

# INTERSIL TECHWELL SECURITY SURVEILLANCE ICs

Intersil Techwell Security IC Overview,  
Advanced Multi-Channel HD Controller,  
Quad / Multiplexers, 4-in-1 NTSC/ PAL Video Decoders,  
Multi-channel PCIe Video Capture IC,  
Techwell Security Product Portfolio

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### About Intersil Techwell

Techwell, now part of Intersil, designs, markets and sells mixed signal integrated circuits for multiple video applications in the security surveillance and automotive infotainment markets. Intersil Techwell designs application specific products that enable the conversion of analog video signals to digital form and perform advanced digital video processing to facilitate the display, storage and transport of video content.



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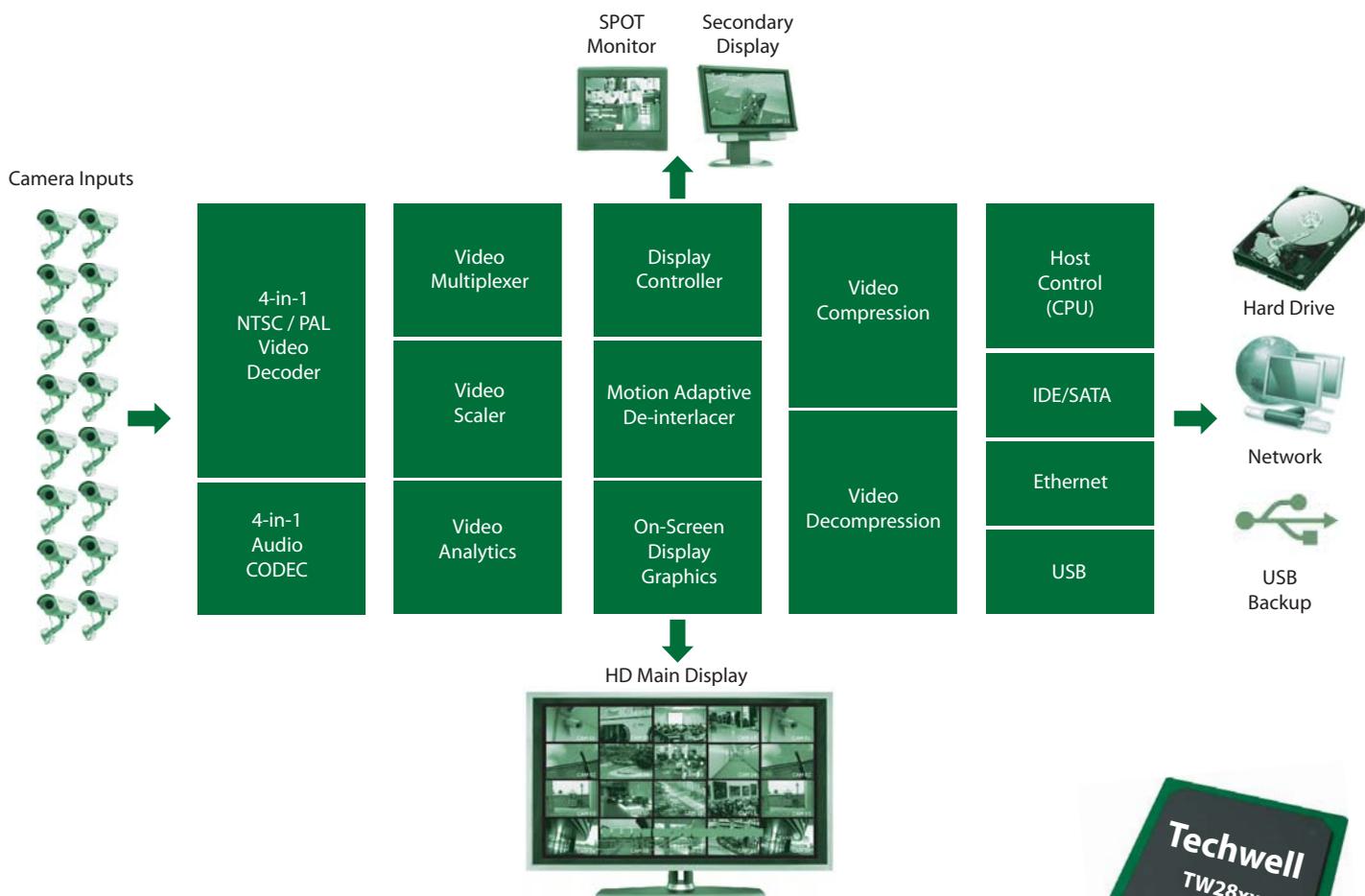
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Intersil Techwell possesses one of the largest portfolios of video semiconductor solutions for the security surveillance industry. Leveraging our extensive video signal processing expertise and our deep surveillance system domain knowledge, Intersil Techwell is a pioneer in the security surveillance industry and unique in its ability to define and deliver IC products specifically for the Digital Video Recorder market.

