Q1 2010 Edition

Techwell Automotive Infotainment Display IC Selection Guide

A pioneer in the automotive infotainment industry, Techwell leverages its extensive portfolio of video semiconductor solutions and its depth of mixed signal video and display processing expertise to define and deliver IC products specifically for automotive infotainment display applications.

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Techwell™

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About Techwell, Inc.

Techwell is a fabless semiconductor company that designs, markets and sells mixed signal integrated circuits in the security surveillance, automotive infotainment, and consumer markets. Founded in 1997, we currently have over 200 employees and are headquartered in San Jose, California, with additional R&D and sales activities in South Korea, Japan, Taiwan and China.
For more information please visit www.techwellinc.com

NASDAQ TWLL

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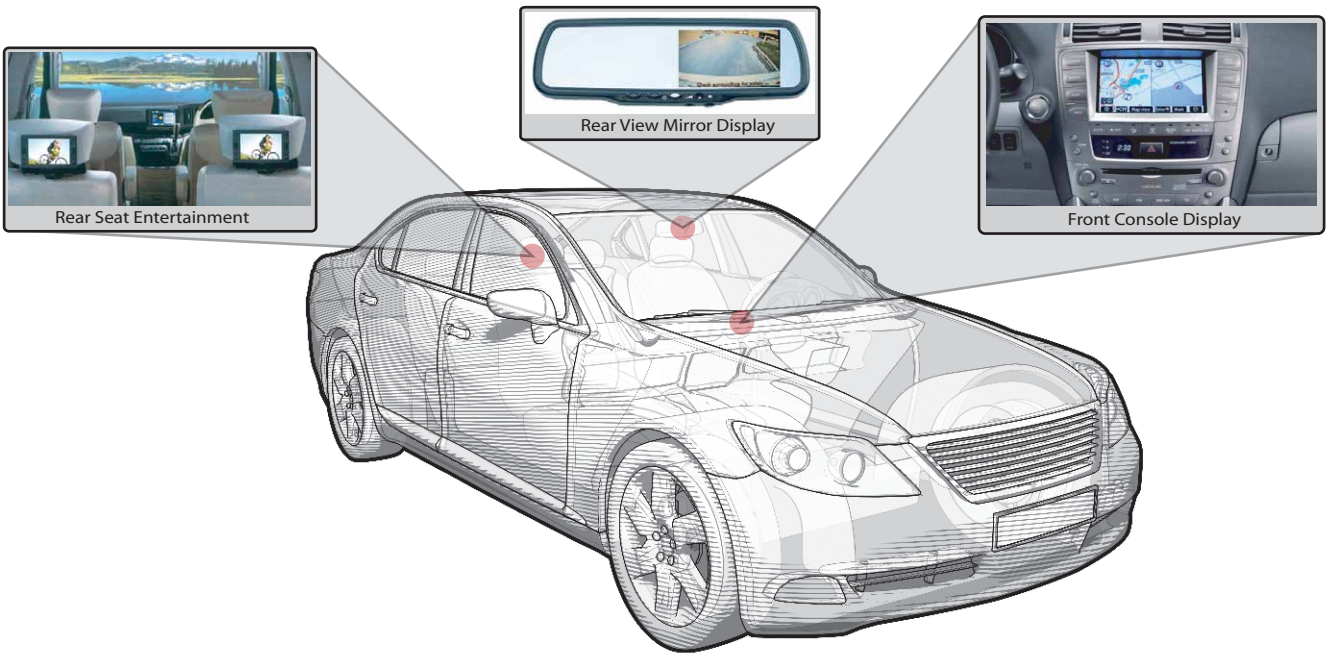
Techwell has one of the largest portfolios of video semiconductor solutions for automotive infotainment display applications. As a pioneer in this market, we have leveraged our extensive mixed signal video and display processing expertise to create unique and robust IC products specifically tailored to the requirements of the automotive display market.

Techwell's TW88xx automotive infotainment display IC product line is defined by feature rich, highly integrated semiconductor solutions that incorporate many key functions blocks for front console, rear seat entertainment, and rear camera display applications, including an analog video decoder, high quality H/V scaler, 2-D de-interlacer, and embedded timing controllers. In addition, certain TW88xx products include advanced technologies such as a 3D adaptive comb filter, 3D noise reduction, an embedded MCU, a touch-screen controller, 16-bit multi-window OSD, graphic overlay with alpha blending, PIP / POP, dual view display support, and a single channel LVDS interface to directly drive LVDS based LCD panels.

In conjunction with our broad product portfolio, Techwell has significant system expertise and excellent local support throughout the world, giving our customers the confidence and ability to implement our products in their next generation of automotive infotainment solutions in a timely, cost effective manor.

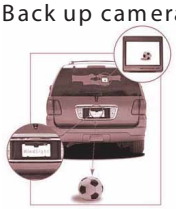
The TW88xx product line is designed for OEM Automotive applications and therefore support the -40˚C to +85˚C temperature range and are AEC-Q100 qualified.



