TW8835

LCD Video Processor with Built-In Decoder, MCU, OSD, TCON and Analog RGB Input Support

The TW8835 incorporates many of the features required to create multipurpose in-car LCD display system in a single package. It integrates a high quality 2D comb NTSC/PAL/SECAM video decoder, triple high speed RGB ADCs, high quality scaler, versatile OSD and high performance MCU. Its image video processing capability includes arbitrary scaling, panoramic scaling, image mirroring, image adjustment and enhancement, black and white stretch, etc. On the input side, it supports a rich combination of CVBS, S-video, component video, analog RGB as well as digital YCbCr/RGB inputs. On the output side, it supports a variety of digital panel types with its built-in timing controller. The integration of additional touch screen controller, LED driver controller, PWM and MCU makes this a versatile solution for many portable applications.

Applications

- In-car display
- Portable DVD and DVR players
- Portable media players

Features

Analog Video Decoder

- NTSC (M, 4.43) and PAL (B, D, G, H, I, M, N, N combination), PAL (60), SECAM with automatic format detection
- Three 10-bit ADCs and analog clamping circuit.
- Fully programmable static gain or automatic gain control for the Y or CVBS channel
- Programmable white peak control for the Y or CVBS channel
- Software selectable analog inputs allow composite, S-video, analog YPbPr or RGB
- High quality adaptive 2D comb filter for both NTSC and PAL inputs
- PAL delay line for color phase error correction
- Image enhancement with 2D dynamic peaking and CTI
- Digital subcarrier PLL for accurate color decoding
- Digital horizontal PLL and advanced synchronization processing for VCR playback and weak signal performance
- Programmable hue, brightness, saturation, contrast, sharpness
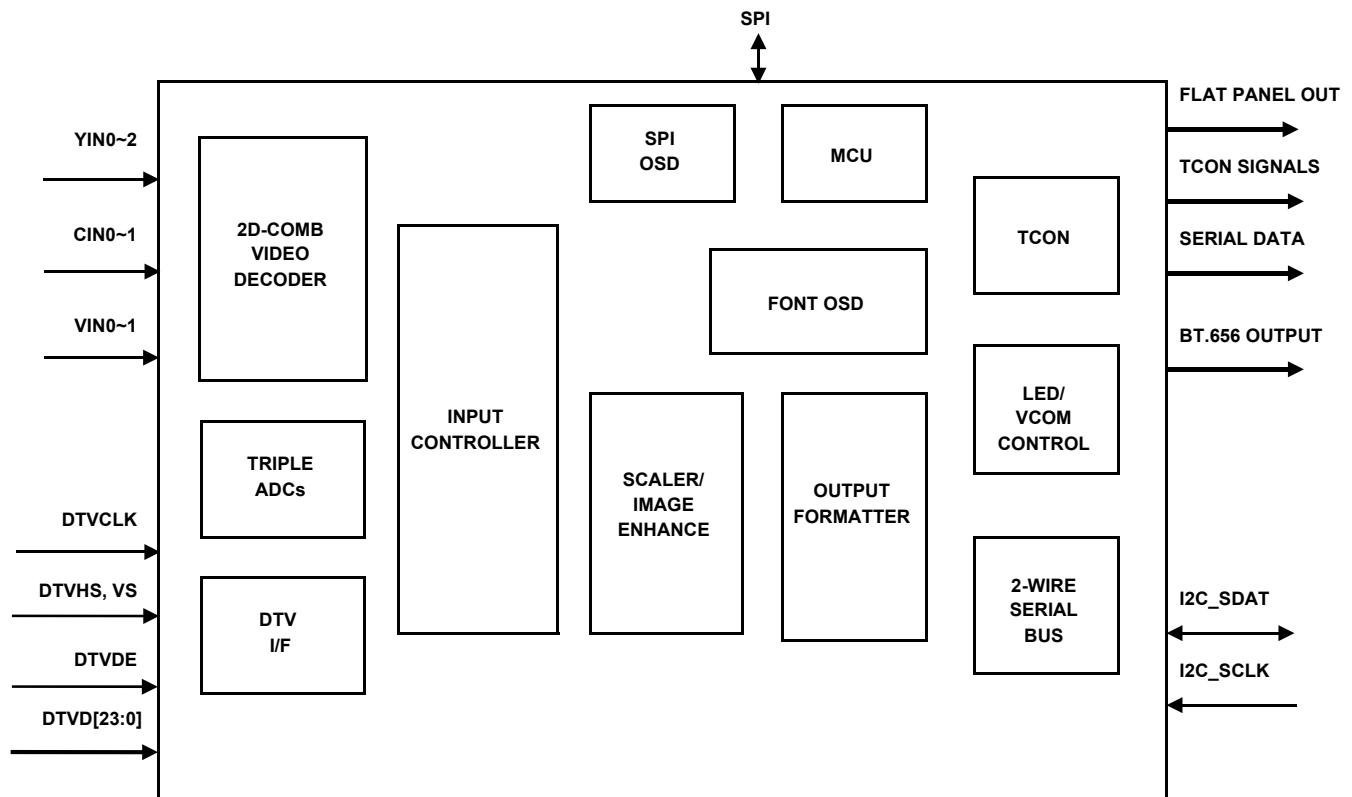- High quality horizontal and vertical filtered down scaling with arbitrary scale down ratio