Intersil Techwell's TW28xx Security Surveillance IC product line is defined by feature rich, highly integrated semiconductor solutions that incorporate many key functional blocks for a Digital Video Recorder, IP Streamer, Networked Video Recorder or PC Based DVR including analog video decoding, audio conversion, video multiplexing, display processing, and video compression. In addition, Techwell's security products embed a number of advanced technologies including comb filtering, motion detection and motion adaptive de-interlacing.

With Intersil Techwell's broad security product portfolio, system expertise, and local dedicated support, you can feel confident your next generation security solution will get to market on time, with advanced features and at a cost effective price.

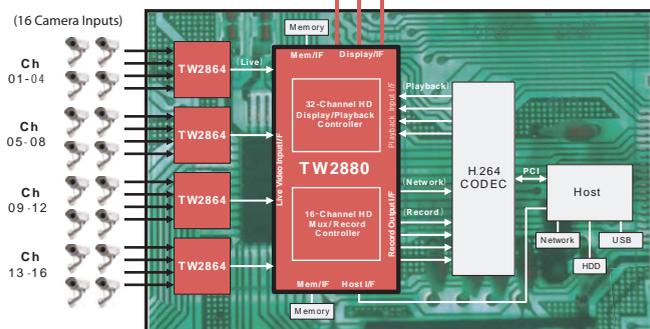


# TW2880

## Advanced Multi-Channel HD Display/Record/Playback Controller IC for Next Generation 16-Channel DVR Applications

The TW2880 is an advanced 16-channel video and graphic controller with HD 1080p display capability for security surveillance applications. The device includes a host of advanced features for 16-channel DVR applications. It is designed to accept 16 live video inputs and playback 16 pre-recorded inputs simultaneously. Incoming live and playback video can be multiplexed, scaled up or down, de-interlaced, and displayed on two separate monitors. The main display output can display up to 32 channels on an HD 1080p monitor via HDMI interface. The secondary display output supports VGA, S-video and CVBS. In addition, there are four analog SPOT outputs that can be used to monitor live camera inputs. For video record, the TW2880 supports 16-channel real time and non-real time recording with flexible frame rate and resolution over 27MHz, 54MHz and 108MHz clocks. The record output ports support BT.656 and BT.1120 data formats. Special record modes such as mixed frame and mixed field switching modes are also supported. Record output stream can be in both field or frame interleaved format. The playback input ports support BT.656 and BT.1120 data formats. Other key features of the TW2880 include triple 16-bit bitmap OSG windows, 4-color OSD, channel ID encoder/decoder, and motion detector.

**HD 1080p Main Display**  
(Live/Playback Video + Map + Control Panel)



**Advanced 16-Channel DVR System**



# TW2880

Advanced Multi-Channel HD Display/Record/Playback Controller IC  
for Next Generation 16-Channel DVR Applications

## Record

- Supports 16-channel real time CIF or D1 recording using 54MHz/108MHz clock
- Supports BT.656 and BT.1120 formats
- Record Resolutions: Full D1, Half D1 and CIF
- Programmable Frame Rates: 1 to 30 fps
- Flexible Record Output Functions
  - Real time and non-real time recording
  - Field switching and frame switching record modes
    - D1 and QUAD modes (Frame-based)
    - Half-D1 and CIF modes (Field-based)
  - Multi-mode recording on single record output stream
    - Mixed Frame Switching Mode
    - Mixed Field Switching Mode
- Embedded Motion Detection and Channel ID Encoder
- 3-Layer Graphic Overlay

