Chipsmall

Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of "Quality Parts,Customers Priority,Honest Operation,and Considerate Service",our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

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S1D13A05 LCD/USB Companion Chip

February 2012

The S1D13A05 is an LCD/USB solution designed for seamless connection to a wide variety of microprocessors. The S1D13A05 integrates a USB slave controller and an LCD graphics controller with an embedded 256K byte SRAM display buffer. The LCD controller supports all standard panel types and multiple TFT types eliminating the need for an external timing control IC. The S1D13A05 includes a Hardware Acceleration Engine to greatly improve screen drawing functions and the built-in USB controller provides revision 1.1 compliance for applications requiring a USB client. This high level of integration provides a low cost, low power, single chip solution to meet the demands of embedded markets requiring USB client support, such as Mobile Communications devices and Palm-size PCs.

The S1D13A05 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 S1D13A05 also provides support for "Picture-in-Picture Plus" (a variable size Overlay window).
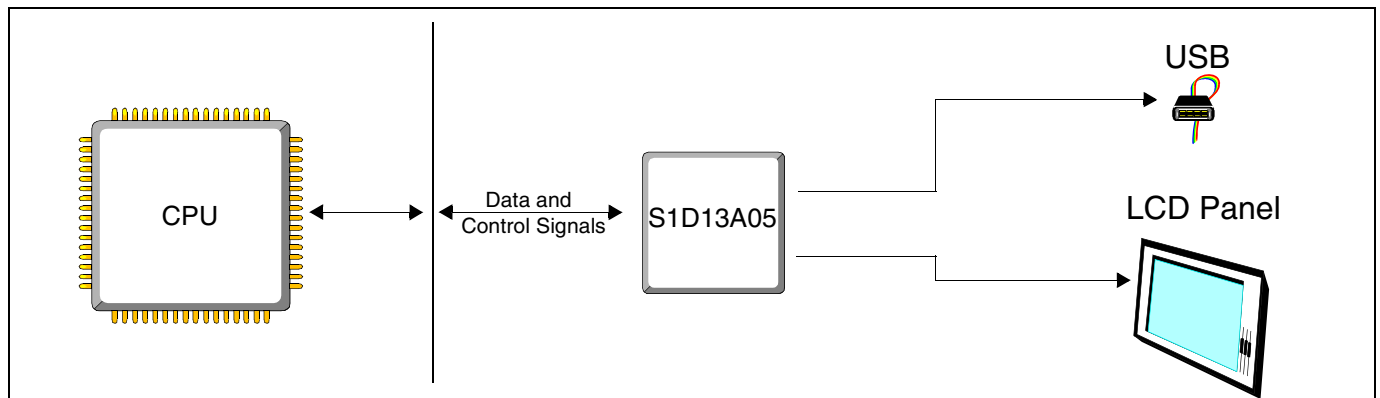
The S1D13A05, with its integrated USB client, provides impressive support for Palm OS® handhelds. However, its impartiality to CPU type or operating system makes it an ideal display solution for a wide variety of applications.

n **FEATURES**

- Embedded 256KB Display Buffer.
- Low Operating Voltage.
- Low-latency CPU interface.
- Direct support for multiple CPU types.
- Programmable resolutions and color depths.
- Passive LCD support.
- Active Matrix LCD support.
- Extended TFT interfaces (Type 2, 3, 4).
- 'Direct' Sharp HR-TFT support (including Mode 2).
- 'Direct' Casio TFT support.

- USB Client, Revision 1.1 compliant.
- SwivelView™ (90°, 180°, 270° hardware rotation of displayed image).
  - (Patent # 5,734,875 - Patent # 5,956,049 - Patent #6,262,751)
- "Picture-in-Picture Plus".
- Pixel Doubling.
- Hardware Acceleration Engine.
- Software Initiated Power Save Mode.
- 48MHz crystal for USBCLK.
- Software Video Invert.
- 121-pin PFBGA package.

n **SYSTEM BLOCK DIAGRAM**

n DESCRIPTION

Memory Interface
- Embedded 256K byte SRAM display buffer.

CPU Interface
- 'Fixed' low-latency CPU access times.
- Direct support for:
  Hitachi SH-4 / SH-3.
  Motorola M68xxx (REDCAP2, DragonBall, ColdFire).
  Motorola Dragonball SZ support (66MHz)
  MPU bus interface with programmable READY.

Integrated USB Features
- USB Client, Revision 1.1 Compliant.

Power Down Modes
- Software Initiated Power Save Mode.

Operating Voltage
- $CORE_{VDD}$ 2.0 ± 10% volts or 2.5 ± 10% volts.
- IO_{VDD} 3.3 ± 10% volts.

Clock Source
- Three independent clock inputs including dedicated USB clock (single clock possible if USB not required).
- 48MHz crystal oscillator for USBCLK.

Package
- 121-pin PFBGA

Integrated LCD Controller Features
- 1/2/4/8/16 bit-per-pixel (bpp) support.
- Up to 64 gray shades on monochrome passive panels.
- Up to 64K colors on passive/active matrix panels.
- Single-panel, single-drive passive displays.
  - 4/8-bit monochrome and 4/8/16-bit color interfaces.
- 9/12/18-bit Active matrix TFT interface.
- 'Direct support for multiple TFT interfaces (Epson, Sharp, Type 2, 3, 4, external timing IC not required).
- SwivelView: hardware rotation by 90°, 180°, 270°.
- "Picture-in-Picture Plus": displays a variable size window overlaid over background image.
- Pixel Doubling: horizontal and vertical resolutions can be doubled without any additional memory.
- Software video invert.
- Typical resolutions supported:
  320x320@16bpp
  160x160 @16bpp (2 pages)
  160x240 @16bpp
- 2D BitBLT Engine.
  Write BLT   Transparent Write BLT
  Move BLT   Transparent Move BLT
  Solid Fill BLT   Read BLT
  Pattern Fill   Color Expansion BLT
  Move BLT with Color Expansion

CONTACT YOUR SALES REPRESENTATIVE FOR THESE COMPREHENSIVE DESIGN TOOLS

- S1D13A05 Technical Manual
- S5U13A05 Evaluation Boards
- CPU Independent Software Utilities
- Palm OS® Hardware Abstraction Layer
- Windows® CE Display Driver
- VXWorks® Tornado™ Display Driver