DIAMOND SYSTEMS CORPORATION

VGA Accessory Kit

SUMIT-ISM SDVO to VGA Converter for Aurora Single Board Computers

Revision A November 2010

Revision	Date	Comment
A	10/22/10	Initial Release

FOR TECHNICAL SUPPORT PLEASE CONTACT:

support@diamondsystems.com

Diamond Systems Corporation
1255 Terra Bella Ave.
Mountain View, CA 94043 USA
Tel 1-650-810-2500
Fax 1-650-810-2525
www.diamondsystems.com

CONTENTS

1. IMPORTANT SAFE HANDLING INFORMATION

WARNING!

ESD-Sensitive Electronic Equipment

Observe ESD-safe handling procedures when working with this product.

Always use this product in a properly grounded work area and wear appropriate ESD-preventive clothing and/or accessories.

Always store this product in ESD-protective packaging when not in use.

Safe Handling Precautions

The Corona board contains a high density connector with many connections to sensitive electronic components. This creates many opportunities for accidental damage during handling, installation and connection to other equipment. The list here describes common causes of failure found on boards returned to Diamond Systems for repair. This information is provided as a source of advice to help you prevent damaging your Diamond (or any vendor's) embedded computer boards.

ESD damage – This type of damage is usually almost impossible to detect, because there is no visual sign of failure or damage. The symptom is that the board eventually simply stops working, because some component becomes defective. Usually the failure can be identified and the chip can be replaced. To prevent ESD damage, always follow proper ESD-prevention practices when handling computer boards.

Damage during handling or storage – On some boards we have noticed physical damage from mishandling. A common observation is that a screwdriver slipped while installing the board, causing a gouge in the PCB surface and cutting signal traces or damaging components.

Another common observation is damaged board corners, indicating the board was dropped. This may or may not cause damage to the circuitry, depending on what is near the corner. Most of our boards are designed with at least 25 mils clearance between the board edge and any component pad, and ground / power planes are at least 20 mils from the edge to avoid possible shorting from this type of damage. However these design rules are not sufficient to prevent damage in all situations.

A third cause of failure is when a metal screwdriver tip slips, or a screw drops onto the board while it is powered on, causing a short between a power pin and a signal pin on a component. This can cause overvoltage / power supply problems described below. To avoid this type of failure, only perform assembly operations when the system is powered off.

Sometimes boards are stored in racks with slots that grip the edge of the board. This is a common practice for board manufacturers. However our boards are generally very dense, and if the board has components very close to the board edge, they can be damaged or even knocked off the board when the board tilts back in the rack. Diamond recommends that all our boards be stored only in individual ESD-safe packaging. If multiple boards are stored together, they should be contained in bins with dividers between boards. Do not pile boards on top of each other or cram too many boards into a small location. This can cause damage to connector pins or fragile components.

Power supply wired backwards – Our power supplies and boards are not designed to withstand a reverse power supply connection. This will destroy each IC that is connected to the power supply (i.e. almost all ICs). In this case the board will most likely will be unrepairable and must be replaced. A chip destroyed by reverse power or by excessive power will often have a visible hole on the top or show some deformation on the top surface due to vaporization inside the package. **Check twice before applying power!**

Overvoltage on analog input – If a voltage applied to an analog input exceeds the design specification of the board, the input multiplexor and/or parts behind it can be damaged. Most of our boards will withstand an erroneous connection of up to ±35V on the analog inputs, even when the board is powered off, but not all boards, and not in all conditions.

Overvoltage on analog output – If an analog output is accidentally connected to another output signal or a power supply voltage, the output can be damaged. On most of our boards, a short circuit to ground on an analog output will not cause trouble.

Overvoltage on digital I/O line – If a digital I/O signal is connected to a voltage above the maximum specified voltage, the digital circuitry can be damaged. On most of our boards the acceptable range of voltages connected to digital I/O signals is 0-5V, and they can withstand about 0.5V beyond that (-0.5 to 5.5V) before being damaged. However logic signals at 12V and even 24V are common, and if one of these is connected to a 5V logic chip, the chip will be damaged, and the damage could even extend past that chip to others in the circuit.

2. INTRODUCTION

The VGA Accessory Kit is designed for use with Aurora single board computers to convert Aurora's SDVO output to VGA output. The Kit contains a VGA accessory board and VGA cable, part number 6891084.