## Playback

- Supports 16-channel real time CIF or D1 playback
- Supports digital BT.656 and BT.1120 formats
- Supports HD 720p/1080i video via BT.1120 interface
- Built-in auto cropping and strobe with channel ID decoder

## Other Features

- Dual SDRAM Memory Controllers
- 8/16-bit DMA Master Interface
- Supports external OSD via digital 24-bit RGB input
- 1.2V, 3.3V Supply

## Display

- Displays up to 32 channels: 16 live channels and 16 playback channels
- Supports dual monitors: Main and Secondary
- Main Display (up to HD 1080p)
  - HDMI, Analog RGB and Digital RGB Interface
  - Built-in Video Scaler and 2D/3D De-interlacer
  - 11-Layer Graphic Overlay with Triple 16-bit Bitmap OSG Windows
- Secondary Display
  - Analog RGB or S-Video and CVBS Interface
  - 8-Layer Graphic Overlay with Dual 16-bit Bitmap OSG Windows
  - Digital BT.656 Output Option
- SPOT Display
  - Four CVBS Outputs
  - 4-Layer Graphic Overlay with 2-bit Bitmap OSG Window

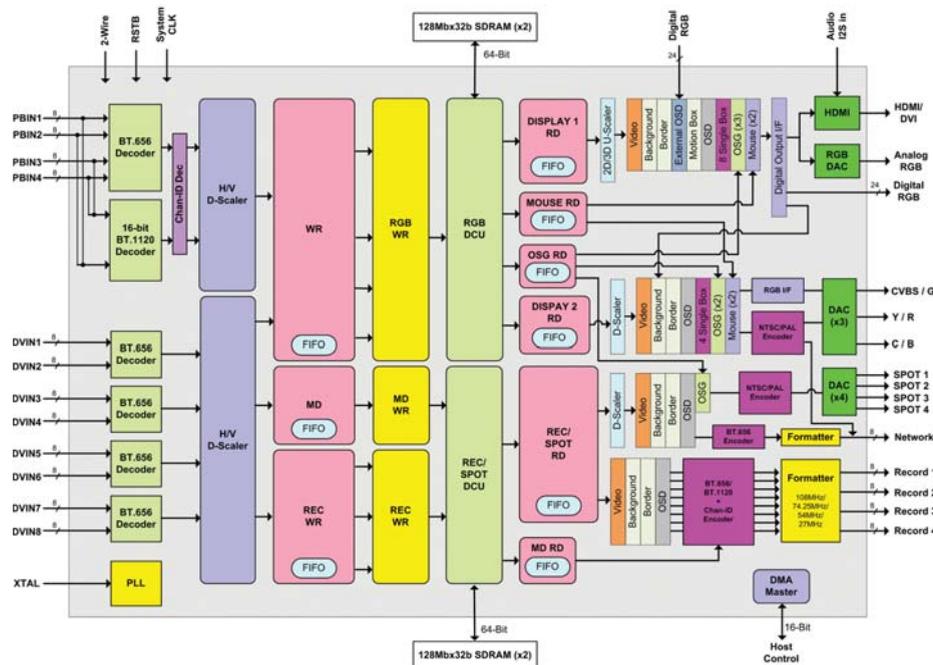
## Network

- Supports standard digital BT.656 and multi-channel field and frame interleaved formats
- Supports 16-channel non-real time output using 27MHz /54MHz / 108MHz clock
- Supports 16-channel real time CIF output using 108MHz clock

