S1D13746 series

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TV controller

■ Summary

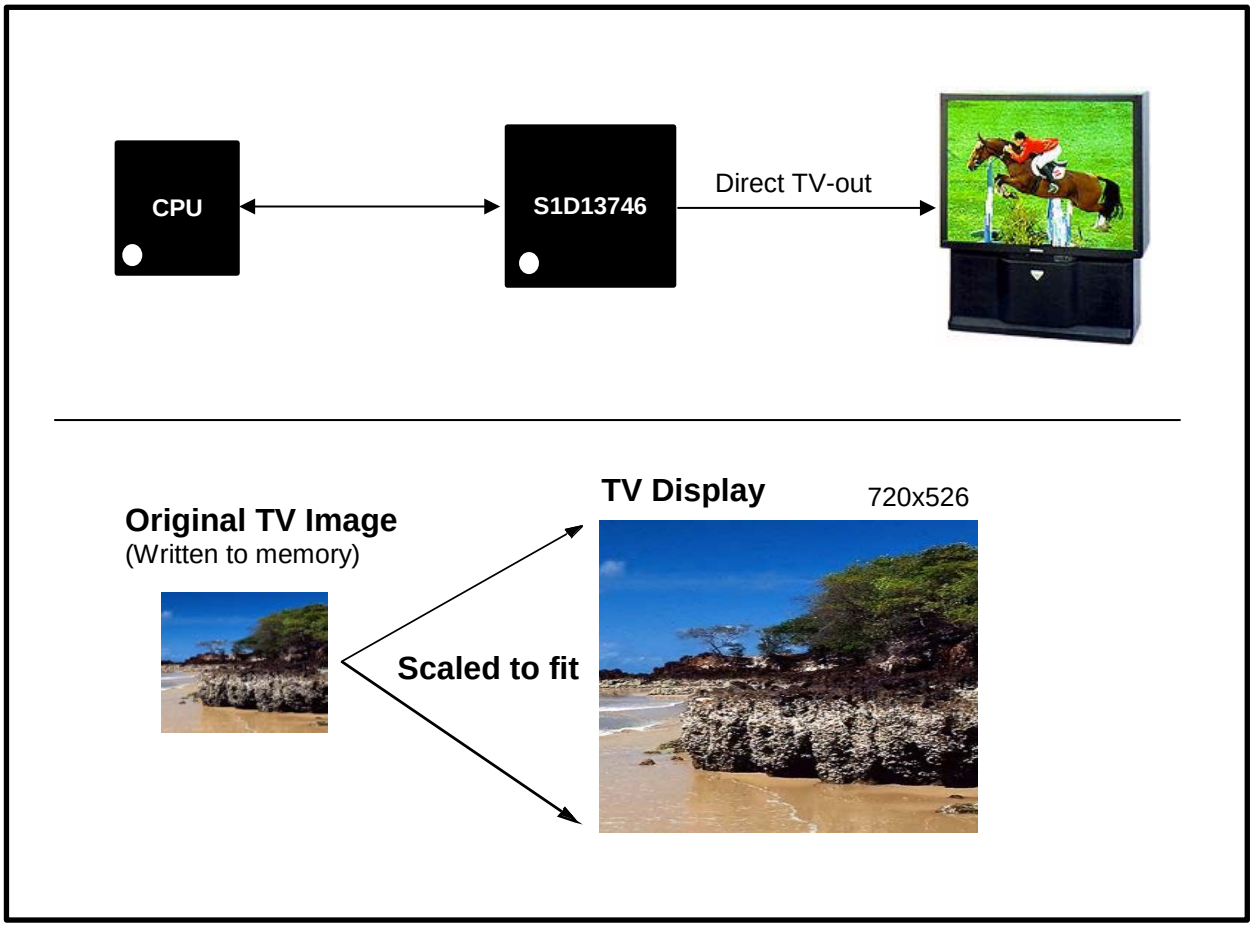
The S1D13746 is an extremely low cost, low pin-count device providing direct support for TV from a standard memory-mapped frame-buffer. Internal high quality scaling algorithms allow for low resolution input to be smoothly scaled to the full resolution as determined by either PAL or NTSC standards. The S1D13746 is the ideal solution for cellular phone markets where TV-output is a requirement.

The S1D13746 contains 312K bytes of embedded SRAM. Input data can be double-buffered, thereby acting as a frame rate converter and preventing any visual tearing during streaming input. The minimal feature set and high level of integration (embedded high output DAC) provides a low cost, low power, single chip solution to meet the demands of embedded markets requiring Digital Video, such as Mobile Communications devices.

■ Features

- Embedded 312K byte SRAM
- Double-buffered for streaming video
- Low Operating Voltage
- Serial / Parallel Host Interface
- Parallel RGB Interface
- Multiple Input Data formats
- High Output DAC
- Input Image Rotation (SwivelView™ 90/180/270°)
- Bi-Cubic Scalar from input to output
- PAL and NTSC output
- Automatic Border
- Auto-Centering
- Destructive Windows (Overlays) with transparency function
- Software Initiated Power Save Mode
- Internal PLL or Digital Clock Input

■ Block diagram



S1D13746 series

■ Description

Integrated Frame Buffer

- 312K byte SRAM

CPU Interface

- Parallel Indirect Interface (Intel 80)
- Serial Interface
  - 3-wire (9-bit)
  - 4-wire (8-bit SPI)
- **Parallel RGB Interface**

Input Formats

- RGB: 3:3:2, 5:6:5, 6:6:6, 8:8:8
- YUV: 4:2:0, 4:2:2
- All input formats are converted and stored as YUV 4:2:0
- Input image can be rotated (SwivelView 90/180/270°)

Input Scalar

- Bi-Cubic, 9-bit, non-integer based
- Arbitrary Horizontal / Vertical settings
- Automatic scaling based on input/output window settings

TV Output

- Composite PAL/NTSC output
- S-Video PAL/NTSC output
- Programmable Chrominance / Luminance Filters
- 3x3 Pixel filter
- Auto-Border / Auto-Center
- Wide-Screen Signaling Support (ETSI EN 300 294 compliant)
- Closed Caption Support (CEA-608-B)
- Test Pattern Generator
- Supports Destructive Windows (overlays) with transparency function

Miscellaneous

- Internal PLL or digital clock input
- Software initiated power save mode
- $CORE_{VDD}$ 1.5 Volts and IO_{VDD} 1.8 to 3.3 Volts
- Package: PFBGA 100-pin (7mm x 7mm)
  QFP15 128-pin (16mm x 16mm)

■Theory of operation

The S1D13746 contains its own frame-buffer memory where image data can be stored and displayed from. Input images larger than the memory size are automatically scaled down using a Bi-cubic method before being stored. All images can be stored using a double-buffered architecture to prevent any visual tearing and act as a rate converter. All stored images can be further scaled up/down for display on the TV. If the resulting scaled image does not fit the maximum resolution as defined by the TV standard, the image is auto-centered and bordered. The 3x3 pixel filter and programmable chrominance / luminance filters are provided to generate a high quality resulting image.
The S1D13746 supports Wide-Screen Signalling, Closed Captioning, includes a built-in Test Pattern Generator.

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Document code: 412984100
First issue April, 2015