Designed for Outdoor Applications

The VGA accessory board was designed with outdoor applications in mind. It is ideal for access point applications or a wide range of other embedded computing applications.

Rugged and Robust

Extended temperature operation of -40°C to +85°C is tested and guaranteed. The mini-PCI wireless module mounts securely to the carrier through a standoff and screw.

Expandability

The VGA accessory board has both SUMIT-A and PC/104 (ISA) stackthrough expandability. Therefore it can be used in legacy PC/104 stacks are well as new SUMIT-based architectures.

2.1 Features

- SDVO to VGA Converter
- Mechanical support for 2.5" SATA solid state flashdisk
- SUMIT-A and PC/104 (ISA) stackable expansion
- Extremely rugged -40°C to +85°C (-40°F to +185°F) operating temperature

3. FUNCTIONAL OVERVIEW

The SDVO to VGA converter takes an externally provided SDVO input and converts it to an analog VGA output. It is designed for use with Diamond's Aurora single board computer.

On the bottom side of the module is a mounting location for an add-on 2.5" SATA solid state flashdisk. This can be used for data storage before off-loading to a host system either through one of the stackable expansion options or the Ethernet port.

3.1 Chrontel CH7317B SDVO to VGA Controller

- Supporting analog RGB outputs for a display monitor
- Supporting maximum pixel rate of 165MP/s or graphics resolutions up to 1920x1200
- High-speed SDVO (1G~2Gbps) AC-coupled serial differential RGB inputs
- Supporting monitor connection detection

3.2 2.5" SATA SSD flashdisk (optional)

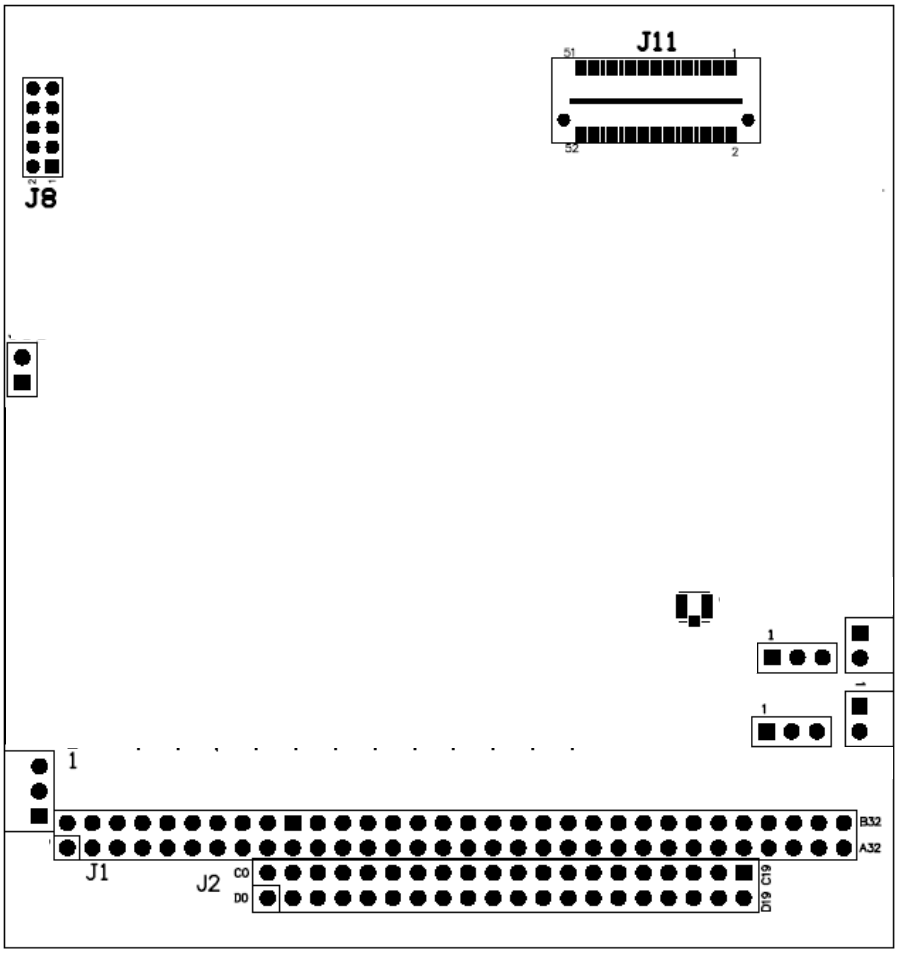
As an optional feature, a 2.5" SATA solid state flashdisk can be mounted on the underside of the VGA accessory board. Diamond Systems offers 32GB and 64GB SATA SSD accessory products; product numbers SSD-32G-XT and SSD-64G-XT respectively.