## Order Information

- Part Number: TW2880
- Package: 676-BGA, 27x27mm, 1.0mm Pitch

## TW2880 Block Diagram



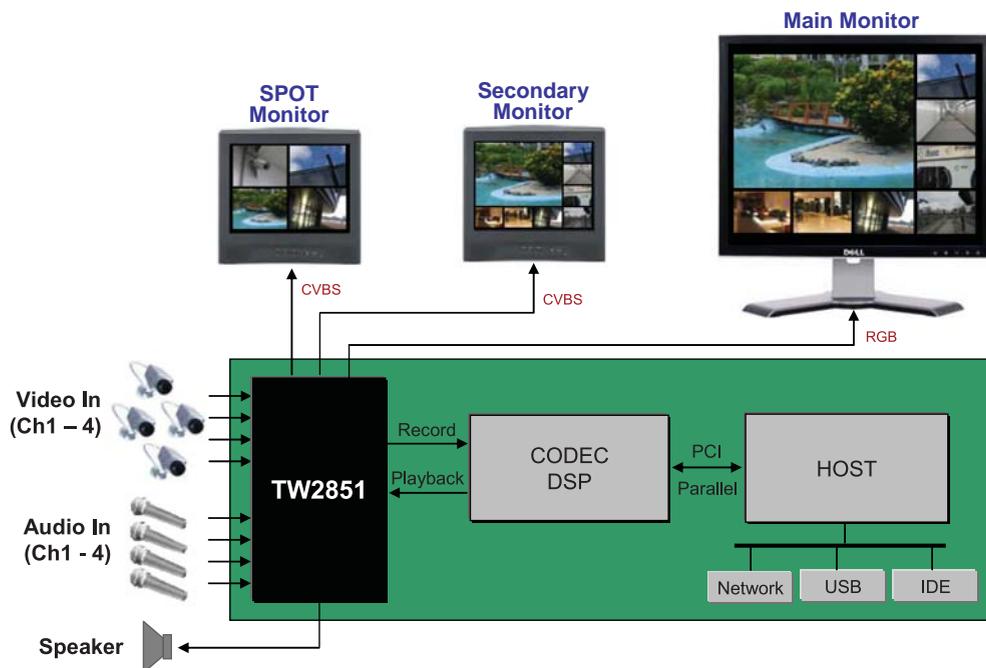
# TW2851

## Advanced 4-Channel A/V Decoder, MUX and Display Processor

The TW2851 is Techwell's 5th generation 4-channel A/V decoder, multiplexer and display processor IC for security surveillance applications. The device has four built-in NTSC/PAL video decoders with high-performance adaptive 4H comb filters, noise reduction algorithm, independent and flexible video scalars for the display and record paths and 16x12 matrix motion/blind/night detectors. The device includes advanced record and display multiplexer functions. The record multiplexer supports multi-channel frame-, field- and byte-interleaved video streams with a total frame rate of up to 120 frames per second. The channel ID and motion/blind/night detection information can be embedded in the video stream for record and playback purposes. The display multiplexer supports up to eight video windows of which the location and size of each window is configurable. The multiplexed output can be displayed via VGA/LVDS and CVBS interfaces. Also included is a SPOT multiplexer that can tile multiple live camera images on an analog output for displaying on SPOT monitor. The TW2851 has an audio CODEC which has four audio ADCs and one DAC. A built-in audio controller can generate digital outputs for recording/mixing and accept digital input for playback. Multiple TW2851 devices can be cascaded to support 8/12/16-channel applications. Up to 32 display windows can be displayed on the PC monitor or LCD panel. Other key features of the TW2851 includes 16-bit bitmap OSG, 2D-deinterlacer, 8-channel non-real time switching inputs, and flexible record and playback ports supporting BT.656, BT.601, BT.1120 and 24-bit RGB formats.

### Target Applications

- 4/8/16-Channel Embedded DVR
- Mobile DVR System
- LCD DVR Combo System



# TW2851

## Advanced 4-Channel A/V Decoder, MUX and Display Processor

### Analog Video Decoder

- Accepts all NTSC(M/N/4.43)/PAL(B/D/G/H/I/K/L/M/N/60) standards with auto detection
- 8 analog CVBS inputs for pseudo 8 channel support
- Integrated analog anti-aliasing filters & 10-bit ADCs
- High performance adaptive 4H comb filters for all NTSC/PAL standards
- Proprietary fast video locking system for non-realtime application
- Noise reduction algorithm to remove impulse noise
- Independent & flexible video scalars for display, record and SPOT path
- Four built-in 16x12 matrix motion/blind/night detectors