DVD Player

Navigation Engine

Back up camera



Analog Video Decoder

3D Comb Filter

High Speed ADC

Digital Interface

De - Interlacer

Video Scaler

PIP / POP

Image Enhancement

Gamma Control

Bit Mapped OSD

Dual View Mixer

CCFL Controller

LED Controller

TCON/ LVDS

MCU

LCD Panel

Broad Portfolio To Meet Customer Needs

TW88xx Comparison Table

		TW8827	TW8817	TW8826	TW8816	TW8810	TW8811	TW8813	TW8823
Input	CVBS	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	S-Video	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	YPbPr	No	No	Yes	Yes	Yes	Yes	Yes	Yes
	SCART	No	No	No	No	Yes	Yes	Yes	Yes
	Analog RGB	No	No	Yes	Yes	Yes	Yes	Yes	Yes
	Digital RGB/YCbCr	16-bit	No	24-bit	24-bit	24-bit	24-bit	2 Ports	2 Ports
	ADC	x	x	27MHz	27MHz	108MHz	108MHz	108MHz	108MHz
Display Processing	Comb Filter	2D	2D	2D	2D	3D	3D	3D	3D
	Max Resolution	WQVGA	SVGA	WQVGA	WXGA	WVGA	WXGA	720p	WXGA
	De-interlacer	2D	2D	2D	2D	2D	2D	2D	2D
	Edge Enhancement	No	No	No	No	Yes	Yes	Yes	Yes
	Color Enhancement	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	PIP	No	No	No	No	Yes	Yes	2 PIP engines	2 PIP engines
OSD	Type	Font	Font	Font	Font	Graphic/Bitmap	Graphic/Bitmap	Graphic/Bitmap	Graphic/Bitmap
	ROM (# of characters)	202	202	202	202	NA	NA	NA	NA
	RAM (# of characters)	75	75	227	227	NA	NA	NA	NA
	Colors	8 x 2 Color/ 8-bit Palette	8 x 2 Colors/ 8-bit Palette	8 x 2 Color/ 8-bit Palette	8 x 2 Color/ 8-bit Palette	256 Colors/ 24-bit Palette	256 Colors/ 24-bit Palette	256 Colors/ 24-bit Palette	65K Colors/ 24-bit Palette
	External OSD	No	No	No	No	Analog, Digital 18-bit	Analog, Digital 18-bit & PIP overlay	Analog, Digital 18-bit & PIP overlay	Analog, Digital 18-bit & PIP overlay
Output	TCON	Analog	Digital	Analog	Digital & Analog	Digital & Analog	Digital & Analog	Digital & Analog	Digital & Analog
	Dual View	No	No	No	No	Yes- Sharp	No	No	No
	LVDS	No	No	No	No	No	No	Yes	Yes
	TTL	No	Yes	Yes	Yes	Yes	Yes	No	Yes
	CVBS Out	Yes (Y+C Out)	Yes (Y+C Out)	Yes (Y+C Out)	Yes (Y+C Out)	Yes (Y+C Out)	Yes (Y+C Out)	Yes (Y+C Out)	Yes (Y+C Out)
Other	Memory Support	No	No	No	No	SDRAM	SDRAM	SDRAM	DDR
	MCU	Integrated	Integrated	Integrated	Integrated	External	External	External	Integrated
	CCFL / LED Controller	CCFL & LED	CCFL & LED	CCFL & LED	CCFL & LED	No	CCFL & LED	CCFL & LED	CCFL & LED
	Touch-screen Controller	No	No	No	No	No	No	No	Yes
	Package	80 LQFP	80 LQFP	128 LQFP	128 LQFP/BGA	208 LQFP	208 LQFP	208 LQFP	216 LQFP
	Temp Spec	-40˚C to 85˚C	-40˚C to 85˚C	-40˚C to 85˚C	-40˚C to 85˚C	-40˚C to 85˚C	-40˚C to 85˚C	-40˚C to 85˚C	-40˚C to 85˚C

TW88xx Comparison Table

TW8823

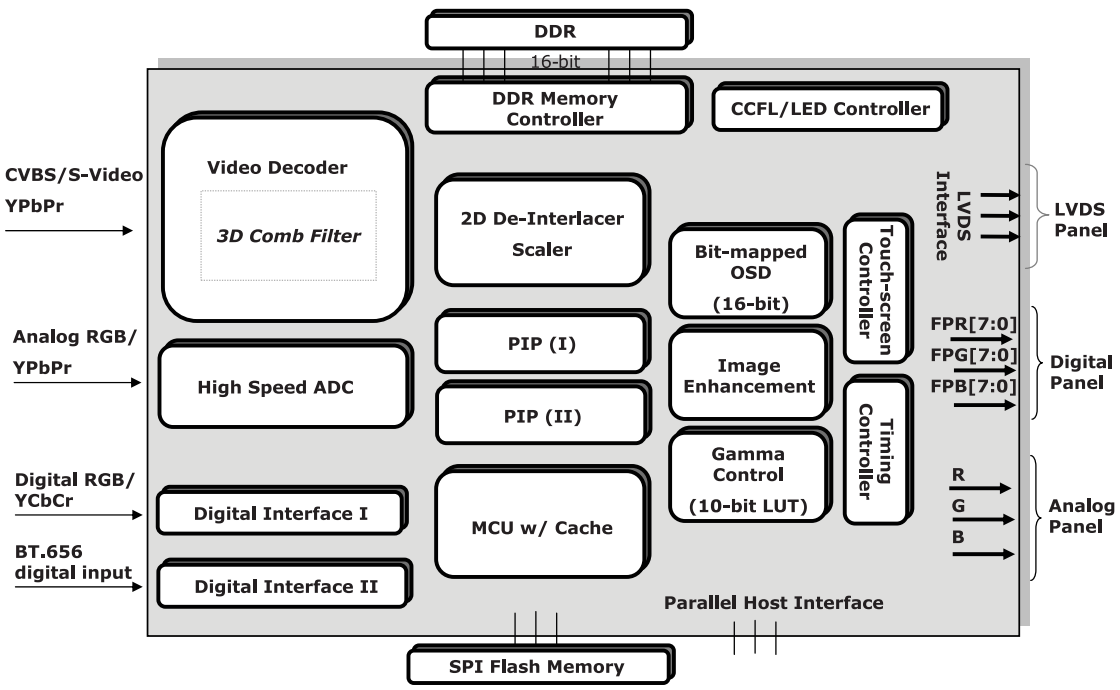
Advanced LCD controller with on-chip MCU and 65K color 16-bit OSD support

