TW8846, TW8847

LCD Video Processor with Decoder, LVDS, TTL, MIPI, Image Enhancement, and Video Integrity Diagnostic

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The TW8846 and TW8847 are highly integrated LCD video processors that incorporate many of the features required to create a multipurpose LCD display system. These features include a high quality 2D comb NTSC/PAL/SECAM video decoder that supports single-ended or differential composite video inputs, two independent TTL digital input interfaces (up to 24-bit each), two LVDS Open LDI input interfaces, two separate high quality scaler and de-interlacer engines, and a versatile OSD and an EEPROM/SPI interface. The outputs include dual channel LVDS Open LDI or TTL panel interfaces, and a separate MIPI-CSI2 output in the TW8846 and a pseudo BT.656 output in the TW8847. The TW8846 and TW8847 can support input resolutions up to 1080p and can drive LCD panels at resolutions up to 1920 x 1080. The video processing capabilities include 10-bit color processing, arbitrary H/V scaling, panoramic scaling, image mirroring, image adjustment and enhancement, black and white stretch, and automatic contrast adjustment. The TW8846 and TW8847 have improved image diagnostic capabilities to determine if the input video is corrupted. The feature set and versatility of this device makes it an ideal solution for automotive LCD display applications.

Applications

- Automotive display
- Industrial/military displays
- Portable/consumer displays

Features

Analog Video Decoder

- Supports NTSC (M, 4.43) and PAL (B, D, G, H, I, M, N, N combination), PAL (60), and SECAM with automatic format detection
- High quality adaptive 2D comb filter for both NTSC and PAL inputs
- 10-bit ADC and analog clamping circuit (clamping is 8-bit processing)
- Fully programmable static gain or automatic gain control for the CVBS channel
- Programmable white peak control for the CVBS channel
- Selectable single-ended or differential CVBS inputs
- PAL delay line for color phase error correction
- Image enhancement with 2D dynamic peaking/CTI
- Digital subcarrier PLL for accurate color decoding
- Programmable hue, brightness, saturation, contrast, and sharpness
- Digital horizontal PLL and advanced synchronization processing for superior VCR playback and weak signal performance
- Up to 3CH differential or 6CH single-ended CVBS input

Digital Input Support

- Supports BT.656, 8-bit and 16-bit BT.601, and BT.1120 video formats
- Supports YCbCr/RGB 24-bit input up to 1080p resolution
- Two single channel LVDS open LDI inputs, up to 104MHz for each channel
- Dual channel LVDS open LDI input, up to 150MHz in Dual mode (75MHz per channel)
- Supports RGB565 + BT.656 at the same time

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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 single channel LVDS panels up to 1920x720 resolution (104MHz)
- Supports dual channel LVDS and digital panels (TTL) up to 1920x1080 resolution (150MHz)

Font Based On-Screen Display

- Four windows font OSD with bordering/shadow
- 13824 bytes programmable font RAM and 1024 characters display RAM
- 1/2/3/4 bits per pixel
- Supports variable width (12/16), height (2~32)

SPI Flash Based On-Screen Display

- Supports fast register initialization by SPI-DMA
- Nine bitmap-based OSD windows in two layers through SPI with alpha blending between layers
- Supports 4/6/8 bits/pixel
- Supports RLE decompression for two windows
- Shares pins with EEPROM interface

EEPROM Interface

- EEPROM interface for fast boot register initialization
- Shares pins with SPI Flash memory interface

Image Processing

- Two high quality scalers with both up/down scaling support
- Built-in 2D de-interlacing function
- Supports programmable cropping of input video and graphics
- Automatic Contrast Adjustment (ACA) on one scaler path
- Independent RGB gain and offset controls
- 10-bit per color processing
- 10-bit image enhancement processing and 10-bit Gamma correction

Clock Generation

- Spread spectrum PLL integrated to each scaler path
- Programmable modulation frequency and spread width

Timing Controller (TCON)

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

MIPI-CSI2 Output (TW8846 only)

- Four lane MIPI-CSI2 output port (1Gb/lane)
- Supports YUV422 and 24-bit RGB data formats