### Record

- Supports BT.656, BT.601 & BT.1120 formats
- Record Resolutions: Full D1, Half D1 and CIF
- Programmable Frame Rates: 1 to 30 fps Flexible Record Output Functions
  - Real time & non-real time recording over 27/54MHz clock
  - Field switching record modes support up to 120 fields per second
- Embedded Motion Detection & Channel ID Encoder
- 6-Layer Graphic Overlay with Independent 16-bit Bitmap OSG Window for Each Record
- Optional multiplexed digital video output for network function

### Display

- Displays up to 32 windows on PC monitor or LCD panel
  - H/V Scaling & Mirroring for Each Window
  - Live & Playback Video Tiling on Same Display
- Last field/frame image captured when video loss detected
- Live or strobe capture for pseudo 8-ch mode
- Supports dual monitors: Main & Secondary
- Main Display (RGB/LVDS Interface)
  - Up to WXGA+ resolution
  - Built-in Video Scalar & 2D De-interlacer
  - 7-Layer Graphic Overlay including Dual 16-bit Bitmap OSG Layers
- Secondary Display (CVBS Interface)
  - Built-in Video Scalar & NTSC/PAL Encoder
  - 5-Layer Graphic Overlay including Dual 16-bit Bitmap OSG Layers
- SPOT Display (CVBS Interface)
  - Displays up to 16 channels of live camera
  - 6-Layer Graphic Overlay including Dual 16-bit Bitmap OSG Layers

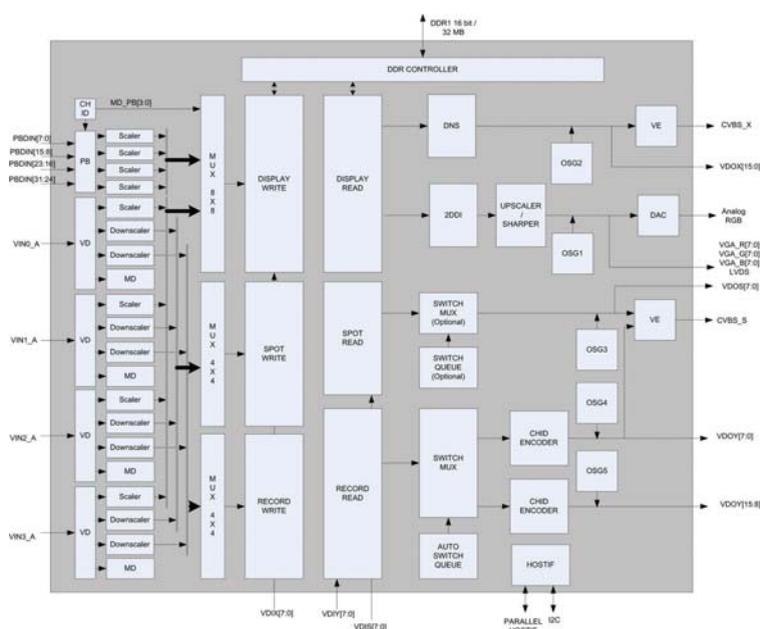
### Playback

- Flexible playback ports supporting BT.656, BT.601, BT.1120 & 24-bit RGB formats
- Supports up to 16-ch non-realtime playback
- Supports 4-ch D1 or 16-ch CIF realtime playback
- Auto cropping & strobe with channel ID decoder for multi-channel playback input

### Other Features

- Integrated Audio Codec
- Single DDR SDRAM Memory Controller
- 8/16-bit Parallel Host Interface
- 8/12/16-channel Cascade Support
- 1.2V, 3.3V Supply
- Package: 352-PBGA, 27x27x2.23 mm

### Block Diagram



# TW2866/TW2867

## 4-Channel Video Decoder and Audio Codec plus Video Encoder for Security Applications

The TW2866 is Intersil Techwell's sixth-generation 4-in-1 video decoder and audio codec, and second generation that features a built-in video encoder for security surveillance applications. The device includes four high quality NTSC/PAL/SECAM video decoders that convert analog composite video signal to digital component YCbCr data. Each channel contains a 10-bit ADC and proprietary clamp/gain controller and utilizes 4H comb filter for separating luminance & chrominance to reduce cross noise artifacts. The TW2866 adopts image enhancement techniques such as IF compensation filter, CTI and programmable peaking. In addition, TW2866 includes one NTSC/PAL video encoder with two 10-bit DACs to support CVBS and YC output. The TW2866 also includes an audio codec which has five audio ADCs and one DAC. A built-in audio controller can generate digital outputs for recording/mixing and accepts digital input for playback. The TW2866 is pin-to-pin compatible to the TW2867. The difference between the two devices is that the TW2867 does not support NTSC/PAL video encoder function.

