S1D13732 MPEG Mobile Graphics Engine

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The S1D13732 is a Mobile Graphics Engine for the digital video revolution in mobile / wireless products. Providing support for YUV digital camera input as well as containing a JPEG Codec and MPEG4 Codec Assist, the S1D13732 is an ideal solution for cellular phone markets where multimedia messaging (MMS) is required.

MPEG4 functionality is realized by a combination of the MPEG4 Codec assist circuit and software on the Host processor, which achieves an optimized low cost and low power Motion Picture system. The S1D13732 conforms to both MPEG4 Visual Simple Profile Level 0 and H.263 Profile 0 Level 10. EPSON will provide software libraries.

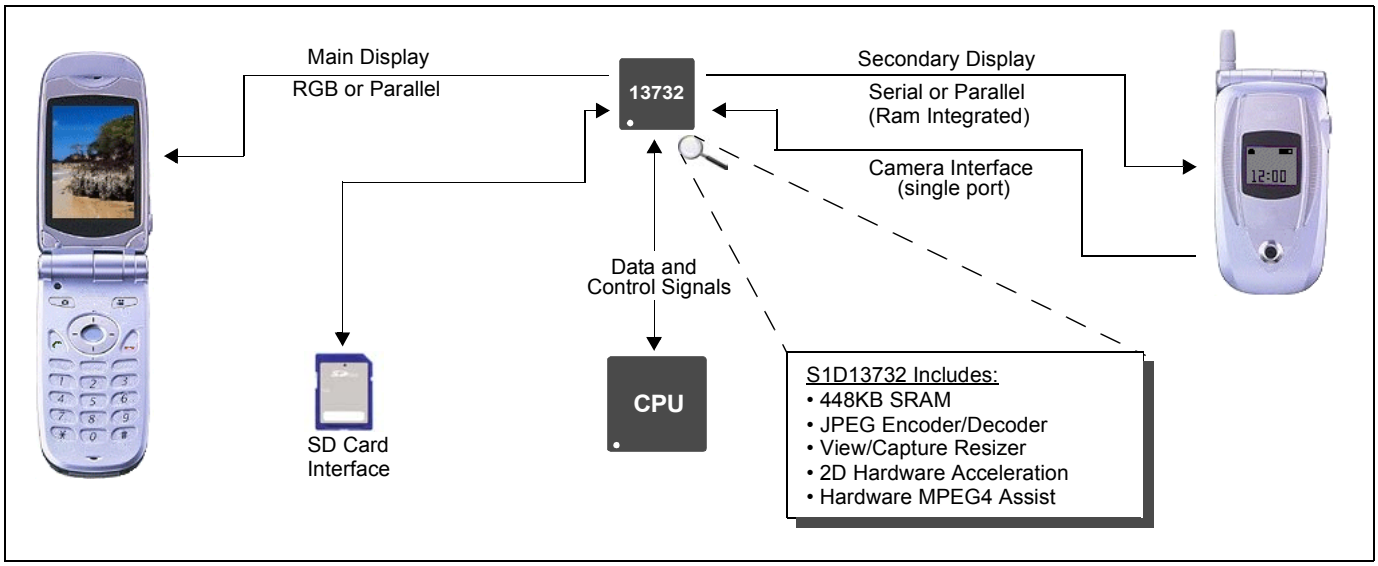
The S1D13732 contains 448K bytes of embedded SRAM which is used as the image and video buffer. Additionally, products requiring a rotated display can take advantage of the SwivelView™ feature which provides hardware rotation of the display memory transparent to the software application. The S1D13732 also provides support for "Picture-in-Picture Plus" (a variable size window with overlay functions). Higher performance is provided by the Hardware Acceleration Engine which provides 2D BitBLT functions.

The S1D13732 provides impressive support for cellular and other mobile solutions requiring Digital Video support. However, its impartiality to CPU type or operating system makes it an ideal display solution for a wide variety of applications.

FEATURES

- Embedded 448K byte SRAM Display Buffer
- Low Operating Voltage
- Direct and Indirect CPU interfaces
- Programmable resolutions and color depths
- Support for 2 panels (LCD2 must be RAM integrated)
- Support for RGB, Serial and Parallel interface panels
- SD Memory Card interface
- Single port Camera interface with resize function
- Internal PLL or digital clock input
- YUV to RGB and RGB to YUV converters
- Hardware JPEG encoder/decoder
- Hardware MPEG4 Codec Assist
  - MPEG4 Visual Simple Profile Level 0
  - H.263 Profile 0 Level 10
- Overlay features
- 2D Hardware Acceleration Engine
- 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"
- Software initiated Power Save Mode

SYSTEM BLOCK DIAGRAM



■ DESCRIPTION

Integrated Display Buffer

- 448K bytes of embedded SRAM
- Addressable as a single linear address space

CPU Interface

- 16-bit Generic Asynchronous CPU interface
- Direct and Indirect addressing
- Fixed cycle access available (Indirect addressing only)

Panel Support

- Supports up to 2 LCD panels
  - LCD1: 9/12/18-bit RGB panel
    LCD2: 8/9/16/18-bit Serial Ram Integrated panel
  - LCD1: 9/12/18-bit RGB panel
    LCD2: 8/16/18-bit Parallel Ram Integrated panel
  - LCD1: 8/16/18-bit Parallel Ram Integrated panel
    LCD2: 8/9/16/18-bit Serial Ram Integrated panel
  - LCD1: 8/16/18-bit Parallel Ram Integrated panel
    LCD2: 8/16/18-bit Parallel Ram Integrated panel
- CPU can directly control LCD2 using Bypass Mode
- TFT, ND-TFD

Miscellaneous

- SD Memory Card Interface
- Software initiated power save mode
- Multiple General Purpose IO pins
- $CORE_{VDD}$ 1.5 volts and IO_{VDD} 1.85 or 2.85 volts
- 160-pin FCBGA package

Acceleration

- 2D BitBLT Engine
- SwivelView: 90°, 180°, 270° hardware rotation of displayed image

Display Features

- 8/16/18 bit-per-pixel (bpp) Display Mode support
- 18-bit LUT (can be used for 8 bpp)
- Picture-in-Picture Plus: displays a variable size window overlaid over the background image
- Overlay Functions (including JPEG encode of camera image combined with Overlay)
- Pixel Doubling: doubles the effective resolution
- Fractional Zoom
- Mirror / Video Invert capabilities

Digital Video

- Single port Camera Interface (YUV 4:2:2)(ITU-R-BT656)
  - View and Capture hardware resizer with trimming and reduction functions
  - YUV to RGB converter
  - YUV Capture (YUV 4:2:2, YUV 4:2:0)
  - Camera input can be Double Buffered
- Hardware JPEG Encoder / Decoder
  - 1280x1024 max size
  - Encoded camera image can be combined with display image
  - Decodes incoming Host image for LCD display
- Hardware MPEG4 Encode / Decode Codec Assist
  - MPEG4 Visual Simple Profile Level 0
  - H.263 Profile 0 Level 10
  - Up to QCIF @ 15fps
  - Hardware Motion Estimation/Compensation, DCT/iDCT, Quantization/InverseQ
  - VLC, Rate control performed by software

CONTACT YOUR SALES REPRESENTATIVE FOR THESE COMPREHENSIVE DESIGN TOOLS

- S1D13732 Technical Documentation
- S5U13732 Evaluation Boards
- CPU Independent Software Utilities
- Royalty Free source level driver code

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