SAA6714

SXGA Triple-input TFT-Display Controller

Features

Input Interfaces

- DVI 1.0 compliant TMDS input including high-bandwidth digital content protection (HDCP), 165 MHz
- Analog VGA input with clamp and automatic gain control, 160 MHz
- Parallel digital video input (YUV, ITU.R 656)
- Analog HDTV input (Y-Pb-Pb)
- Maximum resolution 1280x1024 pixels

Input Auto Detection

- Detection of presence and polarities of sync signals
- Measurement of horizontal and vertical update frequencies
- Statistical measurements to facilitate adjustment of sample clock frequency, vertical and horizontal sample offset and ADC parameters

Input Processing

- Fully programmable color matrix
- Phase-correct downscaling of any input data
- Tearing control and frame rate conversion
- De-interlacing with motion adaptive filtering
- Movie detection for optimal de-interlacing
- Dynamic noise reduction

Output Processing

- Upscaling with independent vertical/horizontal parameters
- Arbitrary upscaling ratio from 1 to 64
- Programmable polyphase filter supports variable characteristics from smoothing to sharpening
- Nonlinear scaling to map different screen aspect ratios (16:9 to 4:3), panorama scale, waterglass scale
- Vertical keystone correction for projection systems
- Picture-in-Picture display
- Color correction look-up table (256x10s bit, e.g. for gamma correction)
- Temporal dithering for 10-bit virtual precision on 8- and 6-bit displays

(Features continued on reverse)

Description

The Philips SAA6714 is a highly integrated, triple-input LCD controller IC. It inputs analog VGA, parallel YUV and DVI 1.0-compliant TMDS signals and performs all needed signal processing and measurement before output to an SXGA LCD panel.

The SAA6714 incorporates many high-performance features to enhance picture quality and optimize contrast. A programmable polyphase filter enables adjustment of various picture characteristics from smoothing to sharpening during upscaling. For video applications, the SAA6714 offers a dedicated, parallel YUV input and the user's choice of sophisticated de-interlacing modes: pure temporal, pure spatial or motion adaptive filtering. Additional picture improvement is achieved through dynamic noise reduction filtering (DNR).

Support for Picture-in-Picture (PIP) allows the SAA6714 to display a second video stream in a scalable window on top of the primary data source. For example, PIP can be used in TV applications to display a second video stream, such as news broadcast, on top of the working display area.

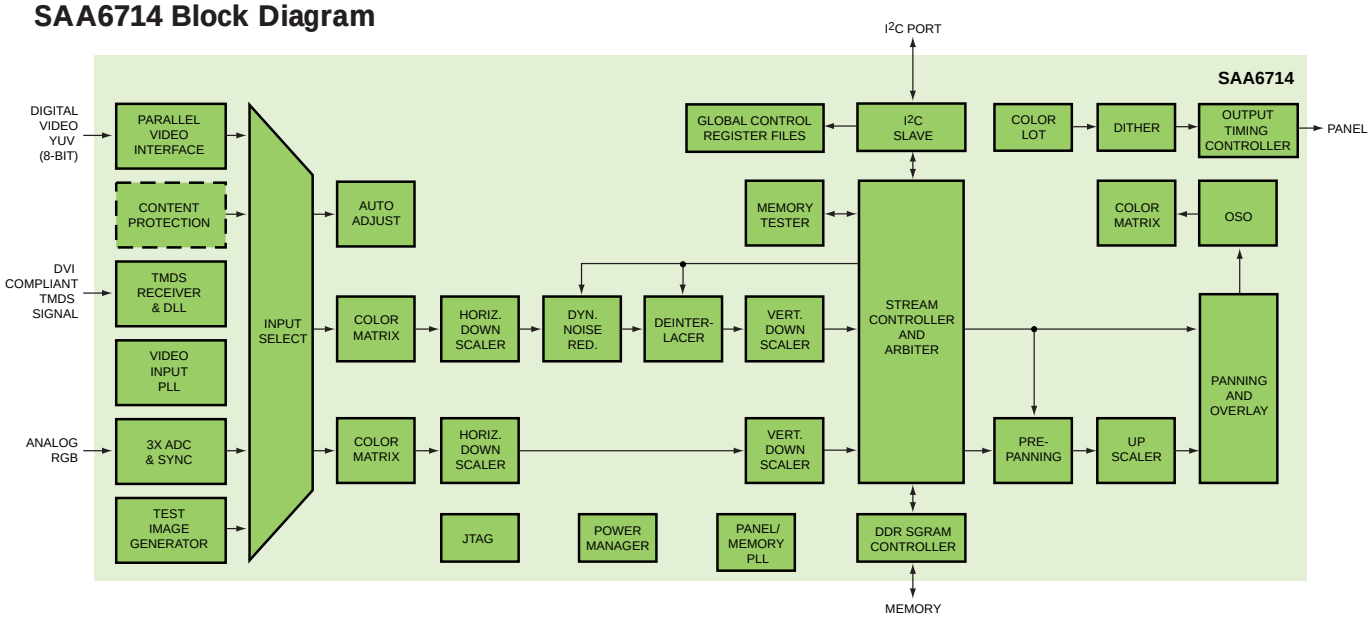
The SAA6714's sophisticated color management features include a fully programmable color matrix, 10-bit gamma correction and temporal dithering for 10 bits of virtual precision on 8- and 6-bit displays. For projector manufacturers, it also includes vertical keystone correction. Its integrated, feature-rich, onscreen display (OSD) functionality enables implementation of a smart and user-friendly graphical user interface. Both character-based OSD features—including predefined and programmable fonts—as well as a bitmapped graphical OSD are supported.

