

# ADV7402/ADV7400 Multiformat Video Decoders for Advanced TV

## Key Features

- 12-bit Noise Shaped Video® (NSV) ADCs
- True 10-bit video data processing and output
- 110 MSPS conversion rate supports RGB input resolutions up to 1280 × 1024 @ 60 Hz (SXGA)
- NTSC, PAL, and SECAM color standards support
- Chroma transient improvement (CTI)
- Full component HDTV input support for 525p, 625p, 720p, and 1080i, plus many other HD and SMPTE standards
- CVBS, S-Video, YPbPr, and RGB input support, including 5-wire YPbPrHV/RGBHV and CSync
- 4× oversampling (54 MHz) for standard definition and 2× oversampling for progressive scan inputs
- 5-line super adaptive comb filters for advanced NTSC and PAL 2D Y/C separation
- 24-bit digital RGB input port accepts data from common DVI/HDMI receivers
- Any-to-Any 3 × 3 color space converter
- Fully certified Macrovision® detection for 525i, 625i, 525p, and 625p
- Adaptive digital line length tracking (ADLLT™) enables robust sync stability for poor video sources such as VCRs and camcorders, including noisy, weak, or distorted composite video signals from tuners and other nonstandard sources
- Digital automatic gain control (AGC) for super fast response to step input changes
- VBI data slicer supports CGMS, WSS, EDTV, Gemstar™ 1×/2×, CC, and XDS

