SENSORAY CO., INC.

PCI JPEG Frame Grabber

Model 615 (Rev.B)

January 2002

SENSORAY

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Limited warranty

Sensoray Company, Incorporated (Sensoray) warrants the hardware to be free from defects in material and workmanship and perform to applicable published Sensoray specifications for two years from the date of shipment to purchaser. Sensoray will, at its option, repair or replace equipment that proves to be defective during the warranty period. This warranty includes parts and labor.

The warranty provided herein does not cover equipment subjected to abuse, misuse, accident, alteration, neglect, or unauthorized repair or installation. Sensoray shall have the right of final determination as to the existence and cause of defect.

As for items repaired or replaced under warranty, the warranty shall continue in effect for the remainder of the original warranty period, or for ninety days following date of shipment by Sensoray of the repaired or replaced part, whichever period is longer.

A Return Material Authorization (RMA) number must be obtained from the factory and clearly marked on the outside of the package before any equipment will be accepted for warranty work. Sensoray will pay the shipping costs of returning to the owner parts that are covered by warranty. A restocking charge of 25% of the product purchase price, or $105, whichever is less, will be charged for returning a product to stock.

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Special handling instructions

The circuit board contains CMOS circuitry that is sensitive to Electrostatic Discharge (ESD). Special care should be taken in handling, transporting, and installing circuit board to prevent ESD damage to the board. In particular:

- Do not remove the circuit board from its protective anti-static bag until you are ready to install the board into the enclosure.
- Handle the circuit board only at grounded, ESD protected stations.
- Remove power from the equipment before installing or removing the circuit board.

Introduction

Model 615 allows simultaneous capture of full resolution JPEG compressed images and scaled down uncompressed bitmaps from up to 16 asynchronous standard video sources at a combined frame rate of 30 frames per second for NTSC, or 25 frames per second for PAL/SECAM. The bitmaps may be used for visual monitoring, or motion detection. An optional text caption (64 characters), modified on a frame-to-frame basis, may be overlayed on the compressed image.
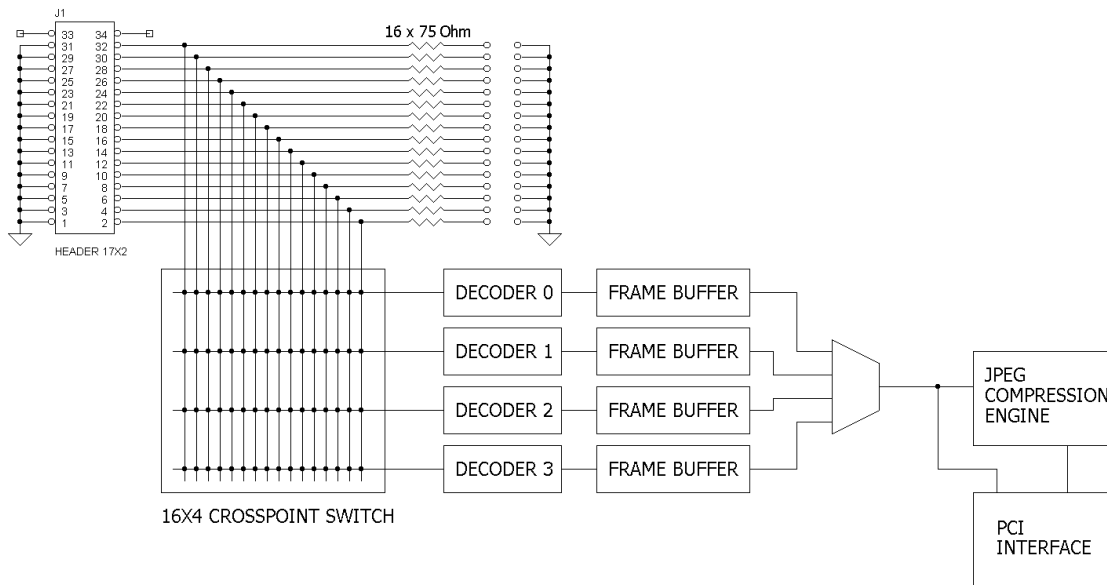
As could be seen from the block diagram, model 615 implements a 16x4 crosspoint video switch and 4 separate video capture channels (decoders) with individual frame buffers. This allows cycling through all 16 input channels at a full capture rate.

