VID34860ER

PCI Express Video Controller

User's Manual

BDM-610020143 Rev. A

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AS9100 and ISO 9001 Certified

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Revision History

Rev A	Initial Release

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1 Introduction

1.1 Product Overview

The VID34860 is a PCIe/104 video controller that uses the AMD E8860 GPU. This powerful video controller offers 5 video outputs. By supporting DisplayPort++, the video outputs can interface with almost any standard monitor (analog or digital). The VID34860 provides an excellent power to performance ratio with the use of the AMD PowerPlay technology. By utilizing the PCIe x4 link the VID34860 provide external GPU support to CPUs with PCIe x4 link.

1.2 Board Features

- PC/104 form factor
- PCIe/104 stackable bus structure
- AMD E8860 GPU
  - 640 shader processors
  - 128-bit memory interface with 2GB GDDR5
  - Microsoft® DirectX® 11.1 support
  - Fourth generation unified video decoder
  - Support for H.264 VC-1, MPEG-2/4 decode
  - Dual HD decode, Blu-ray & stereo 3D
  - Up to 5 simultaneous displays with AMD Eyefinity technology
  - AMD Accelerated Parallel Processing (APP) technology
- Versatile Video Output
  - Analog and Digital
  - DisplayPort++ enables support for any common video outputs standards
    - Analog VGA
    - DisplayPort
    - DVI
    - HDMI
- Utilizes the PCIe X4 Link (Gen 3, 8 GT/s)

1.3 Ordering Information

The VID34860 is available with the following options:

Table 1: Ordering Options

Part Number	Description
VID34860ER	PCIe/104 x4 Video Controller with AMD E8860
IDAN-VID34860ER	PCIe/104 x4 Video Controller with AMD E8860 in IDAN enclosure

The Intelligent Data Acquisition Node (IDAN™) building block can be used in just about any combination with other IDAN building blocks to create a simple but rugged 104™ stack. This module can also be incorporated in a custom-built RTD HiDAN™ or HiDANplus High Reliability Intelligent Data Acquisition Node. Contact RTD sales for more information on our high reliability systems.

1.4 Contact Information

1.4.1 Sales Support

For sales inquiries, you can contact RTD Embedded Technologies sales via the following methods:

Phone: 1-814-234-8087 Monday through Friday, 8:00am to 5:00pm (EST).
E-Mail: sales@rtd.com

1.4.2 Technical Support

If you are having problems with you system, please try the steps in the Troubleshooting section of this manual.

For help with this product, or any other product made by RTD, you can contact RTD Embedded Technologies technical support via the following methods:

Phone: 1-814-234-8087 Monday through Friday, 8:00am to 5:00pm (EST).
E-Mail: techsupport@rtd.com

2 Specifications

2.1 Operating Conditions

Table 2: Operating Conditions

Symbol	Parameter	Test Condition	Min	Max	Unit
V_{cc5}	5V Supply Voltage		4.75	5.25	V
V_{cc3}	3.3V Supply Voltage		n/a	n/a	V
V_{cc12}	12V Supply Voltage		10.8	13.2	V
T_a	Operating Temperature		-40	+55	C
T_s	Storage Temperature		-55	+125	C
RH	Relative Humidity	Non-Condensing	0	90%	%
MTBF	Mean Time Before Failure	Telcordia Issue 2 30°C, Ground benign, controlled		TBD	Hours

