

## S1D13748 Mobile Graphics Engine

October 2007

The S1D13748 is a low cost, low power Mobile Graphics Engine providing multiple LCD support for embedded and mobile products requiring up to WVGA resolution. Supporting up to three display layers, the S1D13748 provides the Host processor with flexibility in handling multiple image sources. It's ability to receive high speed Host writes, combined with it's support for a wide variety of LCD panels, makes the S1D13748 an excellent choice for a multitude of LCD applications.

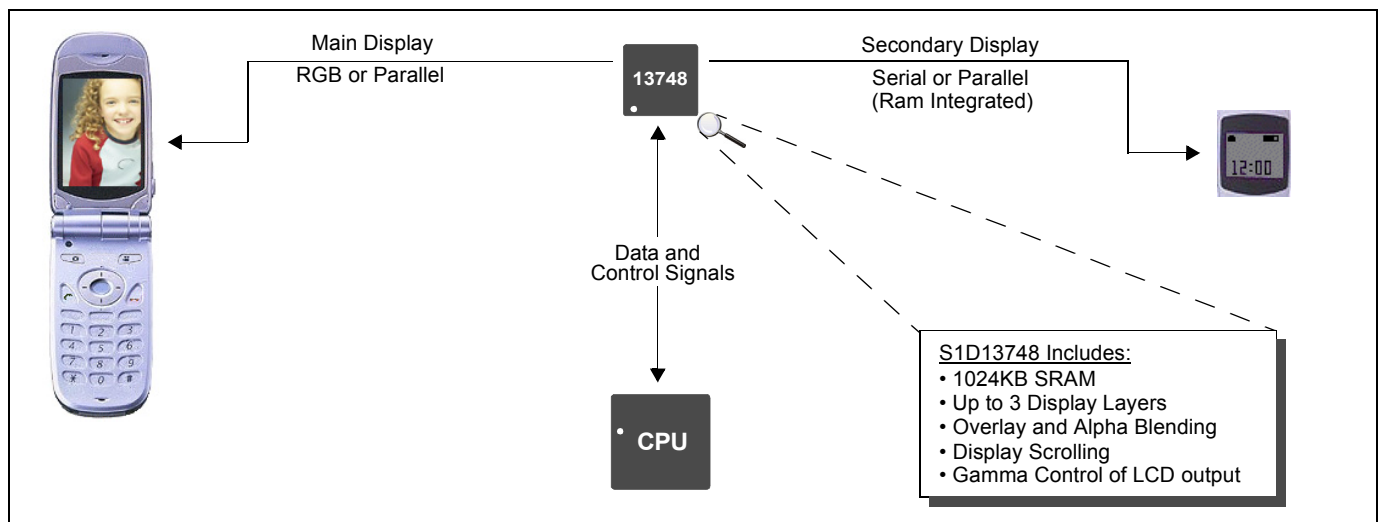
The S1D13748 includes a pixel doubling feature which allows easy migration to larger panel sizes using existing image data. The feature set includes independent resizing of PIP window image data using the bi-cubic scaler, scrolling control for each layer, and LCD output manipulation such as gamma control and optional dithering. This allows the Host processor to provide image data, but off-loads the image processing requirement from the Host. The S1D13748 also incorporates LCD Bypass Mode which allows the Host to exercise direct control over parallel or serial RAM-based panels.

The S1D13748 contains 1024K bytes of embedded SRAM which is used to store image data for up to three layers for LCD1 and image data for LCD2. This feature set provides a low cost, low power single chip solution to meet the demands of embedded markets requiring up to WVGA resolution, such as Mobile Communications devices.

### ■ FEATURES

- Embedded 1024K byte SRAM
- Low Operating Voltage
- 16-bit Indirect Host Interface
  - High Speed Host Writes
  - Rectangular, Rotated, and Mirror Host Write Modes
  - Input Formats: YUV 4:2:2, 4:2:0 and RGB 5:6:5
- Supports up to 2 LCD panels (LCD2 must be RAM integrated)
- Support for RGB, Serial, and Parallel I/F panels
- LCD Bypass Mode
- Support for up to 3 display layers with overlay and alpha blending
  - Main Layer image can be doubled in size
  - PIP1 Layer can be resized from 8x to 1/8x
  - PIP2 Layer can be resized from 8x to 1/8x
- Independent scrolling control for each layer
- Look-up Table for gamma control of LCD output
- Optional dithering of LCD output
- Internal PLL or Digital Clock Input
- Software Initiated Power Save Mode
- PFBGA 121-pin or QFP20 144-pin packages

