Unit / Module Name:	SD/HD AVXB Expansion / Standalone Module
Unit / Module Number:	AV969
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CONFIDENTIAL

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Revision History

Issue	Changes Made	Date	Initials
0.1	Initial Draft	11/03/2011	AH
0.2	Amended Block Diagram + added format info	11/03/2011	AH
0.3	Added PCB top/bottom silk & AVXB Pin-out	13/04/2011	AH

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1 Introduction

The card features Analogue Devices ADV7441 high quality multi-format video decoder that accepts SD/HD analogue and digital video formats in the media forms of DVI/HDMI, VGA, composite and component. The board also offers both stereo audio HDMI and auxiliary decoding.

The card can act as a standalone video streamer card as it features an onboard microcontroller or as part of part of a video development system. The onboard microcontroller is used to setup, control the ADV7441 and the RS232 and CAN communication channels.

The AVXB bus features a voltage translation bus transceiver that can either accept 3v3 / 2v5 inputs and outputs, depending on a jumper selector.

1.1 Related Documents

Advanced Vision Expansion Boards (AVXB) Specification.doc
Analogue Devices Video Decoder Specification

2 Functional Description

The AV969 is high quality multi-format video decoder card. It is based around the Analogue Devices video decoder.

The AV969 comprises of the following features:

- TMDS Input
- VGA, Composite, Component Inputs
- HDMI Audio Supported
- Separate Stereo Input
- Voltage Translation on the AVXB Bus
- VGA & TMDS EDID PROM
- 30-bit Video Processing
- RS232 & CAN Communication Ports
- Standalone mode - video input selection via a DIL switch.

The basic block diagram is represented in Figure 1.

