPrPb, YUV	1080i, 720p	2×	—	4.5 to 12	56	–40 to +85	20-lead QSSOP
ADA4417-3	RGB, YPrPb, YUV	1080i, 720p	2×	—	3.3 to 5	24	–40 to +85	10-lead MSOP
ADA4430-1	SD, Y/C	480i	2×	—	2.5 to 6	1.85	–40 to +125	6-lead SC70
ADA4431-1	SD, Y/C	480i	2×	—	2.5 to 3.3	4	–25 to +85	16-lead LFCSP

Video Encoders

Analog Devices, a leader in the development of multi-format TV and video encoders, offers a range of ICs designed for consumer and professional applications. From handsets to high end DVD recorders, the ADV717x and ADV73xx families of digital video encoders output multiple analog formats conforming to international SDTV and HDTV video standards. Our 8-bit to 14-bit DAC options offer designers flexibility and performance, meeting the most demanding system requirements.

Parts with Macrovision® copy protection require proof of Macrovision license before purchase.

Part Number	Number of DACs	DAC Output (Bits)	Input Data (Bits)	Maximum Oversampling (MHz)	Standard Definition	Progressive Scan	HD (Component)	Component RGB/YPrPb	CVBS/ S-Video	NSV	Macrovision
ADV7390	3	10	8	297	•	•	•	•	•		•
ADV7391	3	10	8	297	•	•	•	•	•		
ADV7392	3	10	10	297	•	•	•	•	•		•
ADV7393	3	10	10	297	•	•	•	•	•		
ADV7170	4	10	8	27	•			•	•		•
ADV7171	4	10	8	27	•			•	•		
ADV7172	6	10	8	27	•			•	•		•
ADV7173	6	10	8	27	•			•	•		
ADV7340	6	12	10	297	•	•	•	•	•	•	•
ADV7341	6	12	10	297	•	•	•	•	•	•	
ADV7342	6	11	8	297	•	•	•	•	•		•
ADV7343	6	11	8	297	•	•	•	•	•		
ADV7344	6	14	10	297	•	•	•	•	•	•	•

NSV®
Precision Video
by Analog Devices

Video Distribution over UTP Cable

Analog Devices offers a broad portfolio of differential drivers, receivers, and cable equalizers, creating a complete low cost solution for transmitting video signals over low cost unshielded twisted pair (UTP) cable.

Differential Drivers

The latest AD8146, AD8147, and AD8148 differential drivers have high –3 dB bandwidths, 0.1 dB flatness, and fast slew rates, making them the perfect choice for transmitting high definition video. The AD8134, AD8147, and AD8148 have integrated sync-on-common-mode encoding schemes, which provide ease of use for the designer and save board space by eliminating external sync encoding circuitry. The AD8148 has a fixed gain of 4, which enables the designer to use a pre-emphasis circuit and provides extra peaking to the high frequency components of high definition video.

Part Number	Number of Channels	–3 dB BW (MHz)	0.1 dB Flatness (MHz)	Gain	Slew Rate (V/μs)	Disable	Positive Supply (V)	Total Supply Current (mA)	Features	Package
AD8131	1	400	85	2	2000		2.7 to 11	11.5	—	8-lead MSOP, 8-lead SOIC
AD8133	3	450	60	2	1600	•	4.5 to 11	28	—	24-lead LFCSP
AD8134	3	450	60	2	1600	•	4.5 to 11	31	Sync-on-CM	24-lead LFCSP
AD8146	3	700	220	2	3000	•	4.5 to 11	57	—	24-lead LFCSP
AD8147	3	600	200	2	3000	•	4.5 to 11	61.5	Sync-on-CM	24-lead LFCSP
AD8148	3	700	200	4	3000	•	4.5 to 11	61.5	Sync-on-CM	24-lead LFCSP

Differential Line Receivers

Part Number	Number of Channels	–3 dB BW (MHz)	0.1 dB Flatness (MHz)	Gain	Slew Rate (V/μs)	Disable	Positive Supply (V)	Total Supply Current (mA)	Features	Package
AD8129	1	200	50	RF/RG	1060	•	4.5 to 25.2	11	Stable G ≥ 10	8-lead MSOP, 8-lead SOIC
AD8130	1	270	45	RF/RG	1090	•	4.5 to 25.2	11	—	8-lead MSOP, 8-lead SOIC
AD8143	3	260	45	RF/RG	1000	•	4.5 to 25.2	11	—	32-lead LFCSP
AD8145	3	530	100	1 or 2	2000	•	4.5 to 11	48.5	Sync-on-CM	32-lead LFCSP

