SENSORAY CO., INC.

PCI MPEG
Video/Audio
Capture Device with
Multi-window
Caption/Overlay

Model 614 (Rev.B)

October 20, 2008

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 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 614 is a PCI version of MPEG video and/or audio capture device. It captures video and/or audio from a standard NTSC/PAL analog video source optional with stereo or monochrome audio source into one of following compressed MPEG streams: MPEG1, MPEG2, MPEG4, H.263, or MJPEG. It also supports capturing raw frames from NTSC/PAL video source.

The capturing frame rate is up to 30 fps for NTSC and 25 fps for PAL. Capturing resolution could be chosen from followings: D1.N (NTSC), D1.P (PAL), VGA, QVGA, QQVGA, SIF, 2SIF, 4SIF, CIF, QCIF, SQCIF, 4CIF.

Captured MPEG-1/2/4/MJPEG video can be annotated with up to 8 windows/fields of caption overlay. Hardware-wise, it's implemented between raw capturing and MPEG/MJPEG compression, on bitmap block base. Therefore, both text characters (for text caption overlay) and bitmap-blocks (for image overlay) could be supported. Up to 64 characters or bitmap-blocks can be filled into one window/field. There are four scales available for being chosen for each window/field to size the overlay. The caption overlay can be chosen in transparent or non-transparent.

A single +5V power supply through PCI bus is required to power the board.

Feature Summary

- PCI MPEG Video/Audio Capturing, optionally with multi-window caption/overlay

- Raw frame grabbing or previewing feature support

- Video input: 4 multiplexed input channels (2 S-Video or 4 Composite)

- Audio input: 1 pair of stereo or 1 mono

- Resolution (Max):   Full-D1:
  - NTSC: 720 x 480 @ 30 fps or 720 x 240 @ 60 fps
  - PAL: 720 x 576 @ 25 fps or 720 x 288 @ 50 fps

- Other supported video Resolution:

D1.N:	720 x 480	D1.P:	720 x 576	D.5:	480 x 352
SIF:	352 x 240	2SIF:	704 x 240	4SIF:	704 x 480
VGA:	640 x 480	QVGA:	320 x 240	QQVGA:	160 x 112
CIF:	352 x 288	QCIF:	176 x 144	SQCIF:	128 x 96
4CIF:	704 x 576				

- Video encoding formats:
  - MPEG-4 SP@L3, plus B-frame support, progressive and interlace, Microsoft, DivX, Sigma Design compatible
  - MPEG-2 MP@ML, progressive and interlace
  - MPEG-1
  - H.263
  - MJPEG (Motion JPEG)

- Bit-rate control: CBR/VBR, 1Kbps to 10 Mbps

- Caption/Overlay feature:

  Up to 8 windows or fields;

  Up to 64 characters or bitmap blocks per window/field;

  8 x 16 pixels per bitmap block or character font;

  Scale: x1 (1:1), x2 (2:1), x2v (2:1, vertically), and x4 (4:1), per window/field;

  Color: white, black, red, blue, green, yellow, magmata, and cyan, on character or bitmap-block base;

  Caption/overlay mode: transparent or non-transparent, on character or bitmap-block base.

- OSD (On-Screen Display): 96 characters, 16x16 pixel font, multi-window supported.