Operation

The JPEG compression engine works at a frame rate of 30 frames per second (NTSC), or 25 frames per second (PAL, SECAM). At the start of every frame the board generates an interrupt. There is a very narrow time window (less than 2 milliseconds) during which the driver has to prepare the board for the next compression pass: the crosspoint switch has to be switched, an input channel has to be selected, and the caption text and settings have to be uploaded. As long as under Windows operating systems the communication between the driver and the application cannot be ensured within this time constraint, the approach of the command queue is implemented in the software. The commands are placed into the queue by the application, and retrieved from it by the driver, as necessary. The command specifies the decoder channel to capture from, caption text and parameters, the input channel to switch the selected decoder to after the capture is complete, and some other parameters. If a command is not present in the queue by the time the interrupt occurs, the next frame is skipped.

Once a video input is connected through the crosspoint switch to a decoder input, it takes up to 3 frames for the decoder to synchronize (lock) to the video. This is an important consideration when selecting a channel-polling algorithm. After a new input channel is connected to a decoder through the crosspoint switch, there has to be at least a 3-frame delay before the image could be captured from this decoder. However, the other decoders may be synchronized and available for capture.

The following algorithm is recommended when cycling through all 16 video inputs (it is assumed that initially decoder 0 is connected to input 1, decoder 1 – to input 2, decoder 2 – to input 3, decoder 3 to input 4):

1. Capture from decoder 0 (input 1), switch decoder 0 to input 5;
2. Capture from decoder 1 (input 2), switch decoder 1 to input 6;
3. Capture from decoder 2 (input 3), switch decoder 2 to input 7;
4. Capture from decoder 3 (input 4), switch decoder 3 to input 8;
5. Capture from decoder 0 (input 5), switch decoder 0 to input 9;
6. Capture from decoder 1 (input 6), switch decoder 1 to input 10;
7. Capture from decoder 2 (input 7), switch decoder 2 to input 11;
8. Capture from decoder 3 (input 8), switch decoder 3 to input 12;
9. Capture from decoder 0 (input 9), switch decoder 0 to input 13;
10. Capture from decoder 1 (input 10), switch decoder 1 to input 14;
11. Capture from decoder 2 (input 11), switch decoder 2 to input 15;
12. Capture from decoder 3 (input 12), switch decoder 3 to input 16;
13. Capture from decoder 0 (input 13), switch decoder 0 to input 1;
14. Capture from decoder 1 (input 14), switch decoder 1 to input 2;
15. Capture from decoder 2 (input 15), switch decoder 2 to input 3;
16. Capture from decoder 3 (input 16), switch decoder 3 to input 4;

Other algorithms may be implemented, provided the above-mentioned condition (3 frame delay after input switching) is satisfied. Please refer to the Software Reference for the implementation details.

Various features (operation modes) are selected in software by means of a call to S615_SetMode function or by setting corresponding fields in the COMMAND structure. Those controlled by S615_SetMode function cannot be changed on a frame-to-frame basis. Those controlled by COMMAND structure can be changed on a frame-to-frame basis.

JPEG capture

JPEG capture can be enabled/disabled on a frame-to-frame basis. If enabled, the memory image of a compressed frame is returned in the BUFFER structure. Saving to a file is done on the application level.

The following options are available for JPEG capture:

▪ JPEG size: controls the size of compressed image. For NTSC video signal the following options are available: 704x480, 640x480, 352x240, 320x240. For PAL(SECAM) the following options are available: 704x576, 352x288. Note: the 640 and 320 horizontal sizes for NTSC are clipped versions of 704 and 352 images, respectively.