The VGA Accessory board provides the mounting location for the SATA SSD via six standoffs and screws on its underside, but no electrical connectivity to the SSD drive itself. Power and data cables connect the SSD flashdisk to the host computer. Power and data cables are included in Diamond's SSD accessory products.

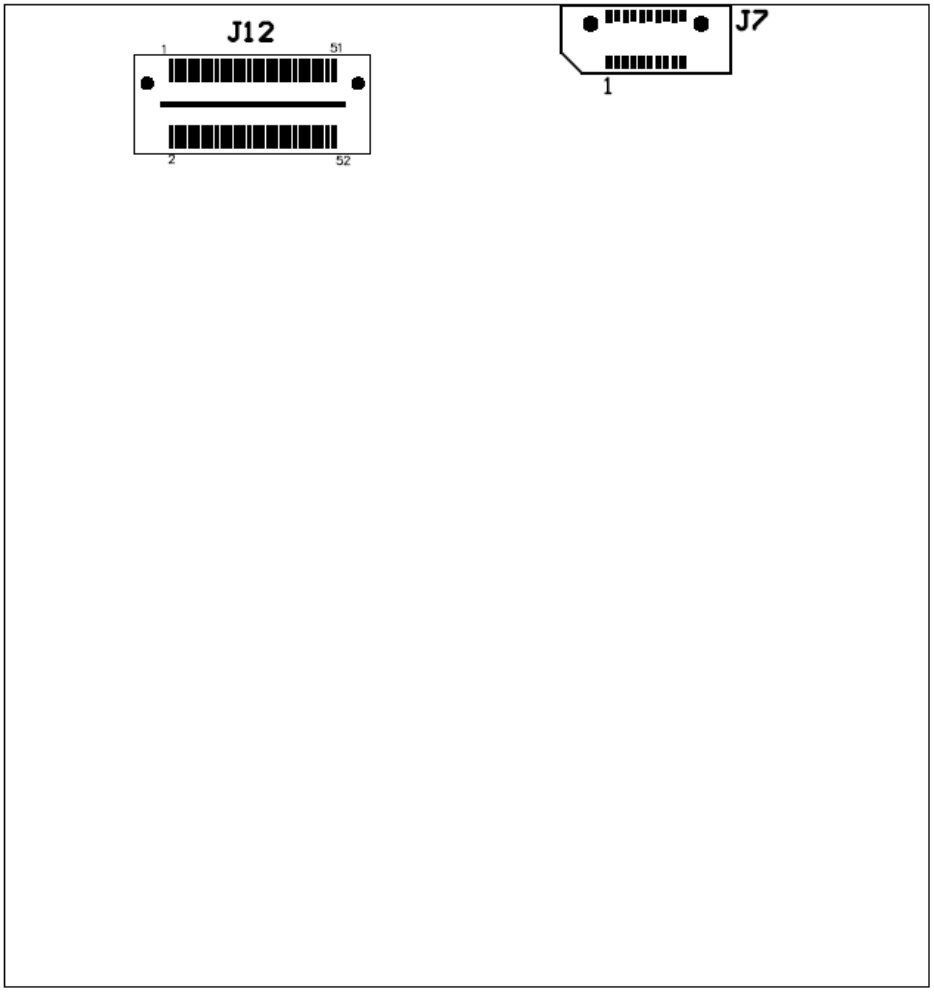
4. BOARD OUTLINE AND LAYOUT

4.1 VGA Accessory Board Drawing

The following diagram shows locations for all connectors identified in the next section.



VGA Accessory Top



VGA Accessory Bottom

5. CONNECTOR LIST

The following table summarizes the functions of the VGA accessory board's interface connectors. Please refer to the drawings in Section 4 for the locations of these connectors. Signal functions relating to all of the board's interface connectors are discussed in greater detail in Section 6 of this document. Other connectors and jumper blocks on the accessory board are reserved for Diamond's use only.

