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PC/104+ MPEG Video/Audio Grabber

Model 314 Rev.A

May 8, 2006

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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.

Sensoray believes that the information in this manual is accurate. The document has been carefully reviewed for technical accuracy. In the event that technical or typographical errors exist, Sensoray reserves the right to make changes to subsequent editions of this document without prior notice to holders of this edition. The reader should consult Sensoray if errors are suspected. In no event shall Sensoray be liable for any damages arising out of or related to this document or the information contained in it.

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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 314 is a PC/104+ MPEG video and/or audio grabber. 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.

A single +5V input power supply is required to power the board, through PC/104+ connector.

Feature Summary

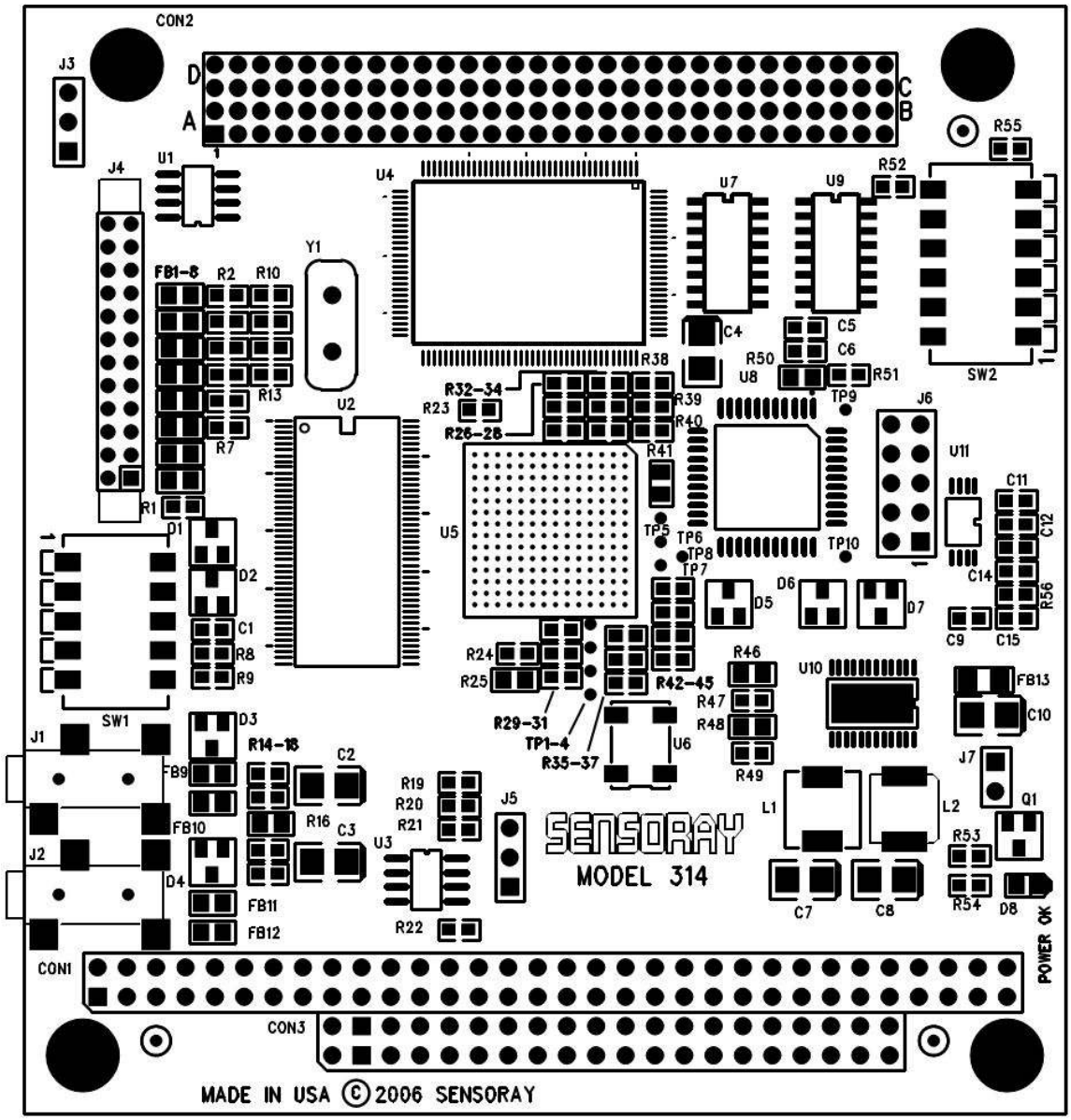
- PC/104+-based MPEG video/audio grabber (capturing module)
- Raw frame grabbing or previewing feature support
- Video input: 4 multiplexed input channels (2 S-Video or 4 Composite)
- Audio input: 1 pair of stereo or 1 mono
- Resolution (Max): Full-D1:
  NTSC: 720 x 480 @ 30 fps or 720 x 240 @ 60 fps
  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
- OSD (On-Screen Display): 96 characters, 16x16 pixel font, multi-window supported.
- Motion detection support
- Signal loss detection support
- 1 digital input and 1 digital output: TTL signals
- Driver and SDK for Linux and Windows