2.1 Block Diagram

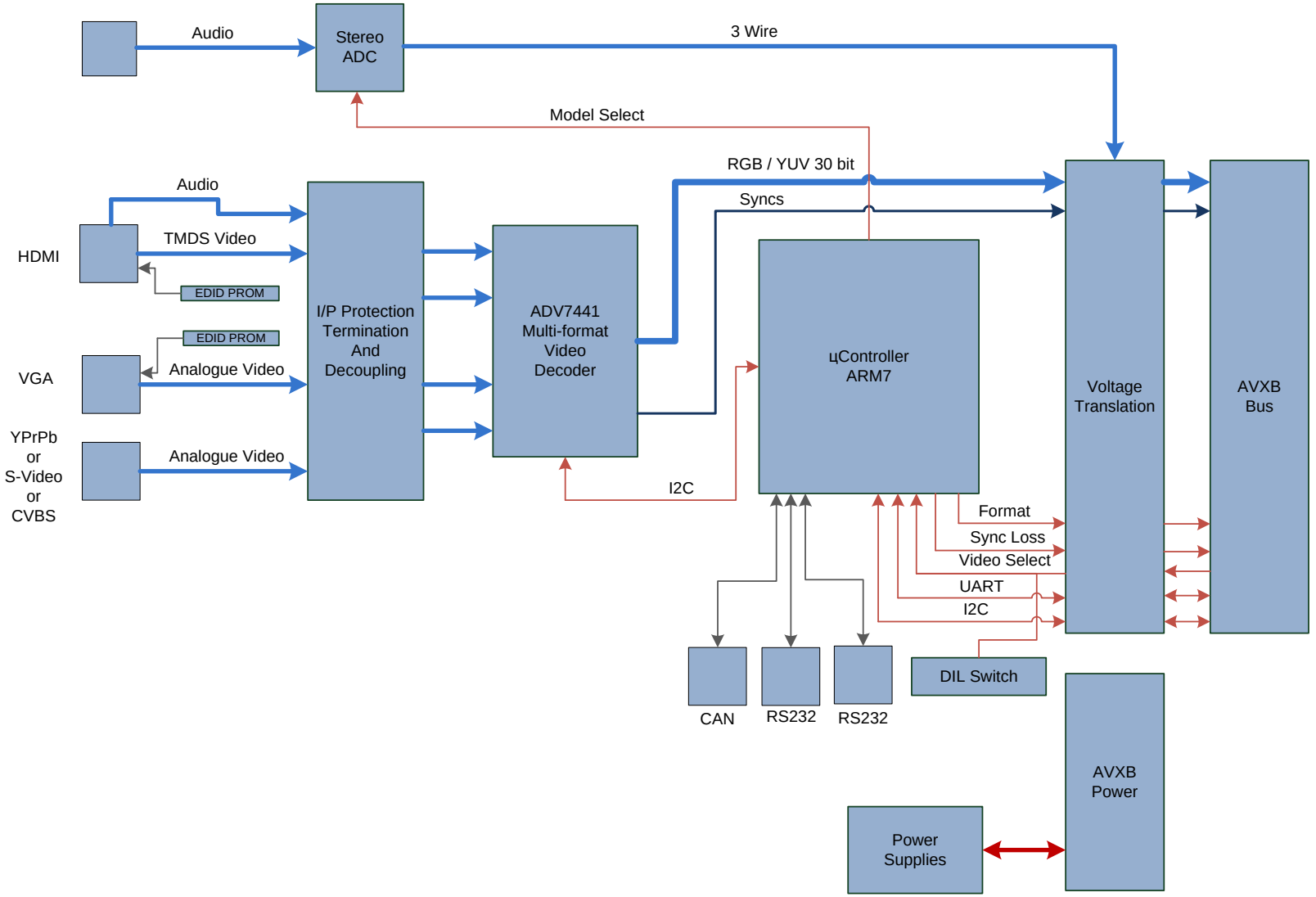

Figure 1 – AV969 Block Diagram

2.2 Detailed Functional Blocks

This section gives a brief description of the various blocks illustrated in Figure 1.

2.3 ADV7441 Video Decoder

All video signals will be decoded using the multi-format video decoder ADV7441. This device has separate digital HDMI and DVI channels which are available on standard connectors. VGA and Component inputs sources can also be decoded; these are featured on a LVDS connector. Two variants of the part are available one with the embedded keys for HDCP decryption (supplied to licence holders only) and the other without the keys (This is orderable dependant). Decoded digital data is passed to a voltage translation device over a 30bit parallel interface with the connectivity for extra sync signals.

2.4 I/P Protection, Termination and Decoupling

This section features input protection, termination and decoupling for the Video Decoder. The ADV7441 has high input bandwidth which intern means that it captures any high frequency noise present. This section helps reduce that amount of noise that gets coupled to the inputs.

2.5 AVXB Interface

Decoded digital video data is distributed from the ADV7441 decoder to the AVXB interface. This information can be either in 3v3 or 2v5 logic levels, jumper dependant.

2.6 ARM7

The ARM7 processor is used to control all the functionality, setup of the video decoder and all the communication channels.

2.7 I2C

There are three independent I2C channels on the ARM7; each device features a dedicated link.

These are to control:

Video Decoder

AVXB Bus

2.8 Communications

The board features four independent communication with the following protocols; two RS232 channels and one CAN transceiver and a separate UART for the AVXB bus. These can be configured to control the on board decoder and the microcontroller. Other devices such as cameras, GPS can also be controlled.

2.9 Auxiliary Audio

Texas instruments PCM1807PW ADC is used convert a single ended analogue input to digital. The device has many function which are controlled via the microcontroller, such as power down, fade-in, fade-out and polarity control. The device features sampling rates of up to 96kHz.

2.10 Video Present

An input present is available on the AVXB Bus when the video on the selected input channel is present.

2.11 Video Input Select

The board can be used in a standalone mode when no master is available to control the setup and selection of the video decoder. To select the input the DIL switch needs to be set in the following configuration.