Pseudo BT.656 Output (TW8847 only)

- Independent BT.656 compatible YCbCr (4:2:2) output format
- YCbCr (4:2:2) output generated from all input paths
- Output can be processed through the scaler path or bypass scaling all together

Miscellaneous

- Fast Mode plus I^{2}C interface up to 1.2Mbps with zero hold time
- Short diagnostics
  - Short to battery
  - Short to ground
- Up to four 10-bit PWMs
- GPIOs
- Programmable drive strength for LVTTL and LVDS
- Pin swapping (MSB ↔ LSB)
- Two separate input measurement engines with continuous measurement capability
- Smooth input switching using shadow registers
- 1.2V internal operation
- 1.8/3.3V I/O support
- Single 27MHz crystal
- 156 Ld LQFP with exposed thermal pad
- TW8846AT-LA1-GE and TW8847AT-LA1-GE are AEC-Q100 qualified

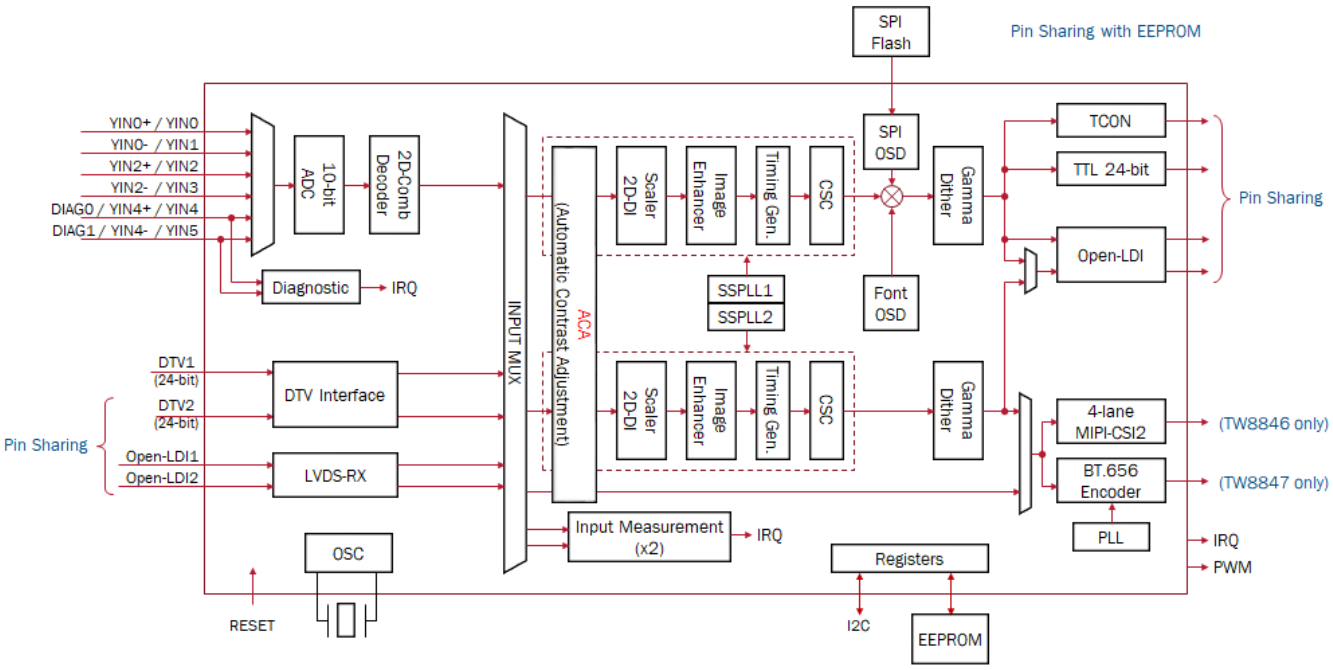


Figure 1. TW8846, TW8847 Functional Block Diagram

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Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu,
Koto-ku, Tokyo 135-0061, Japan
www.renesas.com

Contact Information

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