Differential Receiver/Equalizers

ADI's latest equalizer, the AD8123, provides substantial high frequency gain to the designer that allows compensation of UXGA resolution video after 300 meters UTP or coaxial cable. The AD8123 has four analog controls that provide high flexibility for compensating different lengths and types of cables as well as different video resolutions. In particular, the nature of "analog control" saves designers the cost of peripheral digital circuity and makes it easy for the field installer to adjust the video quality.

Part Number	Number of Channels	Peak Gain	Gain	Disable	Positive Supply (V)	Total Supply Current (mA)	Features	Package
AD8128	1	20 dB @ 120 MHz	1		9 to 11	24	Peak, gain, offset adjust	8-lead LFCSP
AD8123	3	55 dB @ 100 MHz	1	•	9 to 11	132	Peak, gain, offset, pole adjust	40-lead LFCSP

Video Processing

Video Compression

ADI's Wavescale compression technology is based on the JPEG2000 compression algorithm. This technology is well-suited to real-time video compression applications, particularly for high definition video. The ADV212 is designed for professional and industrial applications, including digital cinema, broadcast television, and surveillance. The ADV216 and ADV226 are cost-optimized for consumer applications, like our HDAnywhere networked entertainment platform.

Part Number	Bits per Component	Compression Format	Internal Memory	On-Board Rate Control	720p/1080i/ 1080p @ 30 Hz	1080p @ 60 Hz	Application	Temperature Range (°C)
ADV212	12	JPEG2000	•	•	2 chips	4 chips	DCI/ProVideo	0 to 85
ADV216	12	JPEG2000	•	•	2 chips	4 chips	Advanced TV	0 to 70
ADV226	12	JPEG2000	•	•	1 chip	2 chips	Advanced TV	0 to 70

Wavescale™
Compression Technology
by Analog Devices

Audio Interface and Processing

Audio Analog-to-Digital Converters

Part Number	Number of Input Channels	DNR (dB)	SNR (dB)	THD + N @ 1 kHz (dB)	Description
AD1871	2	105	105	–95	Stereo audio, 24-bit, 96 kHz, multibit Σ-Δ
AD1870	2	92	—	–90	Single-supply, 16-bit stereo Σ-Δ
AD1974	4	105	105	–95	Stereo audio, 24-bit, 96 kHz, multibit Σ-Δ

Audio Digital-to-Analog Converters

Part Number	DNR (dB)	SNR (dB)	THD + N @ 1 kHz (dB)	Description	Function
AD1833A	110	110	–95	Multichannel, 24-bit, 192 kHz Σ-Δ	DAC
AD1852	114	114	–104	Stereo, 24-bit, 192 kHz, multibit, voltage output Σ-Δ	DAC
AD1854	113	112	–97	Complete single-chip stereo audio	DAC
AD1859	94	—	–88	Stereo, single-supply, 18-bit, integrated Σ-Δ	DAC
AD1866	90	95	–86	Single-supply, dual, 16-bit audio	DAC
AD1953	112	112	–100	SigmaDSP,® 3-channel, 26-/48-bit processing	DAC, signal processor
AD1955	120	120	–110	Multibit Σ-Δ with SACD playback	DAC
AD1958	109	108	–96	Stereo, 24-bit, 192 kHz, multibit Σ-Δ with PLL	DAC

Audio Processors for Advanced TV

ADI's family of audio codecs provides flexible audio interfaces with high performance conversion—for both analog-to-digital and digital-to-analog conversion.