▪ compression factor: controls compression level. The higher compression factor values yield higher compression (smaller file size).

All JPEG capture options cannot be changed on a frame-to-frame basis.

Bitmap capture

Bitmap data is returned in the BUFFER structure. The following options are available:

- bitmap flip: controls the order of lines - "natural" order (top line first), or Windows order (bottom line first);

- bitmap color format: monochrome (1 byte/pixel), RGB (3 bytes/pixel), YCrCb (2 bytes/pixel);

- bitmap size: large (256x192), small (128x96).

All bitmap capture options cannot be changed on a frame-to-frame basis.

Text caption

Text caption data is set up in the COMMAND structure. Caption size is 64 characters. Caption can be turned on or off on a frame-to-frame basis. The following options are available:

- caption window format: 8x8, 16x4, or 32x2 characters. Cannot be changed on a frame-to-frame basis.

- caption window position: one of the 4 corners of the image. Cannot be changed on a frame-to-frame basis.

- caption font size: small (8x16 pixels), large (16x32 pixels). Cannot be changed on a frame-to-frame basis.

- caption characters color: one of 8 predefined colors (see Software Reference for details). Can be changed on a frame-to-frame basis.

Text caption is transparent (i.e. only the characters overlay the image). The caption is overlayed on the JPEG image only. As long as the caption is overlayed before the compression, usual quality degradation resulting from compression affects the caption.

System Requirements

A Pentium III CPU with 128MB of RAM is recommended. When using multiple boards in the system, hard drive access speed may become an issue. Fast hard drive (UDMA/66 or faster) is recommended.

Specifications

Video sources	NTSC, PAL, SECAM, RS-170, CCIR
Video inputs	16 analog composite video, 75 Ohm termination (may be disabled by removing jumpers)
Output formats: ▪ uncompressed ▪ compressed	Y8 (8 bits/pixel), YCrCb (16 bits/pixel), RGB (24 bits/pixel) baseline JPEG
Output resolution (max), pixels	704x480 (NTSC, RS-170) 704x576 (PAL, SECAM, CCIR)
A/D resolution: luminance channel chrominance channel	 8 bit 8 bit
Capture rate[1]	Real time: 30 fps (NTSC, RS-170) 25 fps (PAL, SECAM, CCIR)
Bus requirements	PCI, 33 MHz, 32-bit, 5 V; 3.3V power source required[2]
Power consumption	4 W
Operating temperature	0°C to 70°C

Notes:

1. The numbers for the capture rate refer to the case when 2 model 615 boards are running in the system without any other applications. The actual capture rate may be lower in case other Windows applications are using the system resources required for model 615 operation (PCI bus, hard drive).

2. A special revision of model 615 is available for systems without a 3.3V power supply. Please contact Sensoray for details.

Connectors and Jumpers

Input video connector, J1

Pin	Signal	Pin	Signal
1	Ground	2	Input 1
3	Ground	4	Input 2
5	Ground	6	Input 3
7	Ground	8	Input 4
9	Ground	10	Input 5
11	Ground	12	Input 6
13	Ground	14	Input 7
15	Ground	16	Input 8
17	Ground	18	Input 9
19	Ground	20	Input 10
21	Ground	22	Input 11
23	Ground	24	Input 12
25	Ground	26	Input 13
27	Ground	28	Input 14
29	Ground	30	Input 15
31	Ground	32	Input 16
33	-	34	-

Termination jumpers (JP2-JP17)

Jumpers JP2-JP17, when removed, disconnect 75 Ohm termination resistors from video inputs 1-16, respectively. The board is shipped with jumpers installed.

Bracket ground jumper (JP1)

Jumper JP1, when removed, disconnects the bracket from the video signal ground. The board is shipped with the jumper installed.