

S1D13708 Embedded Memory LCD Controller

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The S1D13708 is a color/monochrome LCD graphics controller with an embedded memory / display buffer. Targeted at PDA and Cell Phone applications, the S1D13708 ‘directly’ interfaces to numerous TFT panels and incorporates a minimum pin-count CPU interface thereby making it an ideal solution for an LCD Module.

This high level of integration combined with a 1.8V Core, provides a low cost, low power, single chip solution to meet the demands of embedded markets such as Mobile Communications devices and Palm-size PCs, where board size and battery life are major concerns.

The embedded display buffer greatly improves overall system performance as the S1D13708 handles all of the display functions directly with very little interaction from the processor.

The S1D13708 provides very flexible display features, from our patented SwivelView™ technology which provides hardware rotation of the displayed image, to our Ink Layer with transparency, to our “Picture-in-Picture Plus” feature which allows two active variable size display ‘windows’.

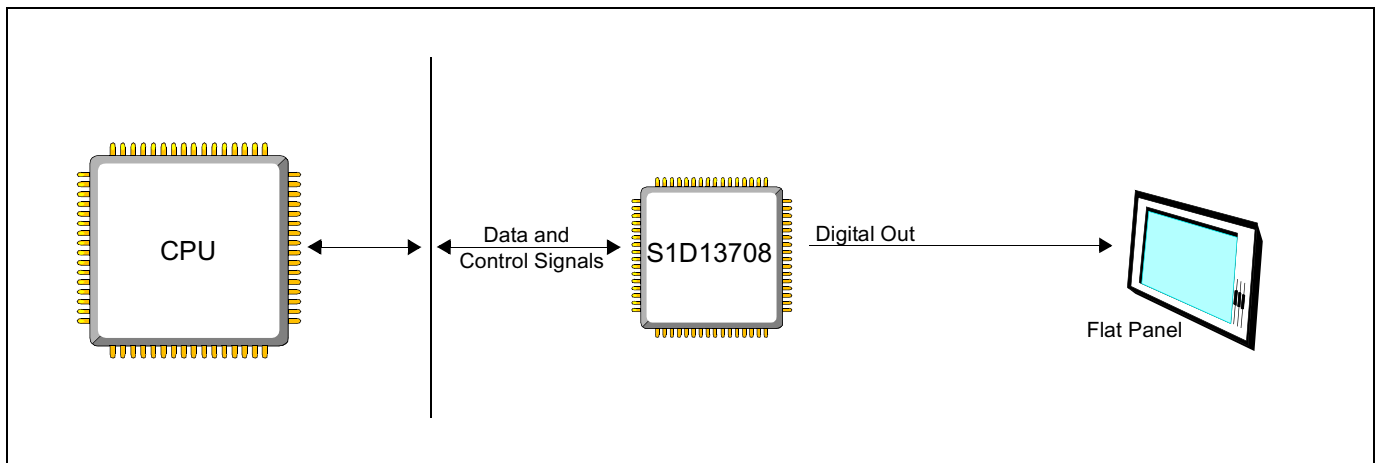
The S1D13708 provides impressive support for Mobile Communication devices and Palm OS® handhelds, however its impartiality to CPU type or operating system makes it an ideal display solution for a wide variety of applications.

■ **FEATURES**

- Embedded Display Buffer.
- Low Operating Voltage.
- Low-latency CPU interface.
- Direct support for the multiple CPU types.
- Programmable Resolutions and Color depths.
- STN LCD support.
- Active Matrix LCD support.
- Reflective Active Matrix support.
- SwivelView™ (hardware rotation of displayed image).
 • (Patent # 5,734,875 - Patent # 5,956,049)
- “Picture-in-Picture Plus”.
- Ink Layer.
- Software Initiated Power Save Mode.
- Hardware or Software Video Invert.
- 120-pin PFBGA package.



■ **SYSTEM BLOCK DIAGRAM**



S1D13708

DESCRIPTION

Memory Interface

- Embedded 80K byte SRAM display buffer.

CPU Interface

- 'Fixed' low-latency CPU access times.
- Direct support for:
 - Hitachi SH-4 / SH-3.
 - Motorola M68xxx (DragonBall, ColdFire, REDCAP2).
 - MPU bus interface with programmable READY.
- InDirect Interface provides a minimum 15-pin interface (as compared to 42-pin max implementation).

Display Support

- 4/8-bit monochrome LCD interface.
- 4/8/16-bit color STN LCD interface.
- Single-panel, single-drive passive displays.
- 9/12/18-bit Active matrix TFT interface.
- 'Direct' support for multiple TFT interfaces (Epson, Sharp, Type 2,3,4 external timing control IC not required).
- Typical resolutions supported (Ink Layer disabled):
 - 320x240 @ 8bpp
 - 160x160 @ 16bpp
 - 160x240 @ 16bpp

Power Down Modes

- Software Initiated Power Save Mode.
- BCLK can be switched off while maintaining LCD refresh.

Display Modes

- 1/2/4/8/16 bit-per-pixel (bpp) support.
- Up to 64 gray shades using FRM and dithering on monochrome passive LCD panels.
- Up to 64K colors on passive STN panels.
- Up to 64K colors on active matrix panels.
- SwivelView: direct hardware rotation of display image by 90°, 180°, 270°.
- "Picture-in-Picture Plus": displays a variable size window overlaid over background image.
- Ink Layer.
- Partial Display Support (available on Type 3 TFT).
- Double Buffering/multi-pages: provides smooth animation and instantaneous screen update.

Clock Source

- Two clock inputs (single clock possible).
- Clock source can be internally divided down for a higher frequency clock input.
- 12MHz Crystal Input.

Operating Voltage

- CORE_{VDD} 1.8 to 2.2 volts.
- IO_{VDD} 3.0 to 3.6volts.

Package

- 120-pin PFBGA.

CONTACT YOUR SALES REPRESENTATIVE FOR THESE COMPREHENSIVE DESIGN TOOLS

- S1D13708 Technical Manual
- S5U13708 Evaluation Boards
- CPU Independent Software Utilities
- Palm OS[®] Hardware Abstraction Layer
- Windows[®] CE Display Driver
- VXWorks[®] Tornado[™] Display Driver



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