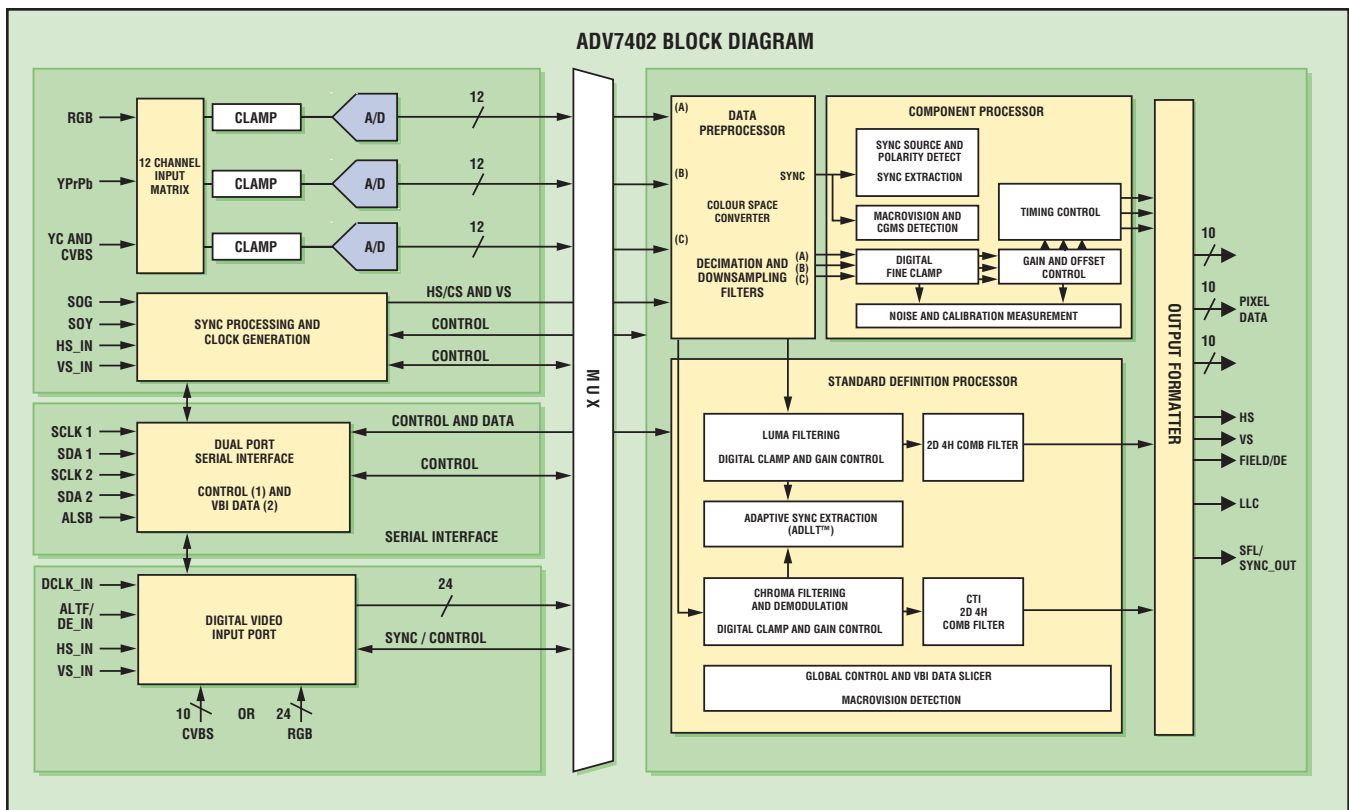


## Integrated Multiformat SDTV/HDTV Video Decoder and RGB Graphics Digitizer

The ADV7402 high performance multiformat video decoder is the first to integrate 12-bit quality video decoding with high speed graphics and high definition video digitization. Designed for the highest mixed-signal performance, Noise Shaped Video ADCs enable true 10-bit data output accuracy for all sources up to HDTV rates.

With 12 analog input channels, the ADV7402 enables system designers to choose one part to route or convert multiple analog video inputs into industry-standard or proprietary output interfaces. With support for single data rate (SDR) and double data rate (DDR) output modes, interfacing to popular scalars, MPEG A/V CODECs, and graphics processors is easily achieved.

Using the on-board 3 × 3 conversion matrix, digital or analog RGB inputs can be converted to any color space. The ADV7402 is suitable for a wide range of domestic and worldwide consumer electronics designs, and is ideal for home theater projectors or direct view and rear projection HDTVs, where two or more chips (decoder and ADC) can be replaced with one ADV7402 IC. For cost-sensitive applications, the ADV7400 provides designers with high performance 10-bit ADCs and an 8-bit accurate output interface.



### ADV7402 Product Specifications

- 12-bit ADCs: 65 dB SNR (luma flat field)
- 0.4% differential gain, 0.4° differential phase (typical)
- 100-lead 100% Pb-free 14 mm × 14 mm LQFP
- 0°C to +70°C and -40°C to +85°C\* temperature ranges

\*ADV7400 only.