Part Number	ADC Input Channels	DAC Output Channels	PWM Output	Broadcast Audio Decode (SIF)
ADAV4601	2	6	Yes	No
ADAV4622	4	8	Yes	Yes
ADAV4322	4	11	—	Yes

Class-A Audio Amplifiers

Part Number	Common-Mode Rejection (dB)	THD + N (%)	Gain Error (%)	PSRR	Slew Rate (V/µs)	Description
SSM2019	130	0.01	0.1 dB	124 dB	16	Complete preamplifier
SSM2141	100	0.0010	0.001	0.7 µV/V	9.5	Differential line receiver
SSM2142	—	0.0060	0.700	80 dB	15	Balanced line driver
SSM2143	90	0.0006	0.03	110 dB	10	Differential line receiver
SSM2160	—	0.01	0.5 dB	—	—	6-channel volume control
SSM2165	—	0.20	—	50 dB	—	Microphone conditioner with noise gate
SSM2166	—	0.25	—	50 dB	—	Microphone conditioner with noise gate

Class-D Stereo Power Stage

Modern audio applications, such as advanced flat panel TVs, require high quality audio amplification. However, due to the form factor, which does not allow space for bulky heat sinks, there is a need for highly efficient amplification, which is increasingly being met by digital switching (Class-D) amplifiers.

ADI provides a range of Class-D audio amplifier solutions in two formats—the first, an analog input that allows connection to existing analog system interfaces; the second, a switching power stage with direct digital connection. In both cases, ADI's Class-D products offer high performance coupled with high efficiency. Both provide robust on-chip error detection and monitoring.

Part Number	Output Power (10% THD + N)	Efficiency @ 15 W	Dynamic Range (dB)	Internal Modulator
ADAU1513	17.5 W @ 6 Ω	90%	96	No
ADAU1592	18.0 W @ 6 Ω	87%	101	Yes

Audio Signal Processors

Integrated Audio Signal Processors

ADI's family of integrated audio processors incorporate a signal processing engine, high performance analog codecs, and flexible digital interfaces to provide powerful solutions for general-purpose audio applications where advanced postprocessing and audio enhancement are required. Several members of this family are targeted specifically at TV audio applications where they incorporate robust broadcast audio demodulation to support legacy analog broadcast worldwide. All devices feature extensive delay memory which can be used for audio/video lip synchronization.

For TV applications, there is a choice of devices with analog (DAC-based) or digital (PWM) interfaces to main speaker amplifiers. ADI's high efficiency, high performance Class-D amplifiers complement these audio processors.

Part Number	Performance (MHz)	L1 SRAM (kB)	L2 Memory (kB)	Ethernet MAC	Pixel Compositor	High Speed USB OTG	Lockbox™	Host DMA	ATAPI	SDIO	Optional Integration
ADSP-BF522	300, 400	132	—				•	•			Audio codec
ADSP-BF524	300, 400	132	—			•	•	•			Audio codec
ADSP-BF526	300, 400	132	—	•		•	•	•			Audio codec
ADSP-BF523	533, 600	132	—				•	•			Audio codec
ADSP-BF525	533, 600	132	—			•	•	•			Audio codec
ADSP-BF527	533, 600	132	—	•		•	•	•			Audio codec
ADSP-BF542	400, 533, 600	132	64		•	•	•	•	•	•	—
ADSP-BF544	400, 533	132	64		•		•	•			—
ADSP-BF547	533, 600	132	128		•	•	•	•	•	•	—
ADSP-BF548	533	132	128		•	•	•	•	•	•	—
ADSP-BF549	533	132	128		•	•	•		•	•	—

Digital Signal Processors

SHARC processors are high performance, 32-bit, floating-point processors based on a Super Harvard Architecture. SHARC processors dominate the floating-point digital signal processing market, delivering exceptional core and memory performance, complemented by outstanding I/O throughput. The industry-standard SHARC family makes floating-point processing economical for applications where performance and dynamic range are key considerations.

The combination of a high performance core surrounded by appropriate peripherals, a large software library, and award-winning development tools makes SHARC processors the ideal choice for audio and broad market processor applications.

The ADSP-21266, ADSP-21366, and ADSP-21367 permit highly efficient software implementations of audio decode and postprocessing algorithms, such as Dolby Digital, Dolby Digital EX, DTS-ES Discrete 6.1, DTS-ES Matrix 6.1, DTS 96/24™ 5.1, MPEG-2 AAC LC, MPEG-2 BC 2ch, Dolby Pro Logic II, Dolby Pro Logic 2x, DTS Neo:6, and WMA Pro. Libraries of all standard—and many proprietary—audio algorithms reside in on-chip ROM, eliminating the need for external ROM.