In addition to support for single or double pixel/clock digital RGB output, the SAA6714 can directly interface to the row and column drivers of virtually any manufacturer by integrating a programmable panel timing controller (TCON). The IC is controlled through I2C bus and comes in a BGA292 package.

SXGA Triple-input TFT Display Controller

SAA6714

SAA6714 Block Diagram



(Features continued)

On-screen Display (OSD)

- Programmable character-size from 8x8 to 32x32
- Predefined character ROM including 256 characters (icons, etc.)
- 144 built-in character size-independent generators for borders and sliders
- Built-in 4-kB memory for up to 512 additional user definable/downloadable characters of up to 4 colors
- Selectable true-color sets for characters and bitmapped OSD
- Four-kB bitmapped image RAM, 2 to 16 colors (e.g. for backdrop or company logo)
- Programmable Alpha blending for OSD window and image window
- Double-buffered cursor/pointer RAM (enables MS Windows®-like cursor) for animation
- Text attributes such as shadowing, blinking, inversion and foreground/background transparency

Output Interface

- Single (30-bit) or double (48-bit) pixel/clock digital RGB output
- Selectable 6-bit or 8-bit per color mode
- Generation of synchronization and validation signals for TFT displays
- Programmable output timing supporting displays of virtually any manufacturer
- Interfaces directly to row and column drivers
- Panel interface drive strength is programmable for EM1 reduction
- Maximum resolution 1280x1024 pixels

Memory Interface

- Frame rate conversion with single or double buffering
- 32-bit DDR SDRAM/SGRAM interface enabling up to 1.14 GB/s bandwidth
- Supports 1Mx32, 2Mx32 and 4Mx3 devices with DLL
- SSTL-2 input/output drivers
- Operation without external memory if frame rate conversion is abandoned

Philips Semiconductors

Philips Semiconductors is a worldwide company with over 100 sales offices in more than 50 countries. For a complete up-to-date list of our sales offices and distributor partners, please visit our website **www.semiconductors.philips.com** or contact any of the following sales offices by phone or mail:

North America
Philips Semiconductors
811 E. Arques Avenue
Sunnyvale, CA 94088
United States

Tel: +1 800 234 7381
Fax: +1 800 943 0087

Europe, Africa, Middle East and South America
Philips Semiconductors International
Fulfillment and Sales Support Center
P.O. Box 366
2700 AJ Zoetermeer
The Netherlands

Fax: +31 79 3685126

Asia
Philips Semiconductors Asia Pacific
Market Response Management Center
P.O. Box 68115
Kowloon East Post Office
Hong Kong

Fax: +852 2756 8271

Japan/Korea
Philips Semiconductors
Philips Building 13-37
Kohnan 2-chome
Minato-ku,
Tokyo 108-8507

Tel: +81 3 3740 5130
Fax: +81 3 3740 5057

Printed in the USA 301678/5K/FP/2pp/0501 9397-750-08309