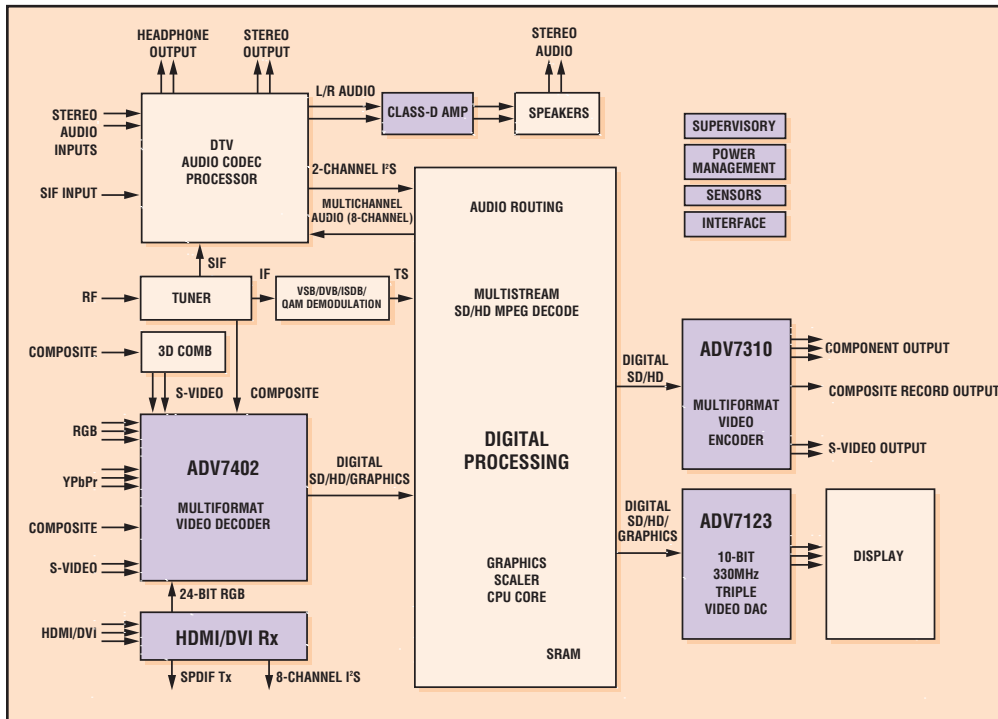
### ADV7402 Product Specifications

- 0.5 V to 1.6 V analog signal input range
- 3.3 V analog, 1.8 V digital core, 3.3 V I/O power supplies
- 2-wire serial MPU interface (I<sup>2</sup>C<sup>®</sup> compatible) (400 kbps max)
- 30-bit configurable pixel output port
  - 8-/10-bit 4:2:2 YCbCr
  - 16-/20-bit 4:2:2 YCbCr
  - 24-/30-bit 4:4:4 YCbCr/RGB
- Double-Data-Rate (DDR) output modes
  - 8-bit 4:2:2 YCbCr
  - 12-bit 4:4:4 RGB (graphics)
- 10-bit digital baseband composite video input for external tuner support
- Automatic VCR/TV detection and processing
- VBI data output through pixel port interface (ancillary data packets as per ITU-R BT.1364) for closed captioning (CC) and Gemstar™ 1×/2×
  - Other VBI data services accessible via the I<sup>2</sup>C interface include copy generation management system (CGMS), wide screen signalling (WSS), EDTV, closed captioning (CC) and extended data services (XDS).
- Support for all worldwide color formats:
  - PAL B/D/I/G/H, PAL60, PAL M, PAL N, PAL Nc
  - NTSC M/J, NTSC 4.43
  - SECAM B/D/G/K/L
  - NTSC Square Pixel Support

Analog Devices offers a diverse range of products to complete the advanced TV signal chain, including multiformat video decoders (ADV7402), dual interface graphics and HDMI/DVI receiver products (AD9880<sup>1</sup>), video encoders (ADV7310), and video DACs (ADV7123). Standard definition video decoders, including the ADV7183A, ADV7189, and ADV7181\* are also available for multichannel configurations and other video recording and processing applications. The AD1991 Class D Audio Power Amplifier Output Stage also enables state-of-the-art, compact electronic component design for home theater systems and flat-panel displays.

<sup>1</sup>Send email to [flatpanel\\_apps@analog.com](mailto:flatpanel_apps@analog.com) for more detailed information.

\*Send email to [video\\_products@analog.com](mailto:video_products@analog.com) for more detailed information.

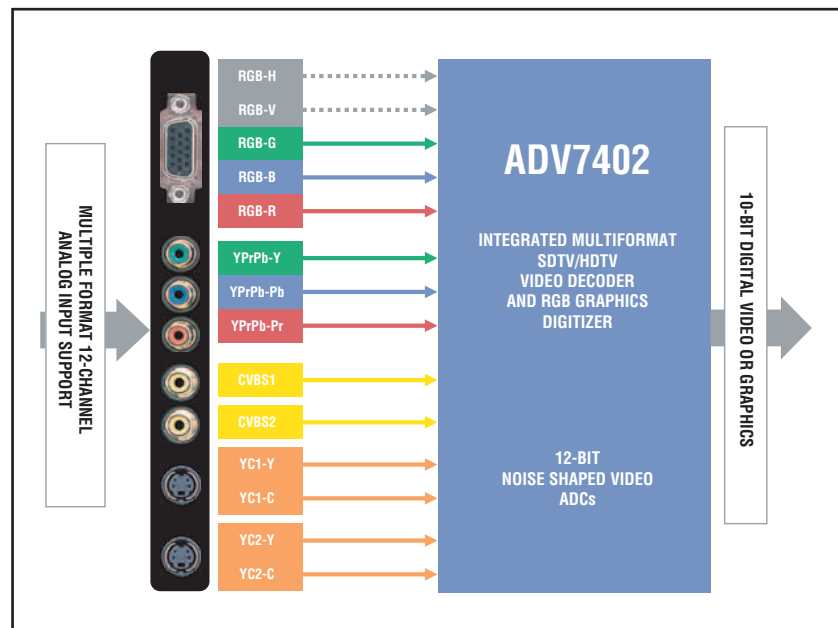


The ADV7402 and ADV7400 multiformat video decoders simplify front end digitizer and decoder architectures by reducing board space, simplifying auto detection and switching of inputs, and reducing overall system power consumption.

For TV configurations, the ADV7402/ADV7400 can process and switch between the following signal types without the need for external multiplexer circuitry:

- RGB graphics outputs from a PC graphics card
- YPbPr outputs from a progressive scan DVD player or high definition set-top-box
- Composite video from a TV tuner or VCR
- S-Video from a camcorder or S-VHS VCR

Ideally suited to applications that require support for all these inputs, the ADV7402/ADV7400 can interface directly to many graphics controllers, scalars, de-interlacers, MPEG encoders, and image enhancement processors with bus widths as low as 10 bits (+clock) for all scanning rates and sampling schemes.



Evaluation kits for the ADV7402 and ADV7400 are now available from Analog Devices. All kits include the equipment necessary to start prototyping with those devices. With the on-board ADuC831 microcontroller, each kit comes ready programmed for standalone operation, including pre-programmed auto detection and mode selection via the on-board rotary hex switches.