Mode	Switch Configuration		
	SW1	SW2	SW3
Master Present – AVXB control	0	0	0
Channel 1 – VGA	0	0	1
Channel 2 – DVI	0	1	0
Channel 3 – Composite 1	0	1	1
Channel 4 – Composite 2	1	0	0
Channel 5 – Composite 3	1	0	1
Channel 6 – YC	1	1	0
Channel 7 – Component	1	1	1

2.12 Video Format

The AV969 features a simple interface to find which format of video is available. This is shown in the table below:

Video Format	AVXB Format IO				
	A	B	C	D	E
	0	0	0	0	0
	0	0	0	0	1
	0	0	0	1	0
	0	0	0	1	1
	0	0	1	0	0
	0	0	1	0	1
	0	0	1	1	0
	0	0	1	1	1
	0	1	0	0	0
	0	1	0	0	1
	0	1	0	1	0
	0	1	0	1	1
	0	1	1	0	0
	0	1	1	0	1
	0	1	1	1	0
	0	1	1	1	1
	1	0	0	0	0
	1	0	0	0	1
	1	0	0	1	0
	1	0	0	1	1
	1	0	1	0	0
	1	0	1	0	1
	1	0	1	1	0
	1	0	1	1	1
	1	1	0	0	0
	1	1	0	0	1
	1	1	0	1	0
	1	1	0	1	1
	1	1	1	0	0
	1	1	1	0	1
	1	1	1	1	0
	1	1	1	1	1

3 Interface Description

3.1 AVXB Interface Connector (J18)

AV979 Connector Part No. Samtec QSH-060-01-F-D-DP-A

Mating Cable Part No. Samtec QTH-060-01-F-D-DP-A

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	HDMI Audio SPDIF	2	HDMI Audio S0	3	HDMI Audio S1	4	HDMI Audio S2
5	HDMI Audio S3	6	Auxiliary Audio LRCLK	7	HDMI Audio SCLK	8	Auxiliary Audio MCLK
9	Auxiliary Audio DOUT	10	Auxiliary Audio BCK	11	Auxiliary Audio LRCK	12	Auxiliary Audio SCKI
13		14		15		16	
17		18		19		20	
21		22		23		24	
25		26		27		28	
29		30		31		32	
33		34		35		36	
37		38		39		40	
41	ICCCLK	42	ICCDATA	43	Video Select B	44	
45	Video Select A	46	Video Select C	47	Microcontroller INT	48	
49	Video Format A	50	Video Format E	51	Video Format B	52	Video Format D
53	Video Format C	54	Microcontroller IO/TX	55	Microcontroller IO/RX	56	Microcontroller IO
57		58		59		60	
61		62		63		64	
65	Video Decoder LLC	66		67		68	
69		70		71		72	
73		74		75		76	
77		78		79		80	
81	Video Out D0	82	Video Out D11	83	Video Out D1	84	Video Out D12
85	Video Out D2	86	Video Out D13	87	Video Out D3	88	Video Out D14
89	Video Out D4	90	Video Out D15	91	Video Out D5	92	Video Out D16
93	Video Out D6	94	Video Out D17	95	Video Out D7	96	Video Out D18
97	Video Out D8	98	Video Out D19	99	Video Out D9	100	Video Out D20
101	Video Out D10	102	Video Out D21	103	Video Sync Present	104	Video Out D22
105	Video Out ACT	106	Video Out D23	107	Video Out VS	108	Video Out HS
109	Video Out D24	110	Video Out D27	111		112	Video Out D28
113	Video Out D25	114	Video Out D29	115		116	
117	Video Out D26	118		119		120	

3.2 AVXB Power Connector

AV979 Connector Part No:.Samtec BKS-133-03-F-V-A

Mating PCB connector: Samtec BKS-133-01-F-V-A

Pin #	Description	Pin #	Description
1	3.3V	2	GND
3	3.3V	4	GND
5	3.3V	6	GND
7	3.3V	8	GND
9	5V	10	GND
11	5V	12	GND
13	5V	14	GND
15	5V	16	GND
17		18	GND
19		20	GND
21		22	GND
23		24	GND
25	GND	26	
27		28	
29		30	
31		32	
33	GND		

4 Mechanical Interface

The mechanical details for the panel connectors are described in this section.

