

# S1D13L04

## S1D13L04 XGA Simple LCD Controller

The S1D13L04 is a simple, multi-purpose graphics LCD controller which supports color TFT LCD panels with up to XGA resolution. With an external SDRAM memory controller, it allows up to 16Mbyte as a display frame buffer. The S1D13L04 supports most popular CPU interfaces in both 16-bit and direct/indirect variations.

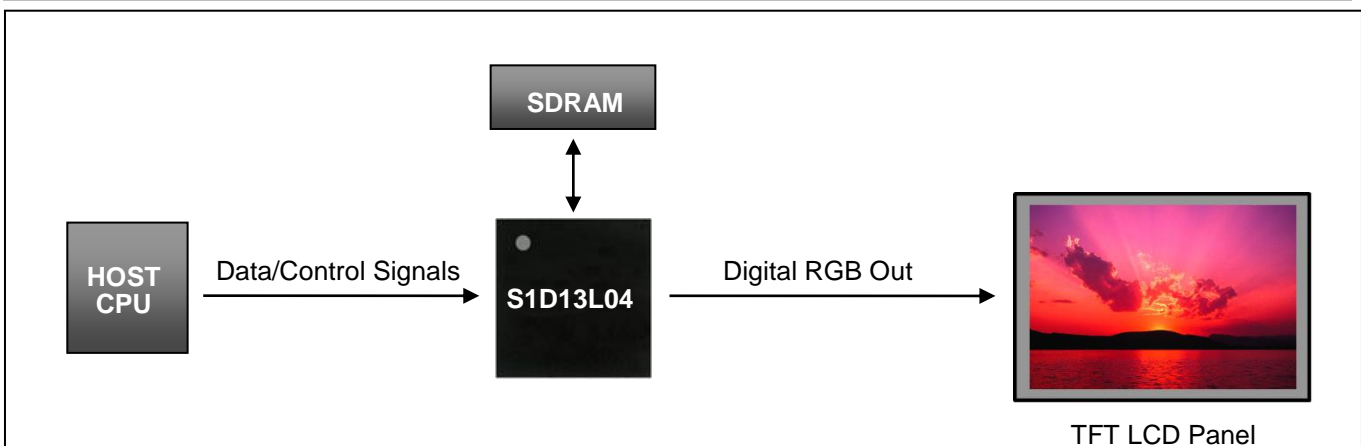
The S1D13L04's combination of multiple CPU interfaces and display interface types offers a versatile, yet easy to develop display system. Additionally, it offers such features as multiple windows (PIP), alpha blending, gamma correction, and mirror/rotation which allow user configurability of various images on the Main/PIP1/PIP2 windows.

The S1D13L04 is a flexible, low cost, low power solution that meets the demands of embedded markets such as medical, office automation, factory automation, home automation and measuring instruments, where total system cost concerns can still be met when using TFT panels up to XGA resolution. Additionally, its impartiality to CPU type or operating system also makes it an ideal display solution for a wide variety of other applications.

### FEATURES

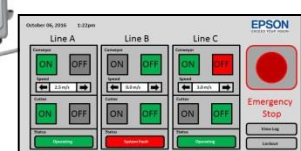
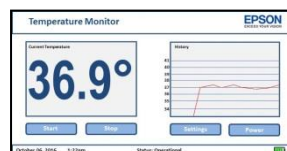
- Direct and indirect CPU interfaces
- Serial host interface
- Memory interface for x16 external SDRAM
- Programmable resolutions and color depths
- Support for single RGB panel with serial command interface
- Multiple windows with overlay features (main, PIP1, PIP2)
- Alpha blending (PIP2)
- Gamma correction LUT (256 x 24 bit x 2 banks)
- 4-channel PWM for backlight control
- Software initiated power save mode
- General purpose input/output pins
- IOVDD: 3.3, CORE/OSC/PLLVD: 1.8V
- Clocks can be selected from two embedded PLLs or digital clock inputs
- Two built-in Crystal inputs
- Temperature range: -40°~ 85°C
- Package: QFP 208-pin, 0.5mm pin pitch

### SYSTEM BLOCK DIAGRAM



### S1D13L04 Features

- External SDRAM controller (up to 16MB) for display buffer
- 3 layer PIP support
- Alpha blending and transparency
- Programmable PLL
- Supports up to XGA TFT panels



## DESCRIPTION

### Display Memory

- Uses external SDRAM or mobile SDRAM as a display buffer (Size: 8M byte or 16M byte)
- SDRAM clock: 100MHz Maximum
- Automatic re-entry into self-refresh mode

### Display Support

- RGB interface single panel
- 16/18-bit color TFT
- Optional serial command interface
- Color depths up to 32 bpp
- Example resolutions
  - 1024x768 at a color depth of 16 bpp
  - 800x600 at a color depth of 16 bpp
  - 640x480 at a color depth of 32 bpp

### Display Features

- Multiple window (layer) support
- Mirror and 180° rotation functions
- Alpha blending
- Gamma correction
- Pseudo color expansion

### CPU Interface

- Direct and indirect interface support for most popular CPU interfaces
- Serial host interface
- Registers are memory-mapped - M/R# input selects between memory and register addresses

### Miscellaneous

- Internal system clock: 50MHz maximum
- (half of SDRAM clock)
- 4 channel PWM for backlight control
- Multiple general purpose input/output pins
- Flexible clock structure:
  - Two embedded PLLs
  - Two built-in crystal inputs
  - Two digital clock inputs
  - Clocks dynamically turned off when modules are not needed
- Interrupts available
- PLL/OSC/COREVDD 1.8 volts, IOVDD 3.3 volts
- Package: QFP 208-pin

For more information on the S1D13L04 and other Epson Display Controllers, visit the Epson Global website.

[https://global.epson.com/products\\_and\\_drivers/semicon/products/display\\_controllers/](https://global.epson.com/products_and_drivers/semicon/products/display_controllers/)



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