Techwell
Mixed Signal Semiconductor Solutions

TECHWELL
VIDEO
DECODERS

NTSC/PAL/SECAM Video Decoder for Portable Applications

TW9900
Low Power NTSC/PAL/SECAM
Video Decoder with VBI Slicer

Features

Target Applications

- Mobile Phone
- Portable Media Player
- Portable DVD player
- Picture in Picture (PIP) decoder
- DVD Recorder

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 allows any of the following combinations, e.g. 2 CVBS or (1 CVBS and 1 Y/C).
- Built-in analog anti-aliasing 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

Video Processing

- 4-H adaptive comb filter Y/C separation
- PAL delay line for color phase error correction
- Image enhancement with peaking and CTI
- Digital sub-carrier PLL for accurate color decoding
- Digital Horizontal PLL for synchronization processing and pixel sampling
- Advanced synchronization processing and sync detection for handling non-standard 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

The TW9900 is Techwell's next generation low-cost multi-standard video decoder chip that is designed for portable applications. It consumes less than 100mW in typical composite input application. 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 needed to decode all analog video standards.

The video decoder decodes the base-band 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 non-standard signal as well as weak signal. The output of the decoder is line-locked and formatted to the ITU-R 656 output with embedded sync.
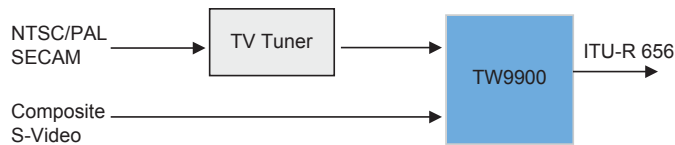
The TW9900 also includes circuits to detect and process vertical blanking interval (VBI) signal. It slices and process VBI data for output through video bus. Some information can also be alternatively retrieved through host interface. It also detects copy-protected signal according to Macrovision standard including AGC and colorstripe pulses.

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

Application Diagram
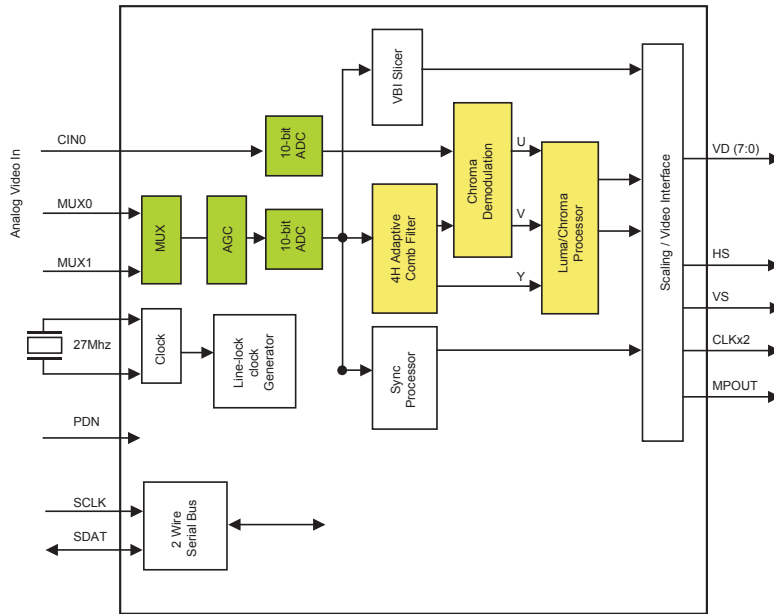
NTSC/PAL
SECAM

TV Tuner

TW9900

ITU-R 656

Composite
S-Video

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TW9900 Block Diagram

Miscellaneous

- Two wire MPU serial bus interface
- Support 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
- 3.3 V tolerant I/O
- 1.8V/3.3 V power supply
- 5x5mm² 32 TQFP package

Video Output

- 8-bit 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
- LLC output support

About Techwell

Techwell is a fabless semiconductor company that designs, markets and sells mixed signal integrated circuits for multiple digital video applications in the consumer, security surveillance and automotive markets, including advanced TVs, multifunction LCD monitors, DVD Recorders, security surveillance systems and in-car LCD displays. Founded in 1997, we currently have over 160 employees and are headquartered in San Jose, California, with additional R&D and sales activities in South Korea, Japan, Taiwan and China.

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