- Motion detection support

- Signal loss detection support

- 2 digital input and 1 digital output: TTL signals

- Driver and SDK for Windows and Linux

Reference

Board Picture and Connector Layout
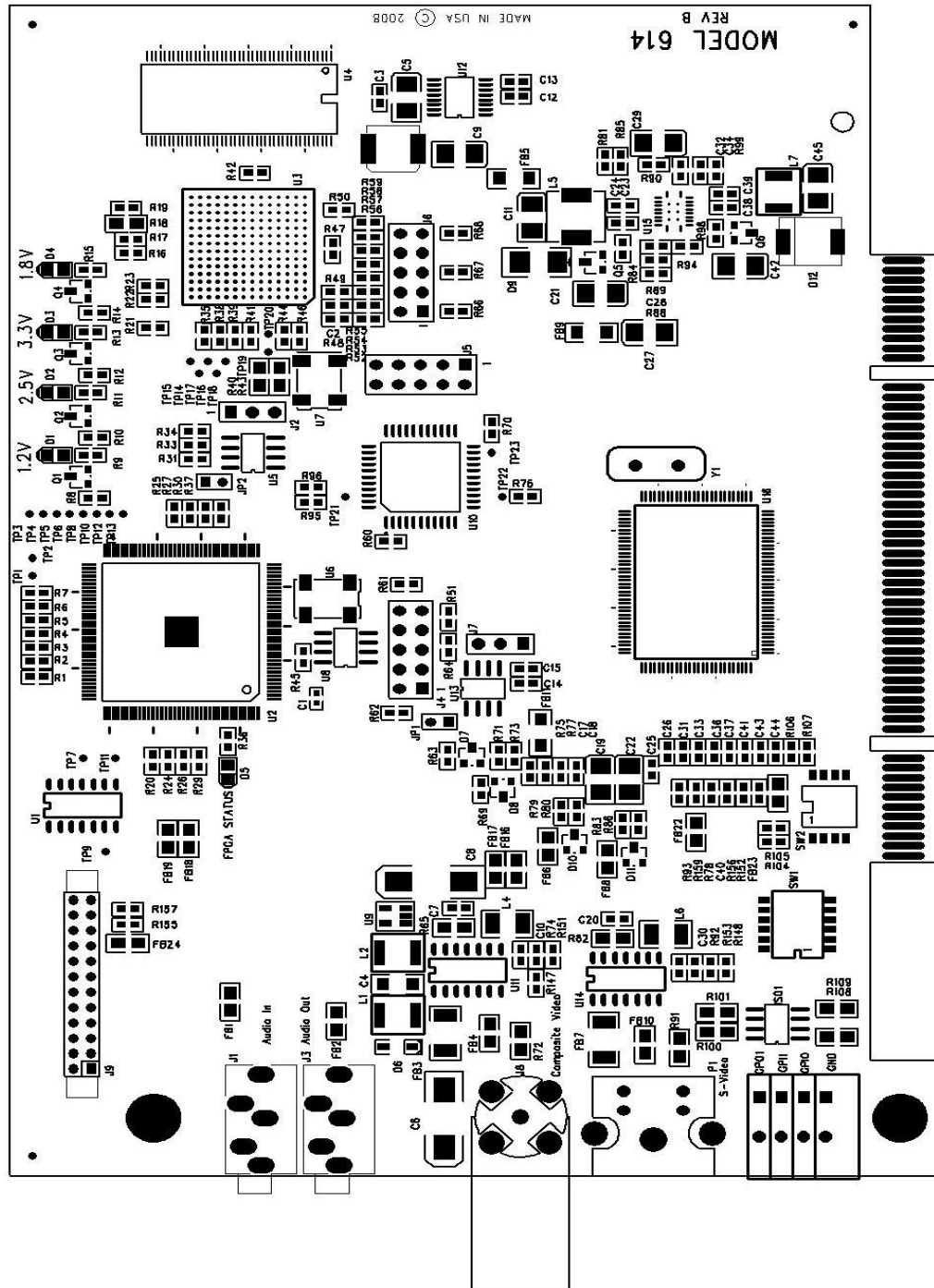
Connectors

PCI Bus Connector:

Pin – Side A	Signal	Pin – Side A	Signal
B1	-12V*	A1	TRST#
B2	TCK	A2	+12V*
B3	Ground	A3	TMS
B4	TDO	A4	TDI
B5	+5V	A5	+5V
B6	+5V	A6	INTA#
B7	INTB#	A7	INTC#
B8	INTD#	A8	+5V
B9	PRSNT1#	A9	Reserved*
B10	Reserved*	A10	+3.3V(I/O)*
B11	PRSNT2#	A11	Reserved*
B12	(C-Key)	A12	(C-Key)
B13	(C-Key)	A13	(C-Key)
B14	Reserved*	A14	+3.3Vaux*
B15	Ground	A15	RST#
B16	CLK	A16	+3.3V(I/O)*
B17	Ground	A17	GNT#
B18	REQ#	A18	Ground
B19	+3.3V(I/O)*	A19	PME#*
B20	AD31	A20	AD30
B21	AD29	A21	+3.3V
B22	Ground	A22	AD28
B23	AD27	A23	AD26
B24	AD25	A24	Ground
B25	+3.3V	A25	AD24
B26	C/BE3#	A26	IDSEL
B27	AD23	A27	+3.3V
B28	Ground	A28	AD22
B29	AD21	A29	AD20
B30	AD19	A30	Ground
B31	+3.3V	A31	AD18
B32	AD17	A32	AD16
B33	C/BE2#	A33	+3.3V
B34	Ground	A34	FRAME#
B35	IRDY#	A35	Ground
B36	+3.3V	A36	TRDY#
B37	DEVSEL#	A37	Ground
B38	Ground	A38	STOP#
B39	LOCK#*	A39	+3.3V
B40	PERR#	A40	Reserved*
B41	+3.3V	A41	Reserved*
B42	SERR#	A42	Ground
B43	+3.3V	A43	PAR

B44	C/BE1#	A44	AD15
B45	AD14	A45	+3.3V
B46	Ground	A46	AD13
B47	AD12	A47	AD11
B48	AD10	A48	Ground
B49	Ground	A49	AD09
B50	Ground*	A50	Ground*
B51	Ground*	A51	Ground*
B52	AD08	A52	C/BE0#
B53	AD07	A53	+3.3V
B54	+3.3V	A54	AD06
B55	AD05	A55	AD04
B56	AD03	A56	Ground
B57	Ground	A57	AD02
B58	AD01	A58	AD00
B59	+3.3V(I/O)*	A59	+3.3V(I/O)*
B60	ACK64#*	A60	REQ64#*
B61	+5V	A61	+5V
B62	+5V	A62	+5V

Note:

*   Not connected.

C-Key   Connector Key

Full A/V (Video and Audio) in and out Connector, J9:

Pin	Signal	Pin	Signal
1	Digital I/O 1	2	+5V
3	Digital I/O 0	4	Digital ground
5	Audio Ground	6	Audio in – R
7	Audio in – L	8	Audio out – R
9	Audio out – L	10	Audio Ground
11	Composite video out 3 / S-Video 1 - C	12	Video Ground
13	Composite video out 2 (for loopback)	14	Video Ground
15	Composite video out 1 / S-Video 1 - Y	16	Video Ground
17	Composite video in 4 / S-Video 2 - C	18	Video Ground
19	Composite video in 3 / S-Video 1 - C	20	Video Ground
21	Composite video in 2 / S-Video 2 - Y	22	Video Ground
23	Composite video in 1 / S-Video 1 - Y	24	Video Ground

S-Video Input Connector, P1:

Pin	Signal	Pin	Signal
1	S-Video in – C	3	Analog ground
2	S-Video in – Y	4	Analog ground

Composite Video Input Connector, BNC, J8:

Pin	Signal	Pin	Signal
Inner	Composite Video Signal	Outer/Ring	Shield, Analog ground

Stereo Audio Input Connector, TRS StereoJack, J1:

Pin	Signal	Pin	Signal	Pin	Signal
Tip	Stereo Line-in Left	Ring	Stereo Line-in Right	Sleeve	Analog ground

Stereo Audio Output Connector, TRS StereoJack, J3:

Pin	Signal	Pin	Signal	Pin	Signal
Tip	Stereo Line-in Left	Ring	Stereo Line-in Right	Sleeve	Analog ground

Digital I/O Connectors, TB1~4:

TB	Signal
1	GPO1 – Digital Output 0
2	GPI1 – Digital Input 1
3	GPI0 – Digital Inpuit 0
4	Digital ground

LED

Power-OK indicator, D1~4:

The LED D1, D2, D3, and D4 are used for indicating on-board Power-OK status.