FIGURE 1. FUNCTIONAL BLOCK DIAGRAM

Features (Continued)

Analog RGB Inputs

- Triple high speed 10-bit ADCs with clamping and programmable gain amplifier
- SOG and H/VSYNC support for YPbPr or RGB input
- Built-in line locked PLL with sync separator
- Supports input resolution up to 1080p

Digital Inputs Support

- Supports both BT.656 and 601 video formats
- Supports YCbCr/RGB 24-bit input
- Supports RGB.565 + BT.656 at the same time
- Supports input resolution up to 1080p

TFT Panel Support

- Built-in programmable timing controller
- Supports 3, 4, 6 or 8 bits per pixel up to 16.8 million colors with built-in dithering engine
- Supports digital panel up to XGA resolution
- Supports serial (8-bit) RGB panel

Font Based On-Screen Display

- Four window font OSD with bordering/shadow
- 10kB programmable font RAM and 512 display RAM
- 1/2/3/4 bits/pixel
- Supports variable width (12/16), height (2~32)

SPI Flash Based On-Screen Display

- Nine bitmap based OSD windows through SPI
- Supports 4/6/8 bits/pixel
- Supports RLE decompression for one window
- Supports overlapping between windows

Image Processing

- High quality scaler with both up/down and panorama scaling support
- Built-in 2D deinterlacing function
- Programmable brightness, contrast, saturation, hue and sharpness
- Programmable color transient improvement control
- Supports programmable cropping of input video and graphics
- Independent RGB gain and offset controls
- DTV hue adjustment
- Programmable 8-bit gamma correction for each color
- Black/white stretch

Clock Generation

- Spread spectrum profile based on triangular modulation with center spread
- Programmable modulation frequency and spread width

Timing Controller (TCON)

- Supports programmable interface signals for control
- Column (source) driver/row (gate) driver

MCU

- Industry standard 8052 based
- Code fetch from external SPI flash memory
- 256B code cache
- 2k XDATA memory
- Support power save mode with 32k internal clock
- ISP (in system programming) with internal boot ROM

Decoder Output

- Independent BT.656 decoder output

Touch Screen Controller

- Built-in 4-wire resistive touch screen
- 12-bit ADC
- 4-channel auxiliary input

Miscellaneous

- Supports 2-wire serial bus interface
- Built-in single LED backlight controller
- Built-in VCOM DC voltage
- Built-in VCOM AC
- Built-in DC/DC converter
- Up to 4 PWMs
- GPIOs
- 1.8/3.3V operation
- Power-down mode
- Single 27MHz crystal
- 128 pin LQFP and 144 pin TFBGA package

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