

# S1D13A04

## S1D13A04 QVGA LCD Controller

The S1D13A04 is an LCD solution designed for seamless connection to a wide variety of microprocessors. The S1D13A04 integrates an LCD graphics controller with an embedded 160K byte SRAM display buffer. The LCD controller supports TFT and passive panel types and adds a Hardware Acceleration Engine to greatly improve screen drawing functions.

The S1D13A04 utilizes a guaranteed low-latency CPU architecture that provides support for microprocessors without READY/WAIT# handshaking signals. The 32-bit internal data path, write buffer and the Hardware Acceleration Engine provide high performance bandwidth into display memory allowing for fast display updates.

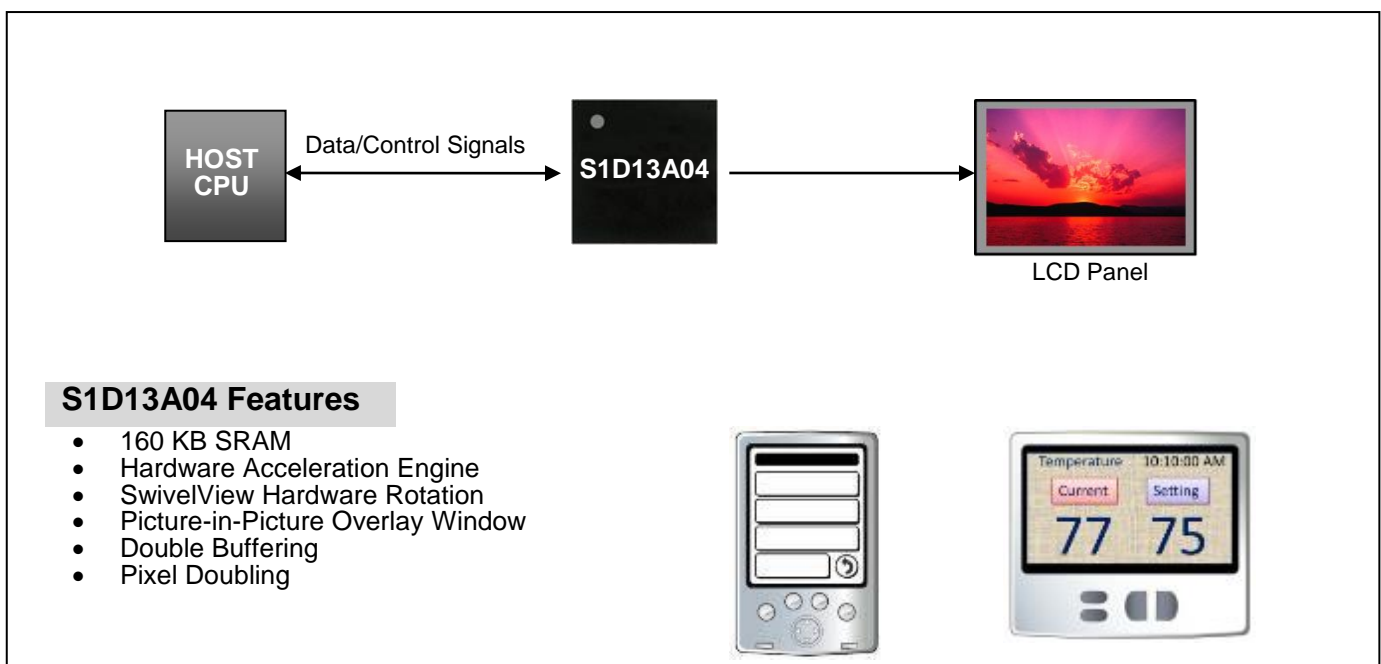
Additionally, products requiring a rotated display can take advantage of the SwivelView™ feature which provides hardware rotation of the display memory transparent to the software application. The S1D13A04 also provides support for Picture-in-Picture (a variable size Overlay window).

The S1D13A04's impartiality to CPU type or operating system makes it an ideal display solution for a wide variety of applications in embedded markets.

### FEATURES

- Embedded 160KB Display Buffer
- Low Operating Voltage
- Low-latency CPU interface
- Direct support for multiple CPU types
- TFT panel support
- Passive LCD panel support
- Programmable resolutions and color depths
- USB Client, Revision 1.1 compliant
- Picture-in-Picture
- SwivelView™ (90°, 180°, 270° hardware rotation of displayed image)
- Pixel Doubling
- Hardware Acceleration Engine
- Software Initiated Power Save Mode
- Software Video Invert
- 121-pin PFBGA or TQFP15 128-pin package

### SYSTEM BLOCK DIAGRAM



## DESCRIPTION

### Display Buffer

- Embedded 160K byte SRAM display buffer

### CPU Interface

- Fixed low-latency CPU access times
- Direct support for a variety of popular interfaces

### Display Support

- 1/2/4/8/16 bit-per-pixel (bpp) support
- Up to 64 gray shades on monochrome passive panels
- 9/12/18-bit TFT interface
- Single-panel, single-drive passive displays
  - 4/8-bit monochrome LCD interface
  - 4/8/16-bit color passive LCD interface
- Typical resolutions supported:
  - 320x320 @ 8 bpp
  - 320x240 @ 16 bpp
  - 160x160 @ 16 bpp (2 pages)
  - 160x240 @ 16 bpp

### Display Features

- Picture-in-Picture: displays a variable size window overlaid over background image
- SwivelView™: hardware rotation of 90°, 180°, 270°
- Pixel Doubling: horizontal and vertical resolutions can be doubled without any additional memory
- Software video invert
- 2D BitBLT Engine:
  - Write BLT
  - Move BLT
  - Solid Fill BLT
  - Pattern Fill
  - Move BLT with Color Expansion
  - Transparent Write BLT
  - Transparent Move BLT
  - Read BLT
  - Color Expansion BLT

### Miscellaneous

- USB Client, Revision 1.1 compliant
- Three independent clock inputs
- Flexible clock source selection with dividers
- Software Initiated Power Save Mode
- COREVDD 2.0 ± 10% or 2.5 ± 10% volts
- IOVDD 3.0 ± 10% volts
- 121-pin PFBGA and 128-pin TQFP15

For more information on the S1D13A04 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/)



For Sales and Technical Support, contact the Epson representative for your region.

[https://global.epson.com/products\\_and\\_drivers/semicon/information/support.html](https://global.epson.com/products_and_drivers/semicon/information/support.html)



#### NOTICE:

Document code: X37A-C-001-05.2

No part of this material may be reproduced or duplicated in any form or by any means without the written permission of Seiko Epson. Seiko Epson reserves the right to make changes to this material without notice. Seiko Epson does not assume any liability of any kind arising out of any inaccuracies contained in this material or due to its application or use in any product or circuit and, further, there is no representation that this material is applicable to products requiring high level reliability, such as, medical products. Moreover, no license to any intellectual property rights is granted by implication or otherwise, and there is no representation or warranty that anything made in accordance with this material will be free from any patent or copyright infringement of a third party. When exporting the products or technology described in this material, you should comply with the applicable export control laws and regulations and follow the procedures required by such laws and regulations. You are requested not to use, to resell, to export and/or to otherwise dispose of the products (and any technical information furnished, if any) for the development and/or manufacture of weapon of mass destruction or for other military purposes.

All brands or product names mentioned herein are trademarks and/or registered trademarks of their respective companies.

©Seiko Epson Corporation 2004 - 2018. All rights reserved.