LED	Signal
D1	1.2V Power-OK Status
D2	2.5V Power-OK Status
D3	3.3V Power-OK Status
D4	1.8V Power-OK Status

Configuration DIP Switches

Interrupt Routing Select DIP switch, SW2:

The DIP switch, SW1, is used for selecting PCI interrupt routing for the Model 614.

Refer to the following tables to choose a right/preferred PCI interrupt routing for Model 614:

SW2-1	SW2-2	SW2-3	SW2-4	Interrupt used
ON (down)	OFF (up)	OFF (up)	OFF (up)	INTA#
OFF (up)	ON (down)	OFF (up)	OFF (up)	INTB#
OFF (up)	OFF (up)	ON (down)	OFF (up)	INTC#
OFF (up)	OFF (up)	OFF (up)	ON (down)	INTD#
All other combinations				Not valid

PCI JTAG Enabling DIP switch, SW1:   Optional

The DIP switch, SW1, is used for connecting PCI JTAG signals to the SAA7135HL JTAG port.

DIP	Signal
SW1-1	TRST#
SW1-2	TMS
SW1-3	TCK
SW1-4	TDO
SW1-5	TDI

Device Driver and SDK

Device driver and SDK including driver API & demo application programs are available for both Windows and Linux.

Windows

Sensoray Co. provides 314 WDM driver and DirectX filter for Windows platform. The SDK is packaged in a S614-Win-SDK.

Linux

Linux SDK package, s614-lnx-sdk, provides device drive, A/V capturing & streaming service library, and A/V capturing & streaming (over-IP) demos, for Linux platform. Currently, kernel version 2.6.9 and above are supported.

To demonstrate the application, two server demos are enclosed in Linux SDK, s614-lnx-sdk:

The server cap-server is mainly used for demonstrating how to capture video and/or audio streams from 314 and save them into files (in a variety of supported formats including MPEG1, MPEG2, MPEG4 (.avi or .divx), H.263, MJPEG (.avi), and even VOB, SVCD/VCD for A/V, and WAV/MP2 for audio only).

The server str-server is used for demonstrating how to stream the live A/V over IP. Also, a variety of supported formats listed above is supported.

Specifications

Video Source Formats	NTSC and PAL
Video Inputs	4 multiplexed input channels: 4 Composite or 2 S-Video, 75 Ohms
Audio Input	Stereo or mono Line-in from connector or 3.5mm TRS StereoJack Signal level: +/- 1.0V
Video Encoding formats	MPEG1, MPEG2 (MP@ML), MPEG4 (SP@L3 + B-frame support), H.263, and MJPEG (Motion JPEG)
Resolution	Up to Full-D1: 　NTSC: 720x480　　PAL:　720x576 Supported: 　D1.N: 720x480　D1.P: 720x576　D.5: 480x352 　SIF: 352x240　2SIF: 704x240　4SIF: 704x480 　VGA: 640x480　QVGA: 320x240　QQVGA: 160x112 　CIF: 352x288　QCIF: 176x144　SQCIF: 128x96 　4CIF: 704x576
Capture rate	Up to: 30 frames/sec for NTSC/RS-170/CCIR 　　　　25 frames/sec for PAL/SECAM
Bit-rate	CBR/VBR, 1 Kbps to 10 Mbps
Caption/Overlay	Up to 8 windows or fields; Up to 64 characters or bitmap-blocks per window/field; 8 x 16 pixels per bitmap block or character font; Scale: x1, x2, x2 (vertically), x4; Color: white, black, red, blue, green, yellow, magmata, cyan Caption/overlay mode: transparent or non-transparent
OSD (On-Screen Display)	96 characters, 16x16 pixel font, multi-window supported
Video Outputs	3 channels (only for direct loopback monitoring/testing purpose)
Audio Output	Stereo or monochrome Line-out to connector or 3.5mm TRS StereoJack Signal level: +/- 1.0V (only for loopback monitoring/testing purpose)
Digital I/O	2 inputs + 1 output, TTL signals
Bus	PCI 2.2, 33 MHz, 32-bit
Power	+5V, 600mA
OS Platform	Windows and Linux
Temperature	0 – 70 C

