S1D13521 EPD Controller

April 2008

EPSON's S1D13521 controller provides a high performance, low cost, solution for current and future E Ink EPDs (Electronic Paper Displays). The controller greatly reduces CPU overhead by providing many functions that were previously handled by the Host.
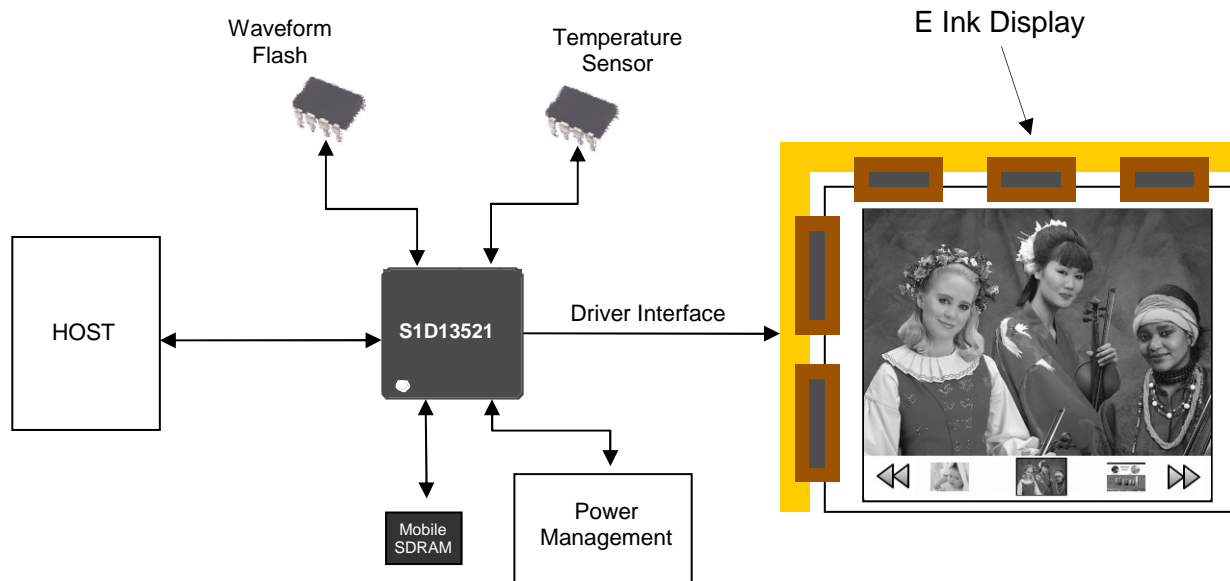
S1D13521 allows multi-regional and concurrent display updates resulting in highly responsive screen changes. This increased responsiveness finally makes touch pen support and on-screen user interfaces viable, opening up a range of new applications.

Additionally, the S1D13521 integrates support for current and future power management chips, as well as future 16 and 32 gray level waveforms. All this is achieved with a lower parts cost than previous EPD controllers making the S1D13521 a perfect choice for new designs and design upgrades.

■ Features

- High speed screen updates (2048x1536 at 50Hz+)
- Smooth screen updates
- Multi-Regional updates for smooth drawing
- Rotation support for the Image Buffer
- Low Host overhead
- 16-bit Indirect Host Support
- I^2C Thermal Sensor provides temperature support for automatic temperature compensation.

- Serial Flash Memory Waveform Read Support
- External Memory Support for 16/32-bit SDRAM
- Internal Programmable PLL
- Single MHz Clock Input
- Power Management IC Support
- Software Power Save Mode
- General Purpose IO Pins available
- Package: PFBGA 180 pin (0.5 or 0.8mm ball pitch)

■ System Block Diagram

■ Description

Display Support
- Up to 2048x1536 @ 50Hz
- Up to 4096x4096 @ less than 50Hz
- Up to 5-bit grayscale waveforms
- New image data can be loaded to the image buffer while display updates are in progress
- Hardware support for pop-up windows
- Source Driver interfaces to the Micronix MX860 IC or compatible
- Gate Driver Interface for Sharp LH1692 or compatible
- Multi-panel Support
- Panel Border Support

16-Bit Host Support
- Indirect 16-bit Bus Host
- Registers can be accessed using Command Mode
- DMA compatible memory bus style host interface

Power Management IC Support
- Supports 3-wire power management ICs (Dialog DA8590 or compatible)

Image Buffer Flexibility
- Host Writes can be rotated counter-clockwise by 90°, 180°, or 270°
- Host Write data input can use packed mode for high-speed transfers

Serial Flash Memory Waveform Read Support
- SPI Flash memory for Waveform Reads
- High Speed SPI Mode
- Waveform format: E Ink's waveform version 1 and version 2 (voltage controlled waveform)

I^{2}C Thermal Sensor Temperature Reading Support
- Supports I^{2}C sequence for temperature reading

External Memory Support
- 16/32-bit mobile SDRAM Interface
- Maximum operating frequency: 133MHz

Clock Source
- Internal Programmable PLL
- Single MHz clock input (CLKI/Crystal)

Miscellaneous
- Software Power Save Mode
- Low and ultra-low power modes
- General Purpose Input/Output pins are available (GPIO[1:0])
- Interrupt pin associated with selectable GPIO inputs
- Packages:
  - PFBGA 180-pin (12 x 12 x 1.2mm, 0.8mm pitch)
  - PFBGA 181-pin (8 x 8 x 1.2mm, 0.5mm pitch)
- Core Voltage: 1.8V
- IO Voltage: 1.8V ~ 3.3V (typical)

For technical and ordering information for the E Ink AM300 Broadsheet Prototype Kit, contact E Ink at www.eink.com/kits/.

For technical and ordering information for the S1D13521 EPD Controller, contact your EPSON sales representative.