

Product Bulletin

TVP5160: 3D Comb-Filter NTSC/PAL/SECAM Video Decoder

Texas Instruments' (TI) newest addition to an already market proven portfolio of video decoders provides unparalleled video quality and features not found in other decoders. The TVP5160 device, a high-quality, high-performance digital video decoder (NTSC/PAL/SECAM) digitizes and decodes all popular baseband analog video formats into digital component video.

Target applications include:

- CRT, LCD, DLP™ and plasma TV
- DVD-Recorder
- High-end set-top box

By implementing a 3D comb filter, the TVP5160 provides the highest quality video available today. The 3D comb filter, which separates the composite signal into both Y and C channels to reduce both cross-luma and cross-chroma artifacts, is applied on both NTSC and PAL video inputs. Through a highly sophisticated motion detection algorithm, the TVP5160 successfully applies TI's patented 2D, 5-line comb filter to those portions of the picture that are moving but also utilizes TI's 3D comb filter to provide cleaner, crisper images to the static portions of the picture.

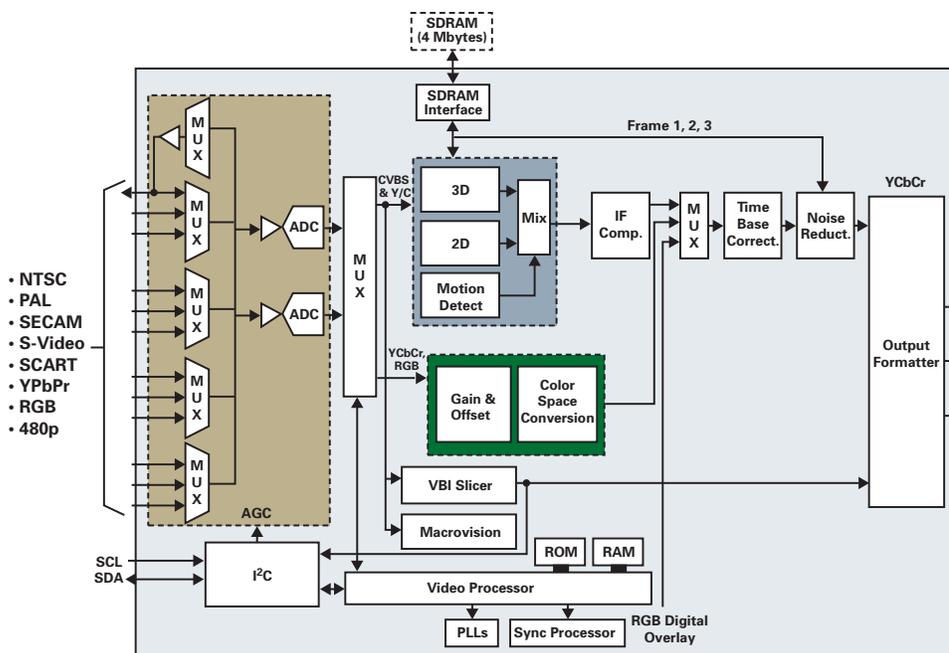
Key Features

- NTSC/PAL 3D comb filter
- Concurrent 3D noise reduction
- 480 p/576 p
- IF compensation
- Time-based correction (TBC)
- Improved 2D, 5-line comb filter
- Weak and non-standard signal support
- Robust VCR performance

In addition to the 3D comb filter, the TVP5160 can simultaneously provide 3D noise reduction to reduce temporal noise on CVBS, S-Video or component inputs and time-based correction (TBC) to correct time-based errors introduced by VCRs. TI's patented sync detector provides high-quality support of VCR trick modes, weak and noisy signals as well as other nonstandard video sources. 480p (576p) inputs are also supported to provide the high-quality progressive video inputs from other video devices including DVD players. This balance of features offers designers one of the most integrated video decoders available today greatly reducing system implementers design costs by providing higher levels of integration.

The output formats supported by the TVP5160 are:

- 20-bit 4:2:2 YCbCr with separate syncs
- 10-bit 4:2:2 YCbCr with separate syncs
- 10-bit ITU-R BT.656 4:2:2 YCbCr with embedded syncs



Technical Details

- 11-bit, 60-MSPS A/D converters with analog pre-processors (Clamp/AGC)
- Fixed RGB to YUV color space conversion
- Robust sync detection for weak and noisy signals as well as VCR
- Supports NTSC (J, M, 4.43), PAL (B, D, G, H, I, M, N, Nc, 60) and SECAM (B, D, G, K, K1, L) CVBS, S-Video
- Supports Component Standards 480i, 576i, 480p, 576p inputs
- Supports 3D-Y/C separation, or 2D 5-line (5H) adaptive comb and chroma trap filter
- Temporal, frame recursive noise reduction (3DNR)
- IF compensation
- Line-based time base correction (TBC)
- Fast switch 4× over sampled input for digital RGB overlay switching between any CVBS, S-Video or component video inputs
- SCART 4× over sampled fast switching between component input (RGB or YCbCr) and CBVS input
- Analog video output
- Chrominance processor
- Luminance processor
- Clock/Timing processor and power-down control
- Output formatter supports both ITU-R BT.656 (embedded syncs) and ITU-R BT.601 (4:2:2 with discrete syncs)
- I²C host port interface
- VBI data processor
- “Blue” screen (programmable color) output
- Macrovision™ copy protection detection circuit (type 1, 2 and 3) on both interlaced and progressive signals

The chip includes 11-bit, 60-MSPS A/D converters. Prior to each A/D converter, each analog channel contains an analog circuit, which clamps the input to a reference voltage and applies a programmable gain and offset. A total of 12 video input terminals can be configured to a combination of Component (YPbPr), RGB, Composite (CVBS), S-Video and SCART video inputs. Progressive component signals are

sampled at 2× clock frequency (54 MHz) and are then decimated to the 1X rate. In SCART mode the component inputs and the CVBS inputs are sampled at 54 MHz alternately, then decimated to the 1X rate. Composite or S-Video signals are sampled at 4× the pixel rate and are then decimated to the 1X rate. All sampling is line locked for correct pixel alignment.

The TVP5160 generates synchronization, blanking, field,

active video window, horizontal and vertical syncs, clock, genlock (for downstream video encoder synchronization), host CPU interrupt and programmable logic I/O signals, in addition to digital video outputs.

The TVP5160 includes methods for advanced vertical blanking interval (VBI) data retrieval. The VBI Data Processor (VDP) slices, and performs error checking on Teletext, closed caption, and other VBI data. A built-in FIFO stores up to 11 lines of Teletext data, and with proper host port synchronization, full-screen Teletext retrieval is possible. The TVP5160 can pass through the output formatter 2× sampled raw Luma data for host-based VBI processing.

Digital RGB overlay can be accomplished in analog or digital mode. Analog overlay can be accomplished by analog RGB or SCART. Digital RGB overlay can be synchronously switched with any video inputs, with all signals being oversampled at 4× the pixel rate.

The device consumes low power: 1.8-V digital core and 3.3-V digital I/O. Power-saving standby modes are controlled via I²C.

For More Information

If you would like more information on using the TVP5160 in your next digital video application, please contact your local TI field sales office.

Or, visit: www.ti.com/tvp5160

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