Part Number	Clock Speed Max (MHz)	MMACS	On-Chip SRAM (Mb)	Audio Decoders in ROM	S/PDIF Transceiver	Sample Rate Conversion (dB)
ADSP-21362	333	666	3	—	•	128
ADSP-21363	333	666	3	—	•	140
ADSP-21364	333	666	3	—	•	140
ADSP-21368	333, 400	666, 800	2	—	•	128
ADSP-21369	266, 333, 350, 400	532, 666, 700, 800	2	—	•	—
ADSP-21371	266	532	1	—	•	—
ADSP-21375	266	532	0.5	—		—
ADSP-21266	200	400	2	4 Mb		—
ADSP-21365	333	666	3	4 Mb	•	128
ADSP-21366	333	666	3	4 Mb	•	128
ADSP-21367	266, 333, 350, 400	532, 666, 700, 800	2	6 Mb	•	128

SHARC® audio processors (Include audio-specific peripherals and on-chip factory-programmed ROM. License agreement required from IP holders.)

Analog/HDMI/DVI Display Interfaces

AD9388A Dual 10-Bit Analog and HDMI Rx Interface

- Three 10-bit ADCs sample up to 170 MHz
- Simultaneous HDMI and analog video processing
- Supports Deep Color (36-bit color for HDMI v1.3)
- 225 MHz HDMI Rx for up to 1080p resolution at 36-bit color
- Adaptive equalizer on HDMI inputs for longer cables
- 2:1 input mux on HDMI Rx
- HDMI repeater support
- Internal EDID RAM

AD9398 Low Cost HDMI Rx

- External HDCP keys
- 150 MHz HDMI Rx
- S/PDIF or up to 8 channels of I²S audio output
- 100-lead LQFP package
- Support for HDMI 1.1, DVI 1.0, and HDCP 1.1

AD9983A 8-Bit Analog Display Interface

- 170 MSPS sampling rate
- 300 MHz analog bandwidth
- Auto-offset adjustment
- Autogain balancing
- Low PLL clock jitter
- 2:1 input mux
- 4:4:4, 4:2:2, and DDR output

AD9984A 10-Bit Analog Display Interface

- 170 MSPS sampling rate
- 300 MHz analog bandwidth
- Auto-offset adjustment
- Autogain balancing
- Low PLL clock jitter
- 2:1 input mux
- 4:4:4, 4:2:2, and DDR output

Audio Signal Processors

ADAV4201 Integrated Audio Processor for Advanced TVs

- One stereo input ADC
- 4 output DAC channels
- –95 dB DNR
- High performance PWM digital outputs
- A/V sync delay up to 400 ms
- 125 MHz SigmaDSP processor core
- Support from SigmaStudio™ with ADI and third-party software

Class-D Audio Amplifiers

ADAU1513 Class-D Output Power Stage

- Integrated stereo output power stage (used with ADAV4201)
- Low R_{DS-ON}: <0.3 Ω (per transistor)
- Efficiency: >90%
- Short-circuit and overtemperature protection
- 48-lead LFCSP package

Display Driver Electronics

AD8383 Low Cost, 10-Bit, 6-Channel *Dec*Driver

- Fast settling time: 30 ns settling time to 0.25%
- Output drive to within 1.3 V of rails
- Slew rate of 460 V/ms
- Voltage controlled brightness and contrast levels
- Output short-circuit protection
- Max input update rate of 100 MSPS

HDMI/DVI Multiplexers

AD8195 Front-Panel HDMI Buffer

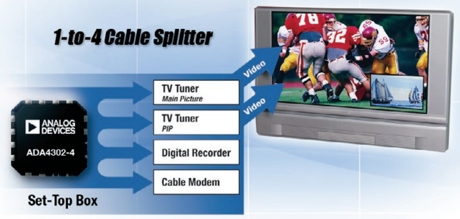
- Supports HDMI compliance testing input capacitance specifications
- Terminates all high bandwidth, DDC, and CEC lines
- Equalized inputs and pre-emphasized outputs for longer cable lengths
- High speed: up to 2.25 Gbps
- 40-lead LFCSP package