### Video Decoder

- Accepts all NTSC(M/4.43) / PAL(B/D/G/H/I/K/L/M/N/60)/SECAM standards with auto detection
- Integrated four video analog anti-aliasing filters and 10-bit ADCs
- High performance adaptive 4H comb filters for all NTSC/PAL standards
- IF compensation filter for improvement of color demodulation
- Color Transient Improvement (CTI) and automatic white peak control
- Programmable hue, saturation, contrast, brightness and sharpness
- Proprietary fast video locking system for non-realtime application
- Supports the standard ITU-R BT.656 format or time multiplexed output with 54/108MHz.
- Provides simultaneous four channel Full D1 and CIF time-multiplexed outputs with 54MHz.

### Video Encoder (TW2866 Only)

- NTSC/PAL Video Encoder
- CVBS and S-video Support

### Audio Codec

- Integrated five audio ADCs and one audio DAC
- Provides multi-channel audio mixed analog output
- Supports I2S/DSP Master/Slave interface for record output and playback input.
- PCM 8/16 bit and u-Law/A-Law 8bit for audio word length
- Programmable audio sample rate that covers popular frequencies of 8/16/32/44.1/48kHz

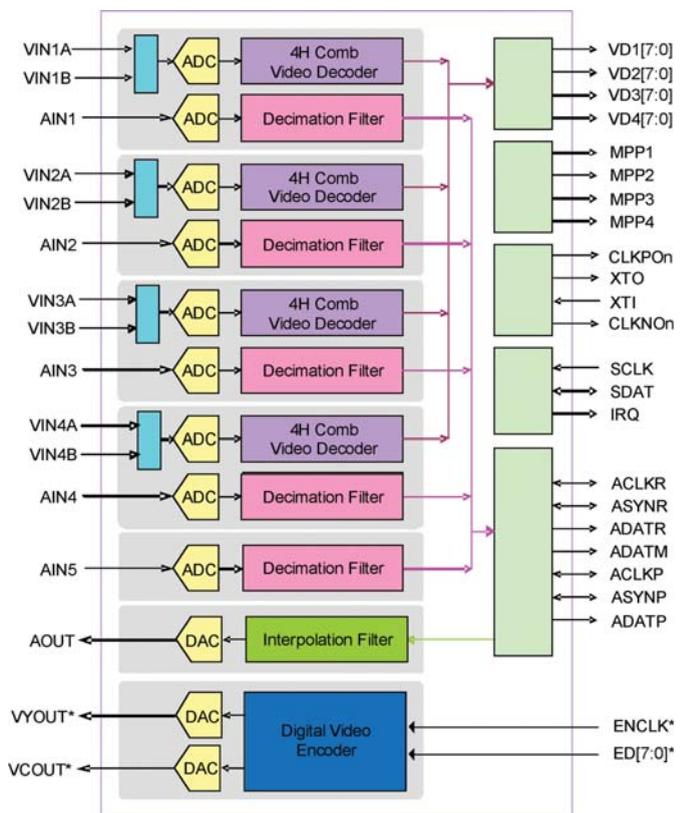
### Other Features

- 2x/4x analog clock PLL for 108MHz clock output
- Supports a two-wire serial host interface
- 1.2V, 3.3V Supply
- Low power consumption

### Order Information

- Part Number: TW2866/TW2867
- Package: 128-pin LQFP

### TW2866/TW2867 Block Diagram



\*Only applicable for TW2866

# TW6816

## 4-CH Audio/Video Decoders with 66MHz PCI Interface

The TW6816 is a highly integrated single-chip solution that supports multi-channel real time video and audio capture via PCI interface for PC DVR applications. It contains four high quality NTSC/PAL/SECAM video decoder that converts analog composite video signal to digital component YCbCr data, and utilizes an adaptive 4H comb filter for separating luminance and chrominance to reduce cross noise artifacts. TW6816 contains a high performance proprietary DMA controller that fully utilizes the PCI bandwidth, enabling it to transfer video and audio data at optimal throughput rate.