### ■ SYSTEM BLOCK DIAGRAM



### DESCRIPTION

#### Memory

- 1024K bytes of embedded SRAM

#### CPU Interface

- 16-bit Indirect Host Interface
  - Supports High Speed Host Writes
  - Integrated Host interface Write Controller supports:
    - Rectangular Write Mode
    - Rotated Write Mode
    - Mirror Write Mode
- LCD Bypass Mode allows direct control of serial and parallel LCD panels by the Host CPU

#### Panel Support

- 9/12/16/18/24-bit RGB interface panels
- 8/16/18/24-bit Parallel interface panels (RAM Integrated)
- 8/16-bit Serial interface panels (RAM Integrated)
- Supports up to 2 LCD panels (LCDs cannot be refreshed simultaneously)
  - LCD1: RGB, LCD2: Serial w/ RAM
  - LCD1: Parallel w/ RAM, LCD2: Serial w/RAM
  - LCD1: Parallel w/RAM, LCD2: Parallel w/RAM
  - LCD1: RGB, LCD2: Parallel w/RAM

#### Input Formats

- Host can input image data as:
  - YUV 4:2:2
  - YUV 4:2:0
  - RGB 5:6:5

#### Display Features

- Supports up to 3 layers with Overlay and Alpha Blending functions:
  - Main Layer features:
    - Image can be stored as RGB 5:6:5
    - Pixel Doubling which doubles the size of the display image (independent horizontal/vertical)
  - PIP1 Layer features:
    - Image can be stored as RGB 5:6:5 or YUV 4:2:2
    - Bi-Cubic Scaler can resize image from 8x - 1/8x
    - Edge Enhancement support
  - PIP2 Layer features:
    - Image can be stored as RGB 5:6:5 or YUV 4:2:2
    - Bi-Cubic Scaler can resize image from 8x - 1/8x
    - Panorama function allows variable vertical scaling
    - Edge Enhancement support
    - LUT (Look-Up Table) for independent gamma control of PIP2 window
- Independent Display Scrolling for each Layer (Main, PIP1, PIP2)
- LUT (Look-Up Table) for gamma control of the LCD output
- Optional dithering for the LCD output

#### Miscellaneous

- Internal PLL or digital clock input (CLKI)
- Software initiated power save mode
- General Purpose IO pins
- CORE<sub>VDD</sub> 1.5 volts and IO<sub>VDD</sub> 1.80, 2.80, or 3.30 volts
- Packages:
  - PFBGA 121-pin (10 x 10 x 1.2mm) (0.8mm pitch)
  - QFP20 144-pin (20 x 20 x 1.4mm) (0.5mm pitch)

### CONTACT YOUR SALES REPRESENTATIVE FOR THESE COMPREHENSIVE DESIGN TOOLS

- S1D13748 Technical Documentation
- CPU Independent Software Utilities
- S1D13748 Evaluation Boards
- Royalty Free source level driver code

#### Japan

Seiko Epson Corporation  
 IC International Sales Group  
 421-8, Hino, Hino-shi  
 Tokyo 191-8501, Japan  
 Tel: 042-587-5812  
 Fax: 042-587-5564  
<http://www.epson.co.jp/>

#### Hong Kong

Epson Hong Kong Ltd.  
 20/F., Harbour Centre  
 25 Harbour Road  
 Wanchai, Hong Kong  
 Tel: 2585-4600  
 Fax: 2827-4346  
<http://www.epson.com.hk/>

#### North America

Epson Electronics America, Inc.  
 2580 Orchard Parkway  
 San Jose, CA 95131, USA  
 Tel: (408) 922-0200  
 Fax: (408) 922-0238  
<http://www.eea.epson.com/>

#### Europe

Epson Europe Electronics GmbH  
 Riesstrasse 15  
 80992 Munich, Germany  
 Tel: 089-14005-0  
 Fax: 089-14005-110  
<http://www.epson-electronics.de/>

#### Taiwan

Epson Taiwan Technology & Trading Ltd.  
 14F, No. 7  
 Song Ren Road  
 Taipei 110  
 Tel: 02-8786-6688  
 Fax: 02-8786-6677  
<http://www.epson.com.tw/>

#### Singapore

Epson Singapore Pte Ltd  
 1 HarbourFront Place #03-02  
 HarbourFront Tower One  
 Singapore, 098633  
 Tel: (65) 6586-5500  
 Fax: (65) 6271-3182  
<http://www.epson.com.sg/>

© SEIKO EPSON CORPORATION 2006-2007. All rights reserved.

Information in this document is subject to change without notice. You may download and use this document, but only for your own use in evaluating Seiko Epson/EPSON products. You may not modify the document. Epson Research and Development, Inc. disclaims any representation that the contents of this document are accurate or current. The Programs/Technologies described in this document may contain material protected under U.S. and/or International Patent laws.

EPSON is a registered trademark of Seiko Epson Corporation. All other trademarks are the property of their respective owners.

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Epson:

[S1D13748B00B100](#) [S1D13748F00A100](#)