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Low Power NTSC/PAL/SECAM Video Decoder with VBI Slicer

TW9900

The [TW9900](#) is a low power NTSC/PAL/SECAM video decoder chip that is designed for portable applications. It consumes less than 100mW in typical composite input applications. The available power-down mode further reduces the power consumption. It uses the 1.8V for both analog and digital supply voltage and 3.3V for I/O power. A single 27MHz crystal is all that is needed to decode all analog video standards.

The video decoder decodes the baseband analog CVBS or S-video signals into digital 8-bit 4:2:2 YCbCr for output. It consists of analog front-end with input source selection, variable gain amplifier and analog-to-digital converters, Y/C separation circuit, multi-standard color decoder (PAL BGHI, PAL M, PAL N, combination PAL N, NTSC M, NTSC 4.43 and SECAM) and synchronization circuitry. The Y/C separation is done with high quality adaptive 4H comb filter for reduced cross color and cross luminance. The advanced synchronization processing circuitry can produce stable pictures for a non-standard signal as well as a weak signal. The output of the decoder is line-locked and formatted to the ITU-R 656 output with embedded sync.

The TW9900 also includes circuits to detect and process vertical blanking interval (VBI) signal. It slices and processes VBI data for output through video bus. Some information can also be alternatively retrieved through the host interface. It also detects copy-protected signal according to Macrovision standard including AGC and color stripe pulses.

A 2-wire serial host interface is used to simplify system integration. All the functions can be controlled through this interface.

Features

Video Decoder

- NTSC (M, 4.43) and PAL (B, D, G, H, I, M, N, N combination), PAL (60), SECAM support with automatic format detection
- Software selectable analog inputs allow any of the following combinations, e.g., 2 CVBS or 1 Y/C
- Built-in analog anti-alias filter
- Two 10-bit ADCs and analog clamping circuit
- Fully programmable static gain or automatic gain control for the Y-channel
- Programmable white peak control for the Y-channel
- 4-H adaptive comb filter Y/C separation
- PAL delay line for color phase error correction
- Image enhancement with peaking and CTI
- Digital subcarrier PLL for accurate color decoding
- Digital horizontal PLL for synchronization processing and pixel sampling
- Advanced synchronization processing and sync detection for handling nonstandard and weak signal
- Programmable hue, brightness, saturation, contrast, and sharpness
- Automatic color control and color killer
- Chroma IF compensation
- Detection of level of copy protection according to Macrovision standard
- ITU-R 601 or ITU-R 656 compatible YCbCr(4:2:2) output format
- VBI slicer supporting industrial standard data services
- VBI data pass through, raw ADC data output
- Programmable output cropping

Miscellaneous

- Two-wire MPU serial bus interface
- Supports real time control interface
- Power save and power-down mode
- Typical power consumption <100mW
- Single 27MHz crystal for all standards
- Supports 24.54MHz and 29.5MHz crystal for high resolution square pixel format decoding
- 3.3V tolerant I/O
- 1.8V/3.3V power supply
- 32 Ld TQFP and 32 Ld QFN package

Functional Description

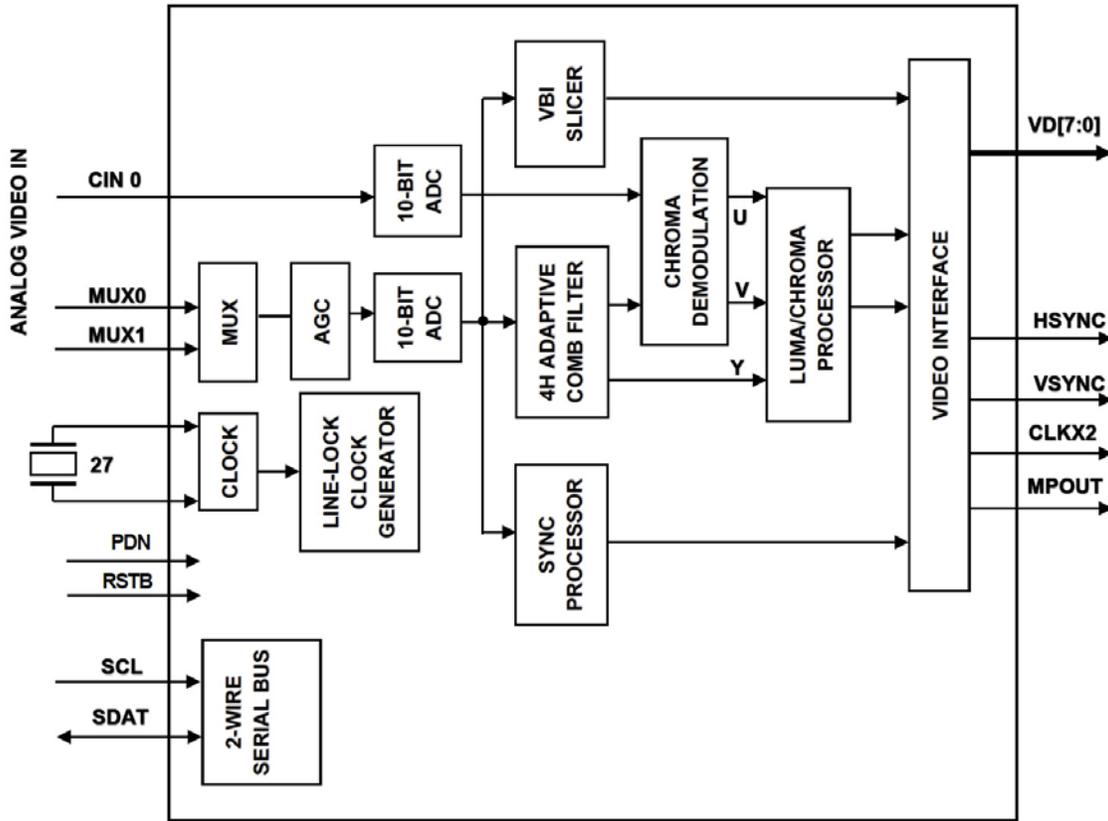


FIGURE 1. BLOCK DIAGRAM

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