Reference

Connectors



PC/104+ Bus Connector, CON2.

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
A1	Ground	B1	n/c	C1	+5 V	D1	AD0
A2	VIO*	B2	AD2	C2	AD1	D2	+5 V
A3	AD5	B3	Ground	C3	AD4	D3	AD3
A4	C/BE0#	B4	AD7	C4	Ground	D4	AD6
A5	Ground	B5	AD9	C5	AD8	D5	Ground
A6	AD11	B6	VIO*	C6	AD10	D6	M66EN*
A7	AD14	B7	AD13	C7	Ground	D7	AD12
A8	n/c	B8	C/BE1#	C8	AD15	D8	n/c
A9	SERR#	B9	Ground	C9	SB0*	D9	PAR
A10	Ground	B10	PERR#	C10	n/c	D10	SDONE*
A11	STOP#	B11	n/c	C11	LOCK*	D11	Ground
A12	n/c	B12	TRDY#	C12	Ground	D12	DEVSEL#
A13	FRAME#	B13	Ground	C13	IRDY#	D13	n/c
A14	Ground	B14	AD16	C14	n/c	D14	C/BE2#
A15	AD18	B15	n/c	C15	AD17	D15	Ground
A16	AD21	B16	AD20	C16	Ground	D16	AD19
A17	n/c	B17	AD23	C17	AD22	D17	n/c
A18	IDSEL0	B18	Ground	C18	IDSEL1	D18	IDSEL2
A19	AD24	B19	C/BE3#	C19	VIO*	D19	IDSEL3*
A20	Ground	B20	AD26	C20	AD25	D20	Ground
A21	AD29	B21	+5 V	C21	AD28	D21	AD27
A22	+5 V	B22	AD30	C22	Ground	D22	AD31
A23	REQ0#	B23	Ground	C23	REQ1#	D23	VIO*
A24	Ground	B24	REQ2#	C24	+5 V	D24	GNT0#
A25	GNT1#	B25	VIO*	C25	GNT2#	D25	Ground
A26	+5 V	B26	CLK0	C26	Ground	D26	CLK1
A27	CLK2	B27	+5 V	C27	CLK3*	D27	Ground
A28	Ground	B28	INTD#*	C28	+5 V	D28	RST#
A29	+12 V	B29	INTA#	C29	INTB#	D29	INTC#
A30	n/c	B30	n/c	C30	n/c	D30	Ground

Note:

* not connected.

n/c not connected.

PC/104 Bus Connector AB, CON1.

Pin	Signal	Pin	Signal
A1	n/c	B1	Ground *
A2	SD7	B2	RSTDRV
A3	SD6	B3	+5 V
A4	SD5	B4	IRQ9
A5	SD4	B5	-5 V
A6	SD3	B6	DRQ2
A7	SD2	B7	-12 V
A8	SD1	B8	n/c
A9	SD0	B9	+12 V
A10	IOCHRDY	B10	n/c
A11	AEN	B11	n/c
A12	SA19	B12	n/c
A13	SA18	B13	IOW#
A14	SA17	B14	IOR#
A15	SA16	B15	DACK3#
A16	SA15	B16	DRQ3
A17	SA14	B17	n/c
A18	SA13	B18	n/c
A19	SA12	B19	REFRESH#
A20	SA11	B20	n/c
A21	SA10	B21	IRQ7
A22	SA9	B22	IRQ6
A23	SA8	B23	IRQ5
A24	SA7	B24	IRQ4
A25	SA6	B25	IRQ3
A26	SA5	B26	DACK2#
A27	SA4	B27	TC
A28	SA3	B28	BALE
A29	SA2	B29	+5 V
A30	SA1	B30	OSC
A31	SA0	B31	Ground *
A32	Ground *	B32	Ground *

Note:

* Only ground connected; all other pins are not connected.

PC/104 Bus Connector CD, CON3.