Each video decoder module is equipped with standard RCA/Phono type connectors for component and composite video inputs. A mini-Din connector is also provided for S-Video connections, along with a 15-Pin D-Sub for standard RGB graphics inputs.

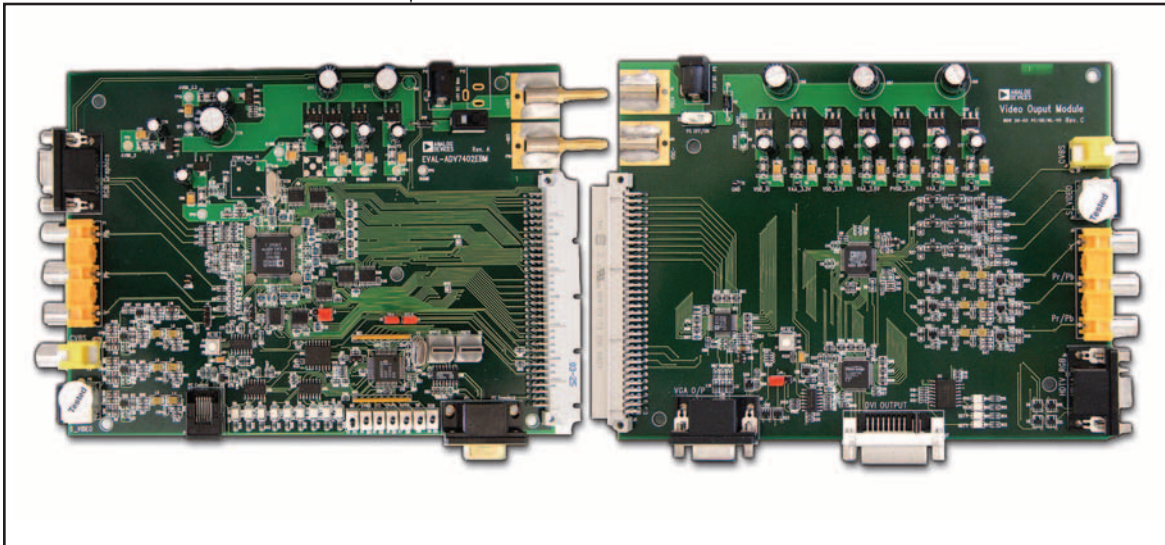
A display output module equipped with video encoder (ADV7310), graphics DAC (ADV7123), and DVI transmitter provides a variety of output formats to interface with professional analog or digital displays and basic televisions. Control software is provided for complete configuration of each module via the parallel port of a PC using serial communications. Various add-on modules are also available to provide data bus expansion and support for future functionality.

**Worldwide Headquarters**  
 One Technology Way  
 P.O. Box 9106  
 Norwood, MA  
 02062-9106 U.S.A.  
 Tel: 781.329.4700,  
 (1.800.262.5643,  
 U.S.A. only)  
 Fax: 781.326.8703

**Analog Devices, Inc. Europe**  
 c/o Analog Devices SA  
 17-19, rue Georges Besse  
 Parc de Haute  
 Technologie d'Antony  
 F-92182  
 Antony Cedex, France  
 Tel: 33.1.46.74.45.00  
 Fax: 33.1.46.74.45.01

**Analog Devices, Inc. Japan Headquarters**  
 New Pier Takeshiba  
 South Tower Building  
 1-16-1 Kaigan,  
 Minato-ku, Tokyo  
 105-6891, Japan  
 Tel: 813.5402.8210  
 Fax: 813.5402.1063

**Analog Devices, Inc. Southeast Asia Headquarters**  
 RBS Tower, Rm 4501-3  
 Times Square  
 1 Matheson Street  
 Causeway Bay  
 Hong Kong, PRC  
 Tel: 852.2.506.9336  
 Fax: 852.2.506.4755



### Ordering Information

Part Number	Description
ADV7402KST-110	12-bit, 110 MHz ADC speed grade (SXGA @ 60 Hz max)
ADV7402KST-80	12-bit, 80 MHz ADC speed grade (1080i/720p max)
ADV7400KST-140	10-bit, 140 MHz ADC speed grade (SXGA @ 75 Hz max)
ADV7400KST-110	10-bit, 110 MHz ADC speed grade (SXGA @ 60 Hz max)
ADV7400KST-80	10-bit, 80 MHz ADC speed grade (1080i/720p max)

**For ADV7402 and ADV7400 samples, evaluation boards, or availability information, please contact us via email at [video\\_products@analog.com](mailto:video_products@analog.com)**

**For more information on these products and Analog Devices' extensive video and imaging product portfolio, please visit our website.**

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