



**TECHWELL  
DISPLAY**



## Automotive Display ICs

# TW8823

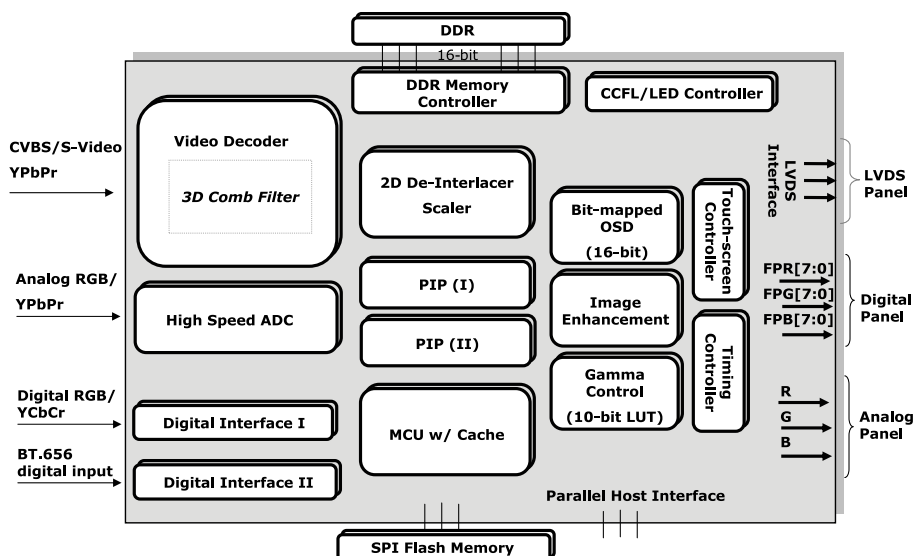
Advanced LCD controller with on-chip MCU  
and 65K color 16-bit OSD support

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

## TFT 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 bit-mapped OSD, one 16-bit (65K colors) and two 8-bit (256 colors) bit-mapped OSD windows
  - 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