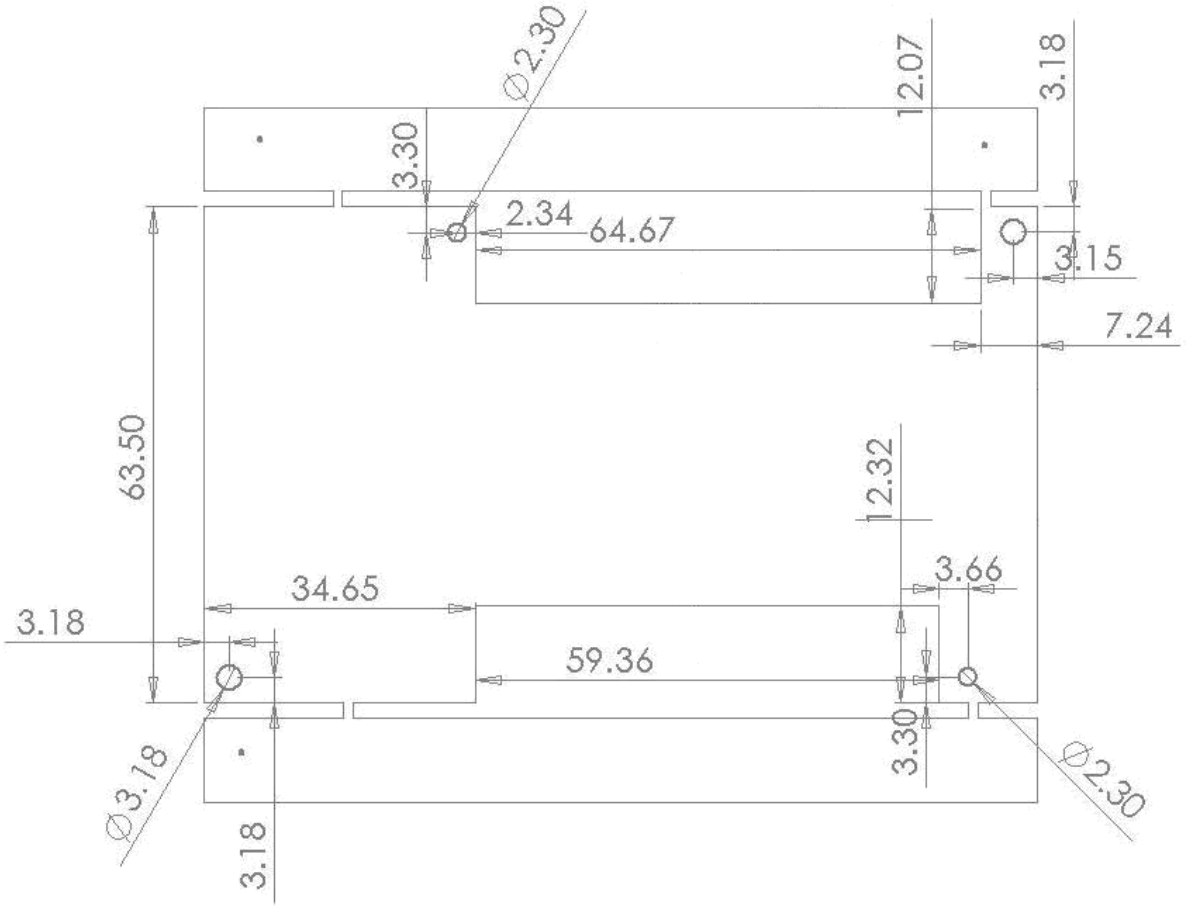

Figure 2 - Mechanical Interface

5 PCB Details

5.1 Top Side

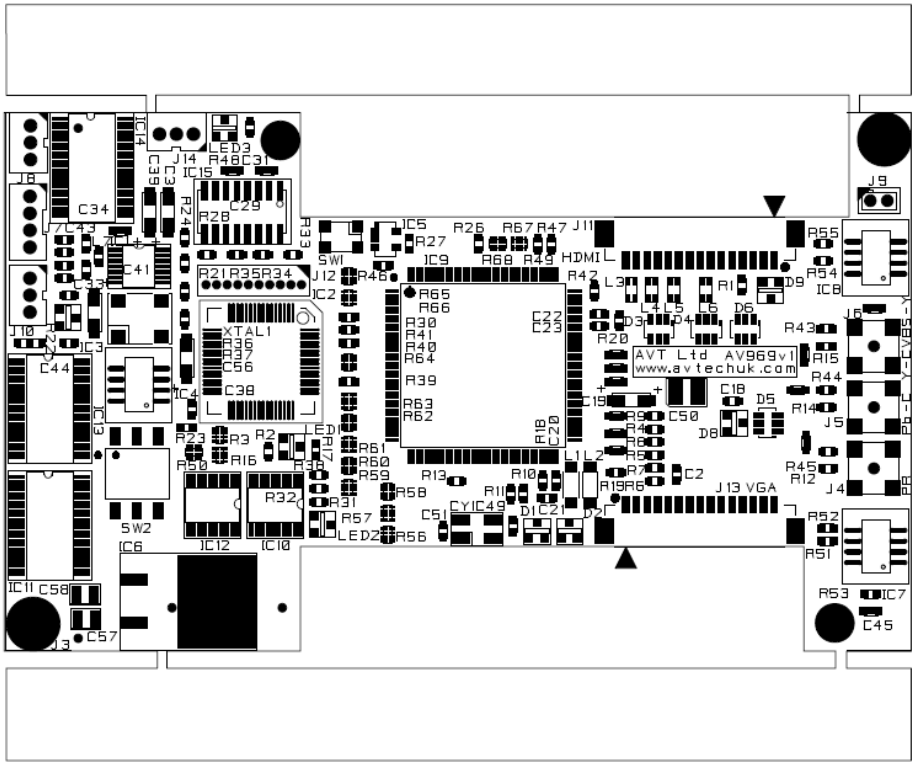

Figure 3 – Top PCB Layout

5.1 Bottom Side

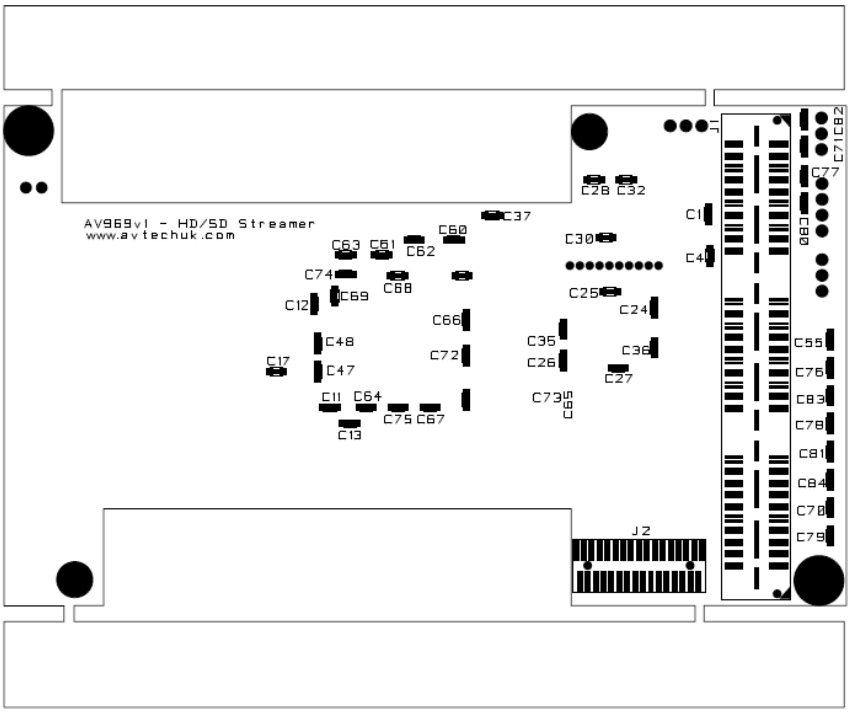

Figure 4 – Bottom PCB Layout

6 Verification Procedures

The module will be tested in accordance to our QCF41 Test Procedure for the AV969.
TBA

7 Validation Procedures

The module complies with the QCF11 Certification of Conformance document for the AV969.
TBA

8 Safety

This module presents no hazard to the user.

9 EMC

This module is designed to operate from within an enclosed host system, which is build to provide EMC shielding. Operation within the EU EMC guidelines is not guaranteed unless it is installed within an adequate host system.

This module is protected from damage by fast voltage transients originating from outside the host system which may be introduced through the output cables.

Short circuiting any output to ground does not cause the host PC system to lock up or reboot.