TW6816 has the versatility to support a wide variety of video applications, including decoding and transferring 4 channel real-time D1 video, and supporting multiple video display formats such as D1, half D1 and CIF. In addition, TW6816 can support up to 16 channel non real-time D1 video.

### 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 4 CVBS per one video ADC
- Four 10-bit ADCs and analog clamping circuit for CVBS input
- Fully programmable static gain or automatic gain control for the Y channel
- Programmable white peak control for CVBS channel
- 4-H adaptive comb filter Y/C separation
- PAL delay line for color phase error correction
- Image enhancement with 2D peaking and CTI
- Digital sub-carrier 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, sharpness, Gamma control, and noise suppression
- Automatic color control and color killer
- Detection of level of copy protection according to Macrovision standard
- Programmable output cropping

### Video Scaler

- High quality horizontal filtered scaling with arbitrary scale down ratio
- Phase accuracy better than 1/32 pixel
- Selectable anti-alias filter

### Audio Capture

- Four 10-bit ADC for analog audio digitizing
- Programmable Sampling rate

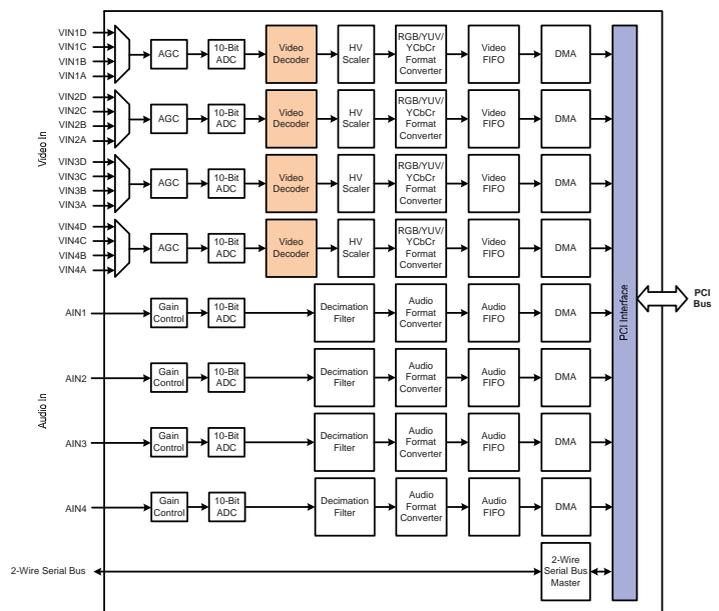
### Miscellaneous

- Support mode: RGB32/24/16/15, YUY2, Y41P, Y411, UYVY and YVYU
- 400Kbps Two-wire MPU serial bus Master interface
- Power-down mode
- Single 27MHz crystal for all standards
- 5V tolerant I/O
- 1.8 V power supply
- 100-pin LQFP package

### PCI

- 66MHz/33MHz PCI with M66EN interface
- PCI Rev. 2.2-3.0 compliant
- ACPI support
- Integrated Video/Audio DMA controller
- Support both selectable one real-time video and 4x switching non real-time video

### TW6816 Block Diagram



# TW6869

## Multi-Channel PCIe Video Capture IC with Built-in 8-Channel Video and Audio Decoder

The TW6869 is a highly integrated single-chip solution that supports multi-channel real time video and audio capture via PCIe x1 interface for PC DVR applications. It contains eight high quality NTSC/PAL/SECAM video decoders that convert analog composite video signals to digital component YCbCr data, and utilizes an adaptive 4H comb filter for separating luminance and chrominance to reduce cross noise artifacts. TW6869 contains a high performance proprietary DMA controller that fully optimizes the utilization of the PCIe x1 bandwidth, enabling it to transfer video and audio data at optimal throughput rate.