2.2 Electrical Characteristics

Table 3: Electrical Characteristics

Symbol	Parameter	Test Condition	Min	Typical	Max	Unit
P	5V Power Consumption	V_{cc5} = 5.0V, V_{cc12} = 12.0V 1 Display with 3D screen saver		3.45		W
	12V Power Consumption			7.75		W
	Total Power Consumption			11.2		W
I_{cc5}	5V Input Supply Current	Active		0.69		A
I_{cc12}	12V Input Supply Current	Active		0.65		A
P	5V Power Consumption	V_{cc5} = 5.0V, V_{cc12} = 12.0V 1 Display, Running Furmark V1.18.2 AAx4 Resolution: 1920x1080		5.55		W
	12V Power Consumption			34.6		W
	Total Power Consumption			40.15		W
I_{cc5}	5V Input Supply Current	Active		1.11		A
I_{cc12}	12V Input Supply Current	Active		2.88		A
PCIe Bus						
	Differential Output Voltage		0.8		1.2	V
	DC Differential TX Impedance		80		120	Ω
	Differential Input Voltage		0.175		1.2	V
	DC Differential RX Impedance		80		120	Ω
	Electrical Idle Detect Threshold		65		175	mV
VGA Port						
	Output Voltage High HSYNC,VSYNC	I_{OH}= -8.0mA	3.8		5.0	V
	Output Voltage Low HSYNC,VSYNC	I_{OL}= 8.0mA	0.0		0.44	V
	Output Voltage High DDCCLK,DDCDATA	I_{OH}= -4.0mA	4.75		5.0	V
	Output Voltage Low DDCCLK,DDCDATA	I_{OL}= 8.0mA	0.0		0.3	V
	5V Overcurrent Limit		690			mA
DisplayPort						
	Differential Output Voltage		0.34		0.92	V
	AUX Differential Output Voltage		525		621	mV
	AUX Common-Mode Voltage		550		620	mV
	3.3V Overcurrent Limit		690			mA
	Supports DisplayPort V1.2	CN5, CN6, CN7, CN8				

3 Board Connection

3.1 Board Handling Precautions

To prevent damage due to Electrostatic Discharge (ESD), keep your board in its antistatic bag until you are ready to install it into your system. When removing it from the bag, hold the board at the edges, and do not touch the components or connectors. Handle the board in an antistatic environment, and use a grounded workbench for testing and handling of your hardware.

3.2 Physical Characteristics

- Weight: Approximately 0.14 Kg (0.30 lbs.) with heat sink
- Dimensions: 90.17 mm L x 95.89 mm W (3.550 in L x 3.775 in W)
- 22mm PCIe Bus connector