The TW8823 is a highly integrated advanced LCD controller designed for the automotive infotainment market, targeting center console and rear seat entertainment applications. Features such as an embedded MCU, LED/CCFL backlight controllers, a 4-wire touch screen controller, analog and digital TCON, and a multi-window 16-bit (65K color) bit-map OSD are designed to reduce the system's overall BOM cost. The TW8823 has multiple analog and digital inputs to support a wide array of video and graphic sources, including navigation modules, back-up cameras, DVD/multimedia modules, PCs, etc. The TW8823 can support a wide variety of both digital & analog LCD panels with resolutions up to WXGA, and also has an integrated single channel LVDS interface to directly drive LVDS based LCD panels.

Key Features

- Supports analog inputs including CVBS, S-Video & Analog RGB/YPbPr
- Dual channel digital inputs support with following combinations:
  - 1 channel 18/16-bit inputs and 1 channel 8-bit inputs
  - 1 channel 24-bit digital RGB/YCbCr inputs
- Integrated 8052 MCU with on-chip cache and SPI DMA support for Read/Write to OSD memory
- 16-bit (65K colors)/8-bit (256 colors) based bit-map OSD support. External 18-bit OSD supported with alpha blending control
- Embedded image enhancement functions:
  - Programmable CTI, hue, brightness, saturation, contrast and sharpness control
  - Black/White stretch
  - Programmable favorite color enhancement- up to three colors (Skin, Grass and Sky)
  - Programmable Gamma Correction tables

TW8823 Functional Block Diagram



TW8823

Advanced LCD controller with on-chip MCU and 65K color 16-bit OSD support

Analog Video Decoder

- NTSC (M, 4.34) and PAL (B, D, G, H, I, M, N, N combination), PAL (60), SECAM with automatic format detection
- Two 10-bit ADCs and analog clamping circuit
- Software selectable analog inputs allows either composite or S-video input
- High quality motion adaptive 3D comb filter for both NTSC and PAL with concurrent 3D noise reduction
- Digital horizontal PLL and advanced synchronization processing for VCR playback and weak signal performance
- Programmable hue, brightness, saturation, contrast, sharpness

Analog RGB Inputs

- Triple high speed 10-bit ADCs
- Built-in line locked PLL with sync separator
- Supports analog input resolution up to 1080i or WXGA

Dual Digital Inputs Support

- Dual channel digital inputs support with following combinations:
  - 1 channel 18/16-bit inputs and 1 channel 8-bit inputs
  - 1 channel 24-bit digital RGB/YCbCr inputs
- Supports both 656 and 601 video formats

Built-in Microcontroller

- Built-in 8052 MCU up to 72MHz clock
- Built-in code cache memory to enhance CPU performance
- Supports Single/Dual/Quad IO SPI Flash
- System programming through UART
- Supports SPI DMA Read/Write to OSD memory
- Supports IR receiver and interrupt output

FTP Panel Support

- Built-in analog and digital TCON with programmability
  - Support for both digital & analog LCD panels with resolutions up to WXGA
  - Integrated single channel LVDS interface to directly drive LVDS based LCD panels

Memory Support

- Integrated 16-bit DDR memory controller supporting DDR-SDRAM up to 256Mb

On Screen Display

- Supports three window bitmapped OSD, one 16-bit (65K colors) and two 8-bit bit-map OSD
  - Built-in OSD controller with Bit Blit Engine
  - Supports variety functions included like blinking, transparency and blending
  - Supports External OSD with external alpha blending control
  - Supports OSD compression

Image Processing

- High quality scaler with both up and down scaling support
- Built-in 2D de-interlacer
- Programmable hue, brightness, saturation, contrast and sharpness
- Panorama/Water-glass scaling
- Programmable 10-bit Gamma correction for each color
- Black/White Stretch
- Programmable favorite color enhancement

PIP Function

- Two independent PIP engines
- Supports both 16-bit YPbPr and RGB data format

Host Interface

- Supports 2-wire serial bus interface
- Supports 8-bit Parallel Host Interface

Power Management

- Supports Panel power sequencing
- Supports DPMS for monitor power management
  - 1.8V / 2.5V / 3.3V operation

Miscellaneous

- Built-in single CCFL and LED backlight controller
- Built-in Touch screen controller with 12-bit ADC
- LVR, provides 100~200 msec. low voltage reset
- Power-down mode
- Single 27MHz crystal