Appendix A: Tested 614 Features

<u>Tested 314 Features:</u>

	MPEG1	MPEG2	MPEG4 (DixX)	MPEG4	H.263	MJPEG	MP2	WAV	VOB	SVCD/VCD
Capturing AV to file	V	V	V	V	TBT	V	V	V	V	V
Streaming over IP	V	V	V	V	V	V				
OSD	V	V	V	V	TBT	V	N/A	N/A	TBT	TBT
OTF Change FPS	V	V	TBT	V	TBT	TBT	N/A	N/A		
Change Bit-rate	V	TBT	TBT	V	TBT	V			TBT	TBT
Brightness&Contrast Ajustment	V	V	S	V	S	S	N/A	N/A	S	S
Hue&Saturation Ajustment	V	V	S	V	S	S	N/A	N/A	S	S
Change Resolution	V	V	S	V	V	V	N/A	N/A	S	S

(including:

		MPEG1	MPEG2	MPEG4 (DixX)	MPEG4	H.263	MJPEG	MP2	WAV		
D1.N :	720 X 480	V	V	V	V	X	V	N/A	N/A		
D1.P :	720 X 576	TBT	TBT	TBT	TBT	X	TBT	N/A	N/A		
D.5 :	480 X 352	V	V	S	V	X	V	N/A	N/A		
SIF :	352 X 240	V	V	S	V	X	V	N/A	N/A		
2SIF :	704 X 240	V	V	S	V	X	V	N/A	N/A		
4SIF :	704 X 480	V	V	S	V	X	V	N/A	N/A		
CIF :	352 X 288	V	V	S	V	V	V	N/A	N/A		
QCIF :	176 X 144	V	V	S	V	V	V	N/A	N/A		
SQCIF :	128 X 96	V	V	S	V	X	V	N/A	N/A		
4CIF :	704 X 576	V	V	S	V	X	V	N/A	N/A		
VGA :	640 X 480	V	V	S	V	X	V	N/A	N/A		
QVGA :	320 X 240	V	V	S	V	X	V	N/A	N/A		
QQVGA :	160 X 112	V	V	S	V	X	V	N/A	N/A		)

Appendix B: Player Compatibility and Interoperability

<u>Player Compatibility:</u> for captured video & audio playback

		MPEG1	MPEG2	MPEG4 (DixX)	MPEG4	H.263	MJPEG	MP2	WAV	VOB	SVCD/VCD
Mplayer	(Liunx)	V	V	V	V	TBT	V	V	V	V	V
WMP-10	(Windows)	V	V	V	V	TBT	V	V	V	V	X
RealPlayer	(Windows)	V	V	V	V	TBT	V	V	V	V	X
VLC-0.8.2	(Windows)			V	V	TBT	V	V	V		

<u>Player Compatibility:</u> for muxed/unmuxed video & audio streaming

		MPEG1	MPEG2	MPEG4 (DixX)	MPEG4	H.263	MJPEG
Mplayer	(Linux)	TBT	TBT	TBT	TBT	TBT	TBT
Quicktime	(Windows)	V	?	X	V	X	V
RealPlayer	(Windows)	V	?	X	V		
VLC-0.8.2	(Windows)	V	V	V	V	V	V

<u>Stream Player Interoperability:</u>

	MPlayer	Quicktime	RealPlayer	VLC-0.8.2
OTF Change Resolution	TBT	X	TBT	V
OTF Change FPS	TBT	X	TBT	V

<u>Notes:</u> for all above

V	---	Tested and working well	S	---	Should be the same, as tested for other formats
X	---	Not supported	TBT	---	To be tested
AV	---	Audio and/or Video	OTF	---	On the Fly
OSD	---	On Screen Display, for caption c	FPS	---	Frame Per Second, for frame rate change
?	---	Need 3rd party codec	N/A	---	Not Applicable

Appendix C: Sensoray Model 614 Feature Showcase