TW6869 has the versatility to support a wide variety of video applications, including decoding and transferring 8 channel real-time D1 video, or up to 32 channel non-real time D1 video simultaneously, plus 8 channels of audio. By implementing Intersil Techwell's advanced proprietary video-switching technology, TW6869 possesses industry leading video locking speed in non-real-time switching mode. The TW6869 comes with a Software Development Kit which includes Windows and Linux compliant drivers, and reference application software.

### Key Features

- Internal 8-channel video decoder with 10 bit ADCs
- Internal 10-bit audio ADC with programmable sampling rate generation (8/16/32/44.1/48KHz)
- High quality proprietary fast video locking system for non-real time application
- PCI Express Base Specification 1.1 and 2.0 Compliant
- Flexible PCIe packet size configuration: 128 byte, 256 byte, and 512 byte options
- Supports 8-channel D1 video plus 8-channel audio simultaneously with Independent channel control
- Dynamic synchronization video processing; and multiple video format output support: UYVY/Y422, UYVY/YUY2, Y420, IYU1/Y411, Y41P, RGB555 and RGB565
- Dual support for both Direct Show and Direct Draw

### Video Decoder

- Accepts all NTSC (M/N/4.43) / PAL (B/D/G/H/I/K/L/M/N/60) / SECAM standards with auto detection
- Integrated eight video analog anti-alias filters and 10-bit COMS ADC's
- IF compensation filter for improvement of color demodulation
- Color Transient Improvement (CTI)
- White peak AGC control
- Programmable hue, saturation, contrast, brightness, and sharpness
- High quality proprietary fast video locking system for non-real-time applications
- High performance adaptive 4H comb filters for all NTSC and PAL standards

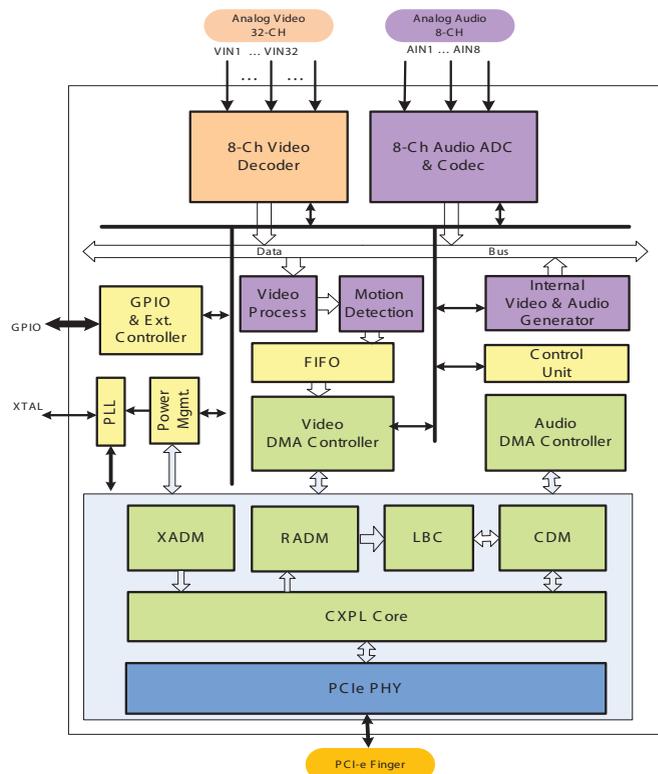
### DMA Controller

- Highly efficient DMA design can support up to 8 real time D1 video and 8 real time audio channels, or up to 32 non-real-time channels with optimization of full PCIe x1 bandwidth
- Built in Motion detection engine for each video channel
- Hardware friendly design enables smooth data transfer

### Order Information

- Part number: TW6869
- Package: 144-pin LQFP

### TW6869 Block Diagram



# Intersil Techwell Security Product Portfolio

## Quad Decoder

TW2866  
TW2867

## Quad Mux

TW2837  
TW2851

## HD Mux

TW2880

## PCI / PCIe Decoder

TW6802  
TW6805  
TW6816  
TW6869

## Single Channel Decoder

TW9900

## CODEC

TW2700



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