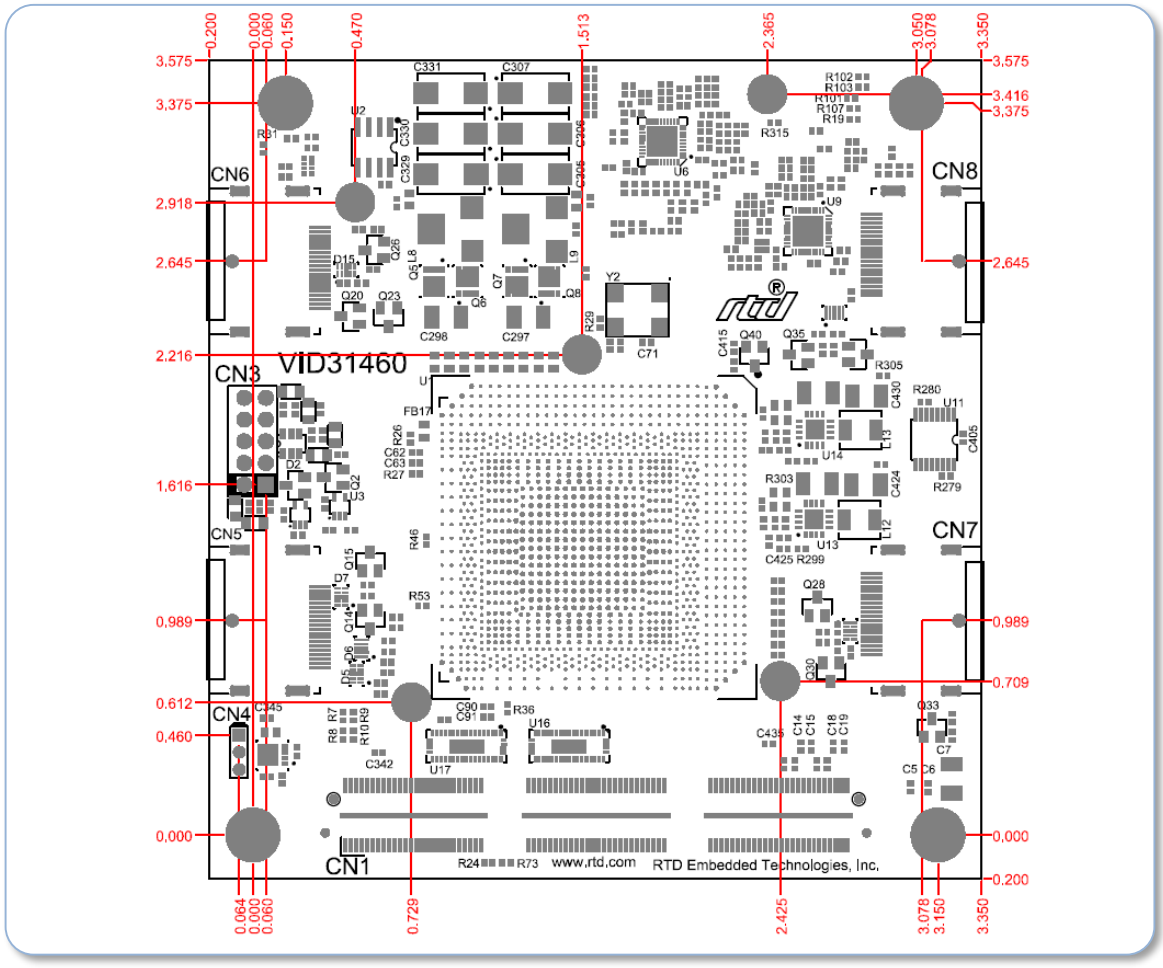


Figure 1: Board Dimensions

3.2.1 THERMAL MANAGEMENT

The VID34860ER are provided with an active heat sink solution to provide thermal cooling for the GPU. It uses auto fan control to the heat sink fan, allowing the fan to only run when needed. The GPU uses internal thermal monitoring to throttle the processor and memory when it exceeds its thermal limit. This thermal limit cannot be modified.

In order to maintain maximum performance over the full temperature range, it is recommended that a PCIe spacer be used between the VID34860ER and any board immediately above it.

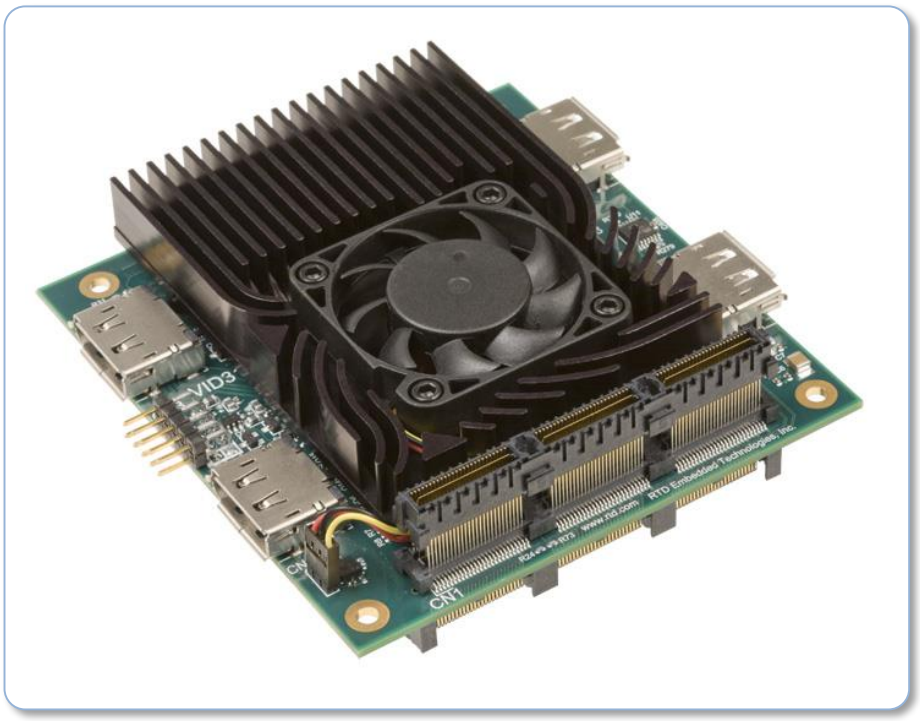


Figure 2: Board with Heatsink

3.3 Connectors and Jumpers