TW8813

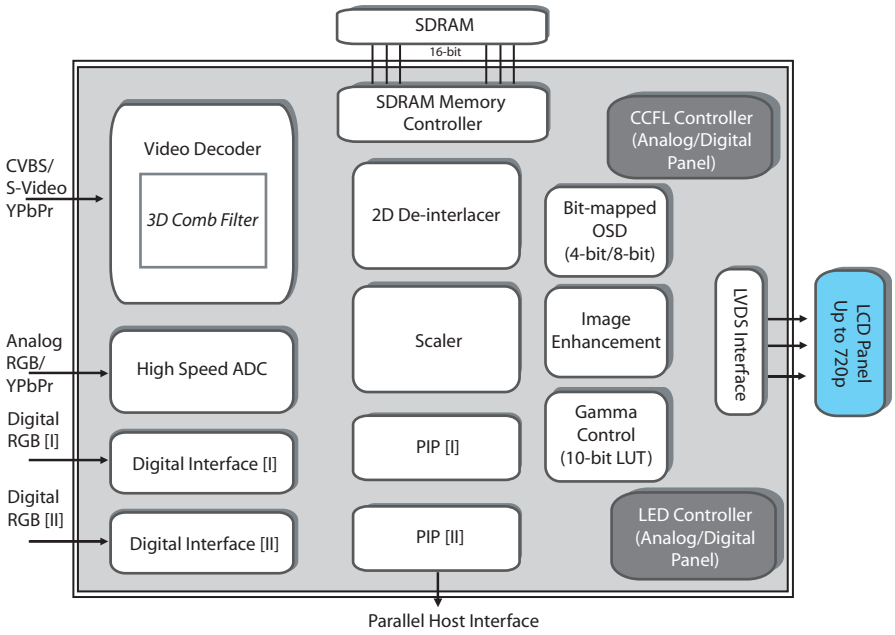
3D Video Decoder based LCD controller with built-in LVDS panel interface

TW8813 is a highly integrated and flexible LCD controller for the automotive infotainment market's front console and rear seat entertainment applications. TW8813 integrates an 8-bit single channel LVDS panel interface to directly drive LVDS LCD panels up to 720p resolution. The TW8813 also features a built-in 3D comb filter based analog video decoder, high quality H/V scaler, 2D de-interlacer, TCON, CCFL and LED backlight controllers, as well as a bit-map OSD engine. This versatile device can support a wide variety of analog inputs and also features two digital RGB inputs.

Key Features

- Supports analog inputs including CVBS, S-Video & Analog RGB/YPbPr
- Configurable Digital RGB input port to support either a single 24-bit Digital RGB input or two 18-bit Digital RGB inputs
  - Both interlaced and progressive ITU 656 and 601 formats supported
- LVDS panel interface (single channel) to drive LVDS LCD panels directly, up to 720p resolution
- Integrated 16-bit SDRAM memory controller supporting external SDRAM up to 8MB
- 2 PIP engines built-in
- Dual window bit-map OSD (4/8-bit)
- External 18-bit OSD supported with alpha blending control
- Embedded Image Enhancement:
  - Programmable CTI, hue, brightness, saturation, contrast and sharpness control
  - Black/White Stretch
  - Programmable favorite color enhancement- up to three colors (Skin, Grass and Sky)
  - Programmable Gamma Correction tables

TW8813 Functional Block Diagram



Order Information

Part #	Package	Description	Pin Count	Body Size
TW8813	LQFP 208	Low Profile Quad Flat Package	208	28 x 28 mm^2

TW8810

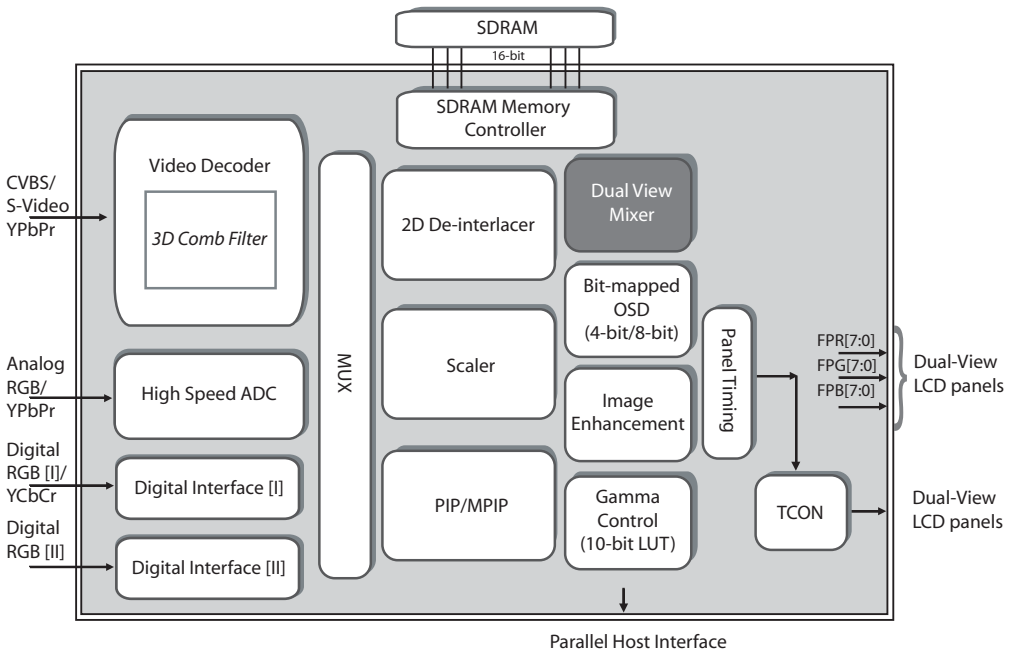
3D Video Decoder based on LCD controller for Dual-View LCD panels

The TW8810 is a highly integrated LCD controller for Dual-View LCD panels primarily targeting front console and rear-seat automotive infotainment applications. The TW8810 integrates a high quality NTSC/PAL/SECAM 3D video decoder and a 2D de-interlacer with low angle compensation. In addition, a built-in dual-view mixer enables direct support for Dual-View LCD panels.

