

# LCD Video Processor with Built-in Decoder, TTL Inputs, BT.656 Output, and LVDS Panel Interface

## TW8824

The TW8824 is a highly integrated LCD video processor that incorporates many of the key features required to create a multi-purpose LCD display system into a single package. This includes a high quality 2D comb NTSC/PAL/SECAM video decoder, which supports both single-ended and differential CVBS signals, a digital RGB input interface, high quality scaler and deinterlacer, a Font OSD engine, and LVDS, TTL or TCON output panel interfaces. The TW8824 can support input resolutions up to 1080p and can drive LCD panels at resolutions up to 1366x768. The TW8824's video processing capability includes arbitrary H/V scaling, panoramic scaling, image mirroring, image adjustment and enhancement, black and white stretch, etc. This device can support fast boot system requirements and provides stability and reliability to the system due to the fact that it is a hardwired solution that can sync to the video source and display an image on the LCD in less than 0.5 seconds from start-up. The feature set and versatility of this device makes it an ideal solution for in-car LCD display applications.

## Applications

- Automotive display systems

## 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
- 10-bit ADC and analog clamping circuit
- Fully programmable static gain or automatic gain control for CVBS channel
- Programmable white peak control for the CVBS channel
- 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/CTI
- Digital subcarrier PLL for accurate color decoding
- Programmable hue, brightness, saturation, contrast, sharpness
- Selectable differential or single-ended CVBS input
- Digital horizontal PLL and advanced synchronization processing for VCR playback and weak signal performance
- High quality horizontal and vertical filtered down scaling with arbitrary scale down ratio
- Up to 3-CH differential or 6-CH single-ended CVBS input

### Digital Inputs Support

- Supports RGB 24-bit input up to 1080p resolution at either 1.8V or 3.3V logic level
- Supports both BT.656 and 601 video formats with H/VSYNC

### 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 panels (TTL) or single channel LVDS panels up to WXGA (1366x768) resolution, 85MHz
- Supports serial (8-bit) RGB panel

### Timing Controller (TCON)

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

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## BT.656 Output

- Independent ITU-R 656 compatible YCbCr(4:2:2) output format
- ITU-R 656 output generated from decoder, LVDS, DRGB and post scaling path
- Max 148.5MHz with 3.3V, 74MHz with 1.8V

## Font Based On Screen Display

- Four window font OSD with bordering/shadow
- 6912B programmable font RAM and 512 display RAM
- 1/2/3/4 bits/pixel
- Supports variable width (12/16), height (2~32)

## Image Processing

- High quality scaler with both up/down and panorama/water-glass scaling support
- Built-in 2D de-interlacing 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

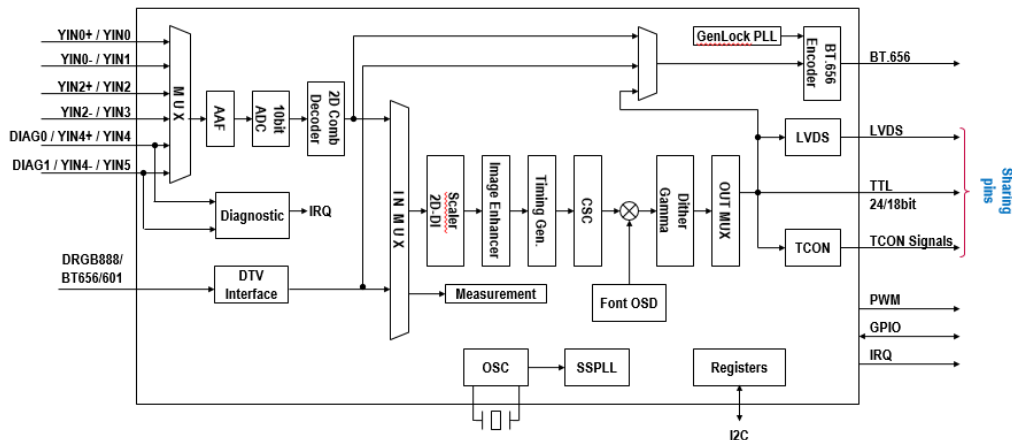
## Clock Generation

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

## Miscellaneous

- Supports Fast Mode I<sup>2</sup>C interface up to 400Kbps
- Short Diagnostics:
  - Short-to-battery
  - Short-to-ground
- Up to 3 PWM outputs
- GPIOs
- 1.8V internal operation
- 1.8V/3.3V DTV input support
- 1.8V/3.3V BT.656 output support
- Hardware mute pin
- Single 27MHz crystal
- 100 pin TQFP

## Functional Block Diagram



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