Connector	*Function*
J1	64 pin 40 ISA connector
J2	40 pin ISA connector
J7	SDVO video input connector
J8	VGA output connector
J11	SUMIT-A connector top side
J12	SUMIT-A connector bottom side

6. CONNECTOR PINOUT AND PIN DESCRIPTION

6.1 PC/104 Connector (J1, J2)

The PC/104 bus is essentially identical to the ISA bus except for the physical design. It specifies two pin and socket connectors for the bus signals. A 64-pin connector, J1, incorporates the 64-pin 8-bit bus connector signals, and a 40-pin connector, J2, incorporates the 36-pin 16-bit bus connector signals. The additional pins on the PC/104 connectors are used as ground or key pins. The female sockets on the top of the board enable stacking another PC/104 board on top of Corona, while the male pins on the bottom enable the board to plug into another board below it. The PC/104 bus connector pinout and signal functions are defined by the latest version of the PC/104 Consortium's "PC/104 Specification" (see http://www.pc104.org).

In the pinout figures below, the tops correspond to the left edge of the connector when the board is viewed from the primary side (side with the mini-PCI connector and the female end of the PC/104 connector) and the board is oriented so that the PC/104 connectors are along the bottom edge of the board.

View from Top of Board

J2: PC/104 16-bit bus connector **J1: PC/104 8-bit bus connector**

Ground	**D0**	**C0**	Ground	IOCHCHK-	**A1**	**B1**	Ground
MEMCS16-	**D1**	**C1**	SBHE-	SD7	**A2**	**B2**	RESET
IOCS16-	**D2**	**C2**	LA23	SD6	**A3**	**B3**	+5V
IRQ10	**D3**	**C3**	LA22	SD5	**A4**	**B4**	IRQ9
IRQ11	**D4**	**C4**	LA21	SD4	**A5**	**B5**	-5V
IRQ12	**D5**	**C5**	LA20	SD3	**A6**	**B6**	DRQ2
IRQ15	**D6**	**C6**	LA19	SD2	**A7**	**B7**	-12V
IRQ14	**D7**	**C7**	LA18	SD1	**A8**	**B8**	0WS-
DACK0-	**D8**	**C8**	LA17	SD0	**A9**	**B9**	+12V
DRQ0	**D9**	**C9**	MEMR-	IOCHRDY	**A10**	**B10**	Key (pin cut)
DACK5-	**D10**	**C10**	MEMW-	AEN	**A11**	**B11**	SMEMW-
DRQ5	**D11**	**C11**	SD8	SA19	**A12**	**B12**	SMEMR-
DACK6-	**D12**	**C12**	SD9	SA18	**A13**	**B13**	IOW-
DRQ6	**D13**	**C13**	SD10	SA17	**A14**	**B14**	IOR-
DACK7-	**D14**	**C14**	SD11	SA16	**A15**	**B15**	DACK3-
DRQ7	**D15**	**C15**	SD12	SA15	**A16**	**B16**	DRQ3
+5V	**D16**	**C16**	SD13	SA14	**A17**	**B17**	DACK1-
MASTER-	**D17**	**C17**	SD14	SA13	**A18**	**B18**	DRQ1
Ground	**D18**	**C18**	SD15	SA12	**A19**	**B19**	Refresh-
Ground	**D19**	**C19**	Key (pin cut)	SA11	**A20**	**B20**	SYSCLK

SA10	**A21**	**B21**	IRQ7
SA9	**A22**	**B22**	IRQ6
SA8	**A23**	**B23**	IRQ5
SA7	**A24**	**B24**	IRQ4
SA6	**A25**	**B25**	IRQ3
SA5	**A26**	**B26**	DACK2-
SA4	**A27**	**B27**	TC
SA3	**A28**	**B28**	BALE
SA2	**A29**	**B29**	+5V
SA1	**A30**	**B30**	OSC
SA0	**A31**	**B31**	Ground
Ground	**A32**	**B32**	Ground

Connector type:

Connectors J1 and J2 provide a standard PC/104 ISA stackable expansion bus. There is no PC/104 functionality on Corona. This board simply passes-through the signals of the PC/104 bus.

6.2 SDVO Video Input (J7)

Connector J7 is used to bring SDVO video in for the purposes of conversion to VGA output. This connector mates to a corresponding connector on Diamond's Aurora single board computer.