Key Features

- Supports analog inputs including CVBS, S-Video & Analog RGB/YPbPr
- Configurable Digital RGB input port to support either a single 24-bit Digital RGB input or two 18-bit Digital RGB inputs
  - Both interlaced and progressive ITU 656 and 601 formats supported
- Supports Dual-View LCD panels with resolutions up to WVGA
- Integrated low cost 16-bit SDRAM memory controller supporting up to 8MB SDRAM external memory
- Supports PIP/POP
- Built-in dual-view mixer block to support both stripe barrier and step barrier dual-view pixel matrix
- Built-in dual window bit-mapped (4/8-bit) OSD
- Supports external 18-bit OSD with alpha blending control
- PIP Overlay
- Embedded Image Enhancement
  - Programmable CTI, hue, brightness, saturation, contrast & sharpness control
  - Black/White Stretch
  - Programmable favorite color enhancement- up to three colors (Skin, Grass & Sky)
  - Programmable Gamma Correction tables

TW8810 Functional Block Diagram



Order Information

Part #	Package	Description	Pin Count	Body Size
TW8810	LQFP 208	Low Profile Quad Flat Package	208	28 x 28 mm^2

TW8811

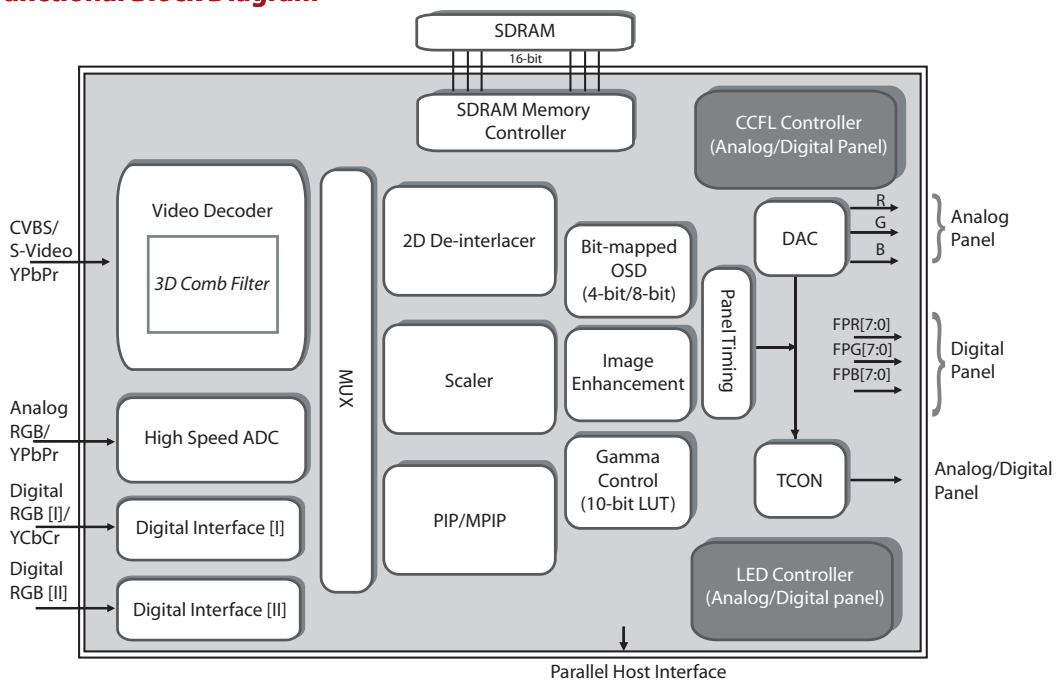
3D Video decoder based on LCD controller with PIP, Graphic OSD & CCFL/LED controller

The TW8811 is a highly integrated multi-purpose LCD controller with a NTSC/PAL/SECAM 3D video decoder and a 2D De-interlacer/Scaler targeting automotive infotainment applications. Through multiple input ports, TW8811 can directly display video and graphic content from a variety of devices including TV Tuners, DVD players, back-up cameras, DTV/DMB receivers and navigation/GPS receivers.

Key Features

- Supports analog inputs including CVBS, S-Video & Analog RGB/YPbPr
- Configurable Digital RGB input port to support either a single 24-bit Digital RGB input or two 18-bit Digital RGB inputs
  - Both interlaced and progressive ITU 656 and 601 formats supported
- Supports both digital and analog panels up to WXGA resolutions
- Integrated CCFL controller & LED controller to reduce BOM cost
- Integrated low cost 16-bit SDRAM memory controller supporting up to 8MB external SDRAM memory
- Built-in single window bit-mapped (4/8-bit) OSD
- Supports external 18-bit OSD with alpha blending control
- PIP Overlay
- Embedded Image Enhancement
  - Programmable CTI, hue, brightness, saturation, contrast & sharpness control
  - Black/White Stretch
  - Programmable favorite color enhancement- up to three colors (Skin, Grass & Sky)
  - Programmable Gamma Correction tables

TW8811 Functional Block Diagram



Order Information

Part #	Package	Description	Pin Count	Body Size
TW8811	LQFP 208	Low Profile Quad Flat Package	208	28 x 28 mm^2

