

# **GRAPHICS**

# S1D13706

March 2009

# S1D13706 Embedded Memory LCD Controller

The S1D13706 is a color/monochrome LCD graphics controller with an embedded 80K byte SRAM display buffer. While supporting all other panel types, the S1D13706 is the only LCD controller to directly interface to both the Epson D-TFD and the Sharp HR-TFT family of products thus removing the requirement of an external Timing Control IC. This high level of integration 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 S1D13706 utilizes a guaranteed low-latency CPU architecture thus providing support for microprocessors without READY/WAIT# handshaking signals. The 32-bit internal data path provides high performance bandwidth into display memory allowing for fast screen updates.

Products requiring a rotated display image can take advantage of the SwivelView<sup>™</sup> feature which provides hardware rotation of the display memory transparent to the software application. The S1D13706 also provides support for "Picture-in-Picture Plus" (a variable size Overlay window).

The S1D13706 provides impressive support for Palm OS<sup>®</sup> 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.

### SYSTEM BLOCK DIAGRAM

 SwivelView<sup>™</sup> (90, 180, 270° hardware rotation of displayed image).



- "Picture-in-Picture Plus".
- Software Initiated Power Save Mode.
- Hardware or Software Video Invert.
- 100-pin TQFP15 package.
- 104-pin CFLGA package.





# S1D13706

## 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 (REDCAP2, DragonBall, ColdFire). MPU bus interface with programmable READY.

#### **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 Epson D-TFD and Sharp HR-TFT (external timing control IC not required).
- Typical resolutions supported:
  - 320x240@8bpp
  - 160x160 @16bpp
  - 160x240 @16bpp

#### **Clock Source**

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

#### **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.
- Double Buffering/multi-pages: provides smooth animation and instantaneous screen update.

#### **Power Down Modes**

Software Initiated Power Save Mode.

#### **Operating Voltage**

- CORE<sub>VDD</sub> 1.8 to 2.2 volts and 3.0 to 3.6 volts.
- HIO<sub>VDD</sub> 1.8 to 2.2 volts and 3.0 to 3.6 volts.
- NIO<sub>VDD</sub> 3.0 to 3.6 volts.

#### Package

- 100-pin TQFP15.
- 104-pin CFLGA.

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

 S1D13706 Technical Manual

CPU Independent Software

- Palm OS<sup>®</sup> Hardware Abstraction Layer
- S5U13706 Evaluation Boards Windows<sup>®</sup> CE Display Driver
  - VXWorks<sup>®</sup> Tornado<sup>TM</sup> Display Driver

#### Japan

Utilities

Seiko Epson Corporation IC International Sales Group 421-8, Hino, Hino-shi Tokvo 191-8501, Japan Tel: +81-42-587-5814 Fax: +81-42-587-5117

#### Hong Kong

Epson Hong Kong Ltd. 20/F, Harbour Centre 25 Harbour Road Wanchai, Hong Kong Tel: +852-2585-4600 Fax: +852-2827-4346

North America Epson Electronics America, Inc. 2580 Orchard Parkway San Jose, CA 95131, USA Tel: +1-800-228-3964 Fax: +1-408-922-0238

### Europe Epson Europe Electronics GmbH

Riesstrasse 15 80992 Munich, Germany Tel: +49-89-14005-0 Fax: +49-89-14005-110

#### **Dongcheng District** Beijing 100005, China Tel: +86-10-6410-6555

Epson (China) Co., Ltd.

Fax: +86-10-6410-7320 Singapore

Taiwan Epson Taiwan Technology & Trading Ltd. 14F, No. 7 Song Ren Road Taipei 110, Taiwan Tel: +886-2-8786-6688 Fax: +886-2-8786-6660

#### Korea

Seiko Epson Corp. Korea Office 50F, LKI 63 Bldg 60 Yoido-dong, Youngdeungpo-Ku, Seoul, 150-763, Korea Tel: +82-2-784-6027 Fax: +82-2-767-3677

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VDC

# 7F, Jinbao Bldg. No. 89 Jinbao St.

China

Epson Singapore Pte., Ltd. 1 HarbourFront Place #03-02 HarbourFront Tower One Singapore 098633 Tel: +65-6586-5500 Fax: +65-6271-3182