HDMI/DVI Transmitters

ADV7520NK Low Power HDMI Tx with CEC Support

- Integrated CEC buffer simplifies system design
- Low power consumption
- Display resolutions up to 720p/1080i and SXGA
- 5 V tolerant I/O pins reduce system cost
- Space-saving 76-ball BGA package
- Integrated I²C master for easier EDID reading

Industry's First HDMI Transmitter to Feature On-Chip CEC Support



RF Splitters

ADA4302-4 1:4 Differential CATV Splitter
ADA4303-2 1:2 Single-Ended CATV Splitter

- 54 MHz to 865 MHz CATV frequency range
- 4.6 dB gain
- 25 dB isolation
- 1.3 GHz bandwidth
- 4.4 dB noise figure
- Single 5 V supply

SHARC Processors

ADSP-21368 SHARC Processor

- 32-bit/40-bit floating-point processor
- Single-instruction, multiple-data (SIMD) computational architecture
- On-chip memory—2 Mb of on-chip SRAM and 6 Mb of on-chip mask-programmable ROM
- 400 MHz maximum core clock frequency
- 1.3 V core VDD/3.3 V I/O
- Software support for ADI and third-party audio algorithms

Video Amplifiers

ADA4853-3 Triple, Low Power, Rail-to-Rail Output Video Op Amp

- Ultralow power-down current: 0.1 mA
- High speed: 100 MHz (–3 dB bandwidth)
- 120 V/μs slew rate
- Single supply (2.65 V to 5 V)
- Output swings to within 200 mV of either rail
- 0.5 dB flatness: 22 MHz
- 16-lead TSSOP package

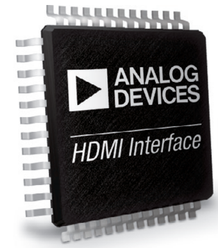
Video Compression

ADV216 Wavescale Video Codec

- Complete single-chip JPEG2000 compression/decompression solution
- Pin-compatible with ADV202 and ADV212
- JTAG boundary scan support
- Two ADV216s can be combined to support full frame SMPTE 274M (1080i) or SMPTE 296M (720p)
- Third-party software support and eval board is available

Video Decoders

ADV7441A 10-Bit Video Decoder with Integrated HDMI Rx



- Four 10-bit ADCs sampling up to 170 MHz
- 12-channel analog input mux
- Supports NTSC, PAL, and SECAM
- SCART fast blanking input
- Supports display resolutions up to 1080p/UXGA
- HDMI Rx supports Deep Color (HDMI 1.3)
- Adaptive equalizer on HDMI inputs for longer cables
- Internal HDCP keys

ADV7802 12-Bit Video Decoder with 3D Comb Filter

- Four NSV 12-bit ADCs sampling up to 80 MHz
- True 12-bit high dynamic range processing
- Support for composite, component, and RGB input
- Adaptive line length tracking (ADLLT)
- SCART fast blanking input
- 12-channel analog mux input

Video Encoders

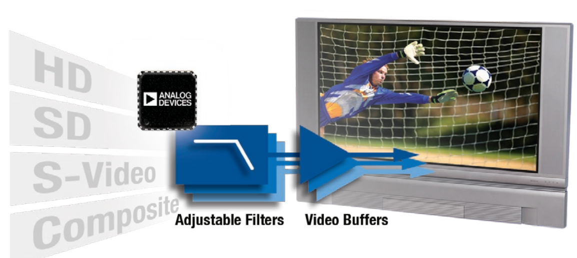
ADV7391 Low Power, 10-Bit, SD/HD Video Encoder

- 297 MHz oversampling triple DACs
- Support for composite, S-Video, and component video output
- Advanced low power consumption features:
  - Content-dependent, low power DAC operation
  - Cable detection
  - DAC auto power-down
- 32-lead LFCSP package

Video Filters

ADA4431 Ultralow Power SD Video Filter

- Low-pass video filter
  - –1 dB flatness out to 5.5 MHz
  - 28 dB rejection at 27 MHz
- Ultralow power-down current: 0.1 μA
- Charge pump allows for negative voltage on a single supply
- Low voltage supply: 2.5 V to 3.3 V
- Small packaging: 16-lead LFCSP



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