TW8816

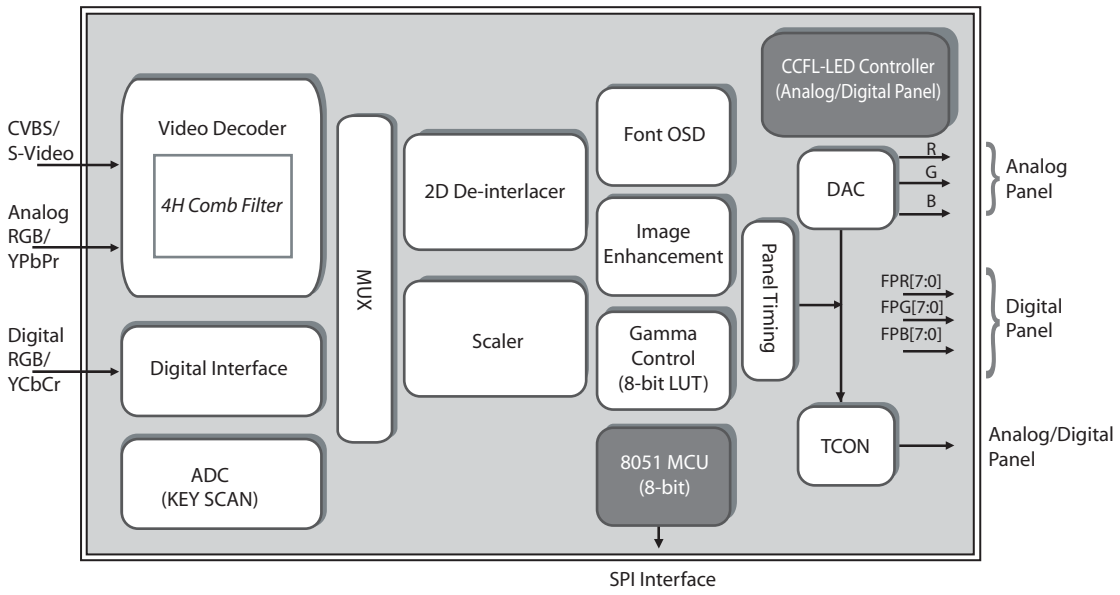
Highly Integrated LCD controller with on-chip MCU & CCFL-LED controller

The TW8816 is a highly integrated mutli-purpose LCD display solution with a high quality NTSC/PAL/SECAM 2D video decoder and a 2D video decoder, 2D de-interlacer, and H/V scaler, supporting both digital and analog panels. To reduce BOM cost, TW8816 integrates an 8-bit MCU and a CCFL/LED backlight controller. Through multiple input ports, TW8816 can directly display video and graphic content from a variety of devices including TV Tuners, DVD players, back-up cameras, DTV/DMB receivers and navigation/GPS receivers.

Key Features

- Supports analog inputs including CVBS, S-Video & Analog RGB/YPbPr
- Supports digital inputs including 8/16/24-bit RGB/YCbCr
  - Both interlaced and progressive ITU 656 and 601 format supported
- Supports both digital & analog panels up to WXGA resolutions
- Integrates cost saving features including a CCFL/LED backlight controller & an on-chip 8-bit 8051 based MCU with SPI interface
- Built-in 8 color Font OSD with 202 ROM fonts and 227 programmable RAM fonts
- Supports Multi-color fonts by combining 3 single color fonts
- Embedded Image Enhancement
  - Programmable CTI, hue, brightness, saturation, contrast & sharpness control
  - Black/White Stretch
  - Programmable favorite color enhancement- up to three colors
  - Programmable Gamma Correction tables

TW8816 Functional Block Diagram



Order Information

Part #	Package	Description	Pin Count	Body Size
TW8816	LQFP 128	Low Profile Quad Flat Package	128	14 x 20 mm
TW8816	BGA 144	Ball Grid Array Package	144	7 x 7 mm^2

TW8817

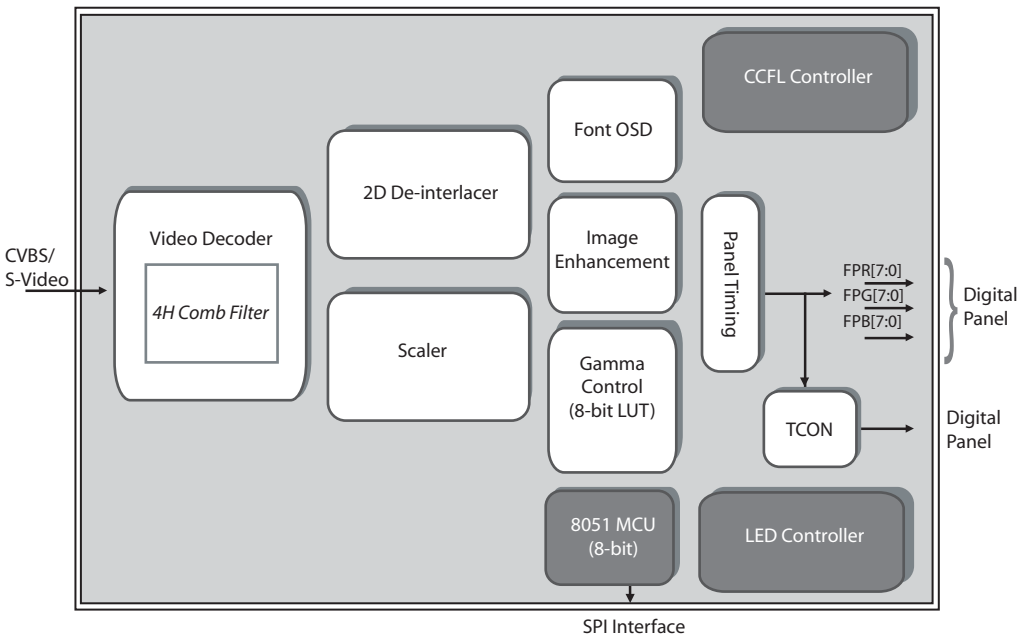
Low cost, highly integrated LCD controller for digital LCD panels

The TW8817 is a highly integrated low cost TFT flat panel controller supporting digital panels. To help reduce the system BOM cost, TW8817 integrates an 8-bit MCU and a CCFL / LED backlight controller. The TW8817 has a high quality NTSC/PAL/SECAM 2D video decoder and a 2D video decoder, 2D de-interlacer, and H/V scaler.