Pin	Signal	Pin	Signal
C0	Ground *	D0	Ground *
C1	SBHE#	D1	MEMCS16#
C2	LA23	D2	IOCS16#
C3	LA22	D3	IRQ10
C4	LA21	D4	IRQ11
C5	LA20	D5	IRQ12
C6	LA19	D6	IRQ15
C7	LA18	D7	IRQ14
C8	LA17	D8	n/c
C9	MEMR#	D9	n/c
C10	MEMW#	D10	DACK5#
C11	SD8	D11	DRQ5
C12	SD9	D12	DACK6#
C13	SD10	D13	DRQ6
C14	SD11	D14	DACK7#
C15	SD12	D15	DRQ7
C16	SD13	D16	+5 V
C17	SD14	D17	n/c
C18	SD15	D18	Ground *
C19	n/c	D19	Ground *

Note:

* Only ground connected; all other pins are not connected

A/V (Audio and Video) in and out Connector, J4.

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

LED

Power-OK indicator, D8.

The LED D8 is used for indicating on-board Power-OK status.

Configuration DIP Switches

A/V routing DIP switch, SW1.

The DIP switch, SW1, is used for choosing audio input routing and video direct loopback routing. Refer to the following chart to select the A/V routing that you prefer:

DIP	ON (down)	OFF (up)
SW1-5	J4-pin6 (AIN-R) == J1-R, and => both of Audio-in Right1 and Right2 on PCI A/V decoder	Audio-in Right1 <= J4-pin6, and Audio-in Right2 <= SteroeJack J1-R
SW1-4	J4-pin6 (AIN-L) == J1-L, and => both of Audio-in Left1 and Left2 on PCI A/V decoder	Audio-in Left1 <= J4-pin7, and Audio-in Left2 <= SteroeJack J1-L
SW1-3	Composite video out 1 <= Composite video in 1 or S-Video out 1 – Y <= S-Video in 1 – Y	No direct loopback (v-in1=>v-out1) or (sv-in1-y => sv-out1-y)
SW1-2	Composite video out 2 <= Composite video in 1 or S-Video out 1 – C <= S-Video in 1 – C	No direct loopback (v-in2=>v-out2) or (sv-in1-c => sv-out1-c)
SW1-1	Composite video out 3 <= Composite video in 1	No direct loopback (v-in3=>v-out3)

Note: in the chart, == presents connected; <= presents "take from"; => presents "pass to".

PCI slot # select and interrupt routing DIP switch, SW2.

The DIP switch, SW2, is used for selecting PCI slot number and interrupt routing for the Model 314.

Refer to the following tables to choose a right/preferred setting for Model 314 in a (your) PC/104+ stack:

SW2-2 (SelB)	**SW2-1** (SelA)	**PCI Slot #**
ON (down)	ON (down)	0
ON (down)	OFF (up)	1
OFF (up)	ON (down)	2
OFF (up)	OFF (up)	3

SW2-6	SW2-5	SW2-4	SW2-3	Interrupt line 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

Device Driver and SDK

Device driver and SDK including demo application program are available for both Windows and Linux.

Windows

Sensoray Co. provides 314 WDM driver and DirectX filter for Windows platform. All are packaged in S314-Win-SDK (coming soon).

Linux

Linux SDK package, s314-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 2.4.23 and/or above are supported.

To demonstrate the application, two server demos are enclosed in Linux SDK, s314-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

Dimension	96mm x 105mm x 23mm
Weight	78 g
Power	+5V, 500mA
Bus	PC/104+
Video inputs	4 multiplexed input channels: 2 S-Video or 4 Composite, 75 Ohms
Video formats	NTSC and PAL
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
Bit-rate	CBR/VBR, 1 Kbps to 10 Mbps
OSD (On-Screen Display)	96 characters, 16x16 pixel font, multi-window supported
Video outputs	3 channels (only for direct loopbak monitoring and testing)
Audio input & output	Stereo or monochrome line in/out from/to connector or optional Jacks (output only for loopback testing). Signal level: +/- 1.0 Volt
Digital I/O	1 input + 1 output, TTL signals
OS Platform	Linux and Windows
Temperature	0 – 70 C

Appendix A: Tested 314 Features

Tested 314 Features:

		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:											
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

Player Compatibility: for captured video & audio playback

	MPEG1	MPEG2	MPEG4 (DivX)	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		

Player Compatibility: for muxed/unmuxed video & audio streaming

	MPEG1	MPEG2	MPEG4 (DivX)	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

Stream Player Interoperability:

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

Notes: 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

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