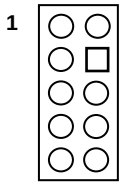
1	SDVO_B_BLUE#
2	BUF_PLT_RST#
3	SDVO_B_BLUE
4	Ground
5	Ground
6	SDVO_B_GREEN#
7	SDVO_CTRLCLK
8	SDVO_B_GREEN
9	SDVO_CTRLDATA
10	Ground
11	Ground
12	SDVO_B_CLK_N
13	+3.3V
14	SDVO_B_CLK_P
15	+3.3V
16	Ground
17	+5V
18	SDVO_B_RED#
19	+5V
20	SDVO_B_RED

Connector type: 20 pin Samtec stacking connector ERF8-010-07.0-L-DV-TR

6.3 VGA Video Output (J8)

Connector J8 is used to connect a VGA monitor. Although the DDC serial detection pins are present, a +5V power supply is not provided, and the legacy "Monitor ID" pins are also not used. Diamond Systems' cable number 6981084 mates with this connector.

RED	1	2	Ground
GREEN	3	4	**Key**
BLUE	5	6	Ground
HSYNC	7	8	DDC-Data
VSYNC	9	10	DDC-Clock

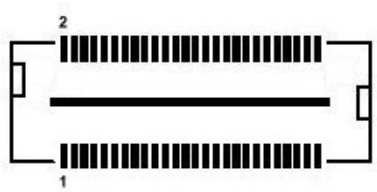


Connector type: 2x5 standard 2mm dual row straight pin header with gold flash plating

6.4 SUMIT-A Expansion Bus (J11)

The SUMIT-A stackable bus is a 52-pin connector. The VGA accessory board uses the following SUMIT bus functions:

- 1 PCIe x1 lane



The signal assignments of the SUMIT-A connector appear in below. Note: For more information on the SUMIT specification, visit the SFF-SIG website at http://www.sff-sig.org.

+5VSB	1	2	+12V
3.3V	3	4	SMB/I2C_DATA
3.3V	5	6	SMB/I2C_CLK
EXPCD_REQ#	7	8	SMB/I2C_ALERT#
EXPCD_PRSNT#	9	10	SPI/uWire_DO
USB_OC#	11	12	SPI/uWire_DI
Reserved	13	14	SPI/uWire_CLK
+5V	15	16	SPI/uWire_CS0#
USB3+	17	18	SPI/uWire_CS1#
USB3-	19	20	Reserved
+5V	21	22	LPC_DRQ
USB2+	23	24	LPC_AD0
USB2-	25	26	LPC_AD1
+5V	27	28	LPC_AD2
USB1+	29	30	LPC_AD3
USB1-	31	32	LPC_FRAME#
+5V	33	34	SERIRQ#
USB0+	35	36	LPC_PRSNT# / Ground
USB0-	37	38	CLK_33MHz
Ground	39	40	Ground
A_PETp0	41	42	A_PERp0
A)PETn0	43	44	A_PERn0
Ground	45	46	APRSNT# / Ground
PERST#	47	48	A_CLKp
WAKE#	49	50	A_CLKn
+5V	51	52	Ground

7. INSTALLATION AND CONFIGURATION

7.1 Attaching the VGA Accessory Board to Aurora

Align the VGA accessory board so that the PC/104 and SUMIT-A connectors on the accessory board align with the mating connectors on Aurora.

Push evenly on all four sides of the accessory board until it firmly seats onto the Aurora SBC.

Secure the accessory board to Aurora with four screws (4-40 x ¼" pan head) inserted into the four mounting holes on the corners of the board.

Connect the VGA cable, part number 6891084, between connector J8 and the desired VGA display.

7.2 Attaching a 2.5" SATA SSD Flashdisk

Locate the six mounting standoffs on the underside of Corona. Remove the six screws from the standoffs.

Position the SSD flashdisk, component side down, over the six standoffs, aligning the standoffs with the mounting holes on the edges of the flashdisk, see the illustration below.

Secure the flashdisk to Corona by inserting and tightening the six mounting screws.

Attach the power and data cables to the SSD flashdisk module, and then attach the two cables to the host computer.

VGA accessory board with SATA SSD installed on the bottom

8. SPECIFICATIONS

General	
Graphics	VGA, 1920 x 1200 maximum resolution
Mass storage	1 2.5” SATA solid state disk mounting location
Expansion	SUMIT-A stackable expansion PC/104 (ISA) stackable expansion
Power supply	+5VDC ±5% +3.3VDC ±5%
Power consumption	1.8W maximum
Dimensions	3.55 x 3.775 in. (90 x 96 mm)
Operating temperature	-40°C to +85°C (-40°F to +185°F)
Weight	3.4oz (96g)
RoHS	Compliant