Key Features

- Supports analog inputs including CVBS & S-Video signals
- Supports digital panel up to SVGA resolution
- Integrated 8-bit 8051 MCU, CCFL and LED backlight controller
- Built-in 8 color font based OSD with ~200 ROM & 75 RAM fonts. Supports Multi-color fonts by combining three single color fonts
- Embedded Image Enhancement
  - Programmable CTI, hue, brightness, saturation, contrast & sharpness control
  - Black/White Stretch
  - Programmable favorite color enhancement- up to three colors (Skin, Grass & Sky)
  - Programmable Gamma Correction table

TW8817 Functional Block Diagram



Order Information

Part #	Package	Description	Pin Count	Body Size
TW8817	TQFP 80	Thin Quad Flat Package	80	12 x 12 mm^2

TW8826

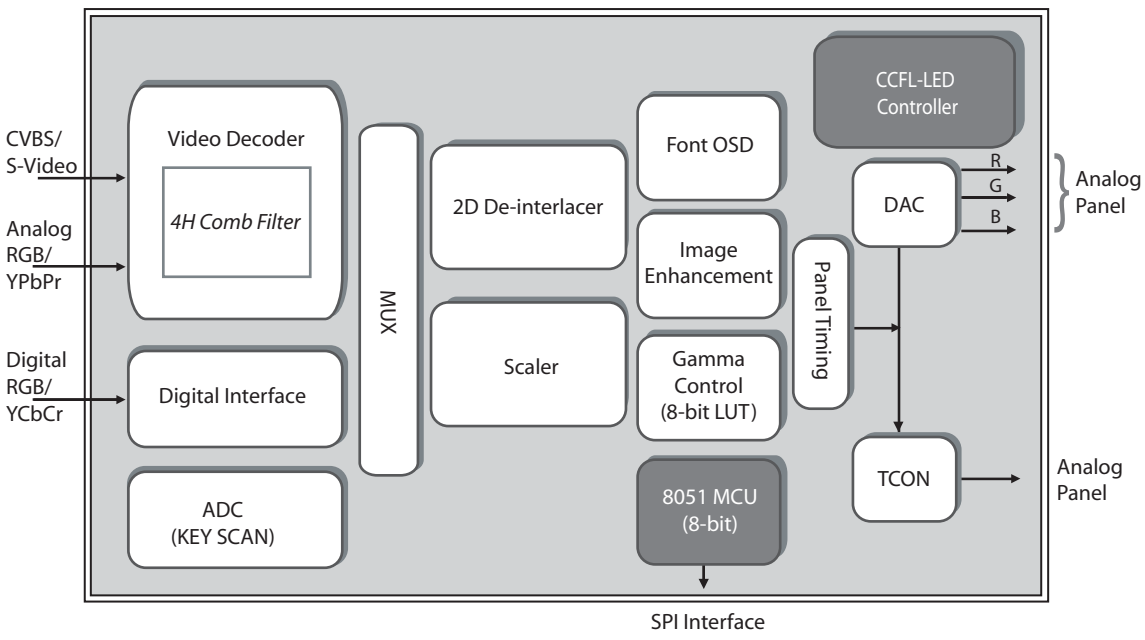
Ultra low cost, highly integrated LCD controller for analog panels

The TW8826 is a low cost highly integrated mutli-purpose LCD display solution with a high quality NTSC/PAL/SECAM 2D video decoder, 2D de-interlacer, and H/V scaler, supporting analog panels. To reduce BOM cost, TW8826 integrates an 8-bit MCU and a CCFL/LED backlight controller. Through multiple input ports, TW8826 can directly display video and graphic content from a variety of devices including TV Tuners, DVD players, back-up cameras, DTV/DMB receivers and navigation/GPS receivers.

Key Features

- Supports analog inputs including CVBS, S-Video & Analog RGB/YPbPr
- Supports digital inputs including 8/16/24-bit RGB/YCbCr
  - Both interlaced and progressive ITU 656 and 601 format supported
- Supports analog panels up to WQVGA resolutions
- Integrates cost saving features including a CCFL/LED backlight controller, charge pump booster, programmable panel offset control and on-chip 8-bit 8051 MCU with SPI interface
- Built-in 8 color font based OSD with 202 ROM fonts and 227 programmable RAM fonts. Supports Multi-color fonts by combining three single color fonts
- Embedded Image Enhancement
  - Programmable CTI, hue, brightness, saturation, contrast & sharpness control
  - Black/White Stretch
  - Programmable favorite color enhancement- up to three colors
  - Programmable Gamma Correction tables

TW8826 Functional Block Diagram



Order Information

Part #	Package	Description	Pin Count	Body Size
TW8826	LQFP 128	Low Profile Quad Flat Package	128	14 x 20 mm

TW8827

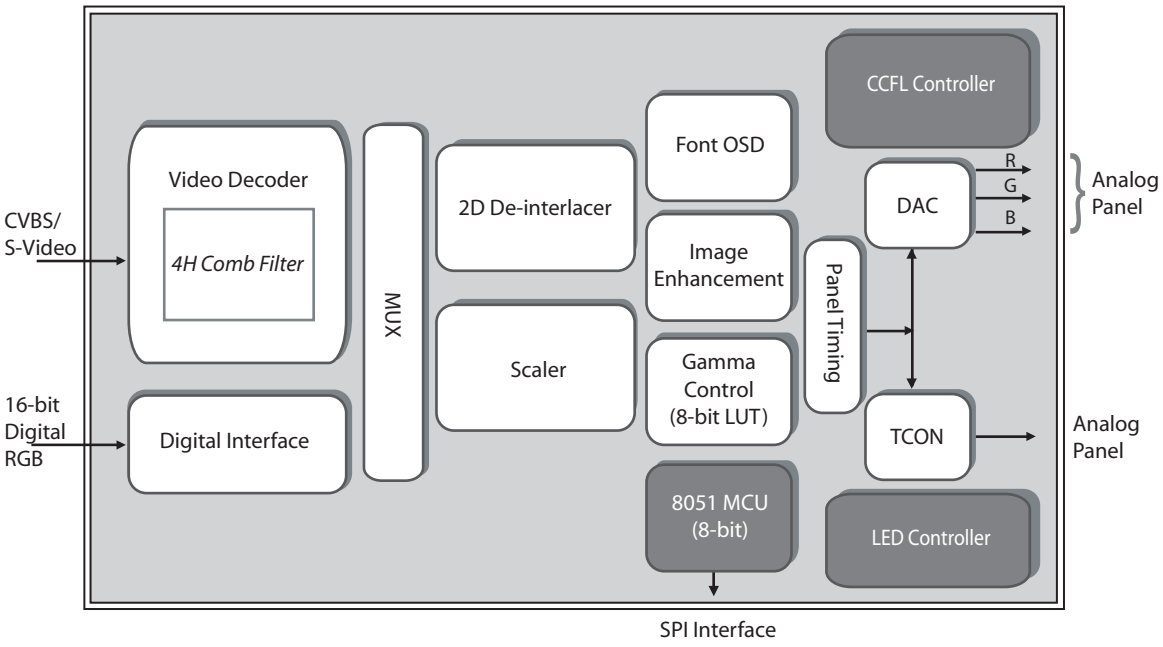
Ultra low cost, highly integrated
LCD controller for analog LCD panels

The TW8827 is an ultra low cost, highly integrated LCD controller supporting analog panels. To reduce BOM cost, TW8827 integrates an 8-bit MCU, a CCFL controller and a LED controller. The TW8827 has a high quality NTSC/PAL/SECAM 2D video decoder, 2D de-interlacer, and H/V scaler. In addition, the built-in digital interface supports 16-bit digital RGB/YCbCr inputs.

Key Features

- Supports analog inputs including CVBS & S-Video
- Supports 16-bit digital RGB/YCbCr input
  - Both interlaced and progressive ITU 656 and 601 format supported
- Supports analog panel up to WQVGA resolutions
- Integrated 8-bit 8051 MCU, LED controller and CCFL controller
- Built-in 8 color font based OSD with ~200 ROM & 75 RAM fonts
- Embedded Image Enhancement
  - Programmable CTI, hue, brightness, saturation, contrast & sharpness control
  - Black/White Stretch
  - Programmable favorite color enhancement- up to three colors (Skin, Grass & Sky)
  - Programmable Gamma Correction table

TW8827 Functional Block Diagram



Order Information

Part #	Package	Description	Pin Count	Body Size
TW8827	TQFP 80	Thin Quad Flat Package	80	12 x 12 mm^2

Techwell's Product Lines

The Products

TW28xx
Security Surveillance ICs

TW28xx is a product line of feature rich, highly integrated video decoders, video controllers, and video codec solutions for the CCTV Security Surveillance market. In addition to integrating 4 video decoders in one chip, TW28xx solutions incorporates DVR audio, multiplexing, DSP, display, compression, motion detection and horizontal/vertical scaling algorithms.

TW88xx
Automotive Infotainment Display Processors

TW88xx is a product line of highly integrated LCD controllers for TV, In-Car Display and other LCD video displays applications. TW88xx leverages Techwell's TW99xx video decoder technology and supports all popular analog video formats. With built in scaling, de-interlacing and on-screen-display, the TW88xx can support from QVGA up to WXGA LCD panels.

TW99xx
NTSC/PAL Video Decoders

TW99xx is a broad product line of NTSC/PAL/SECAM video decoders for multimedia applications, including Advanced Digital TV, LCD Monitor, DVD-Recorder, and PC applications. TW99xx video decoders convert worldwide analog broadcast TV signals and all popular video formats into standard digital formats. In addition, TW99xx video decoders integrate proprietary 2D and 3D comb filtering technology to reduce artifacts commonly associated with analog video.

TW68xx
PCI Video Decoders

TW68xx is a product line of multistandard video decoders with PCI for multimedia PC and security surveillance applications. The TW68xx leverages Techwell's TW99xx video decoder technology and supports worldwide analog broadcast TV as well as popular video formats. With an on chip PCI interface, the TW68xx is a cost effective turn key solution for PCI DVR Cards and TV Tuner Cards.

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Techwell is a fabless semiconductor company that designs, markets and sells mixed signal integrated circuits in the security surveillance, automotive infotainment, and consumer markets. Founded in 1997, we currently have over 200 employees and are headquartered in San Jose, California, with additional R&D and sales activities in South Korea, Japan, Taiwan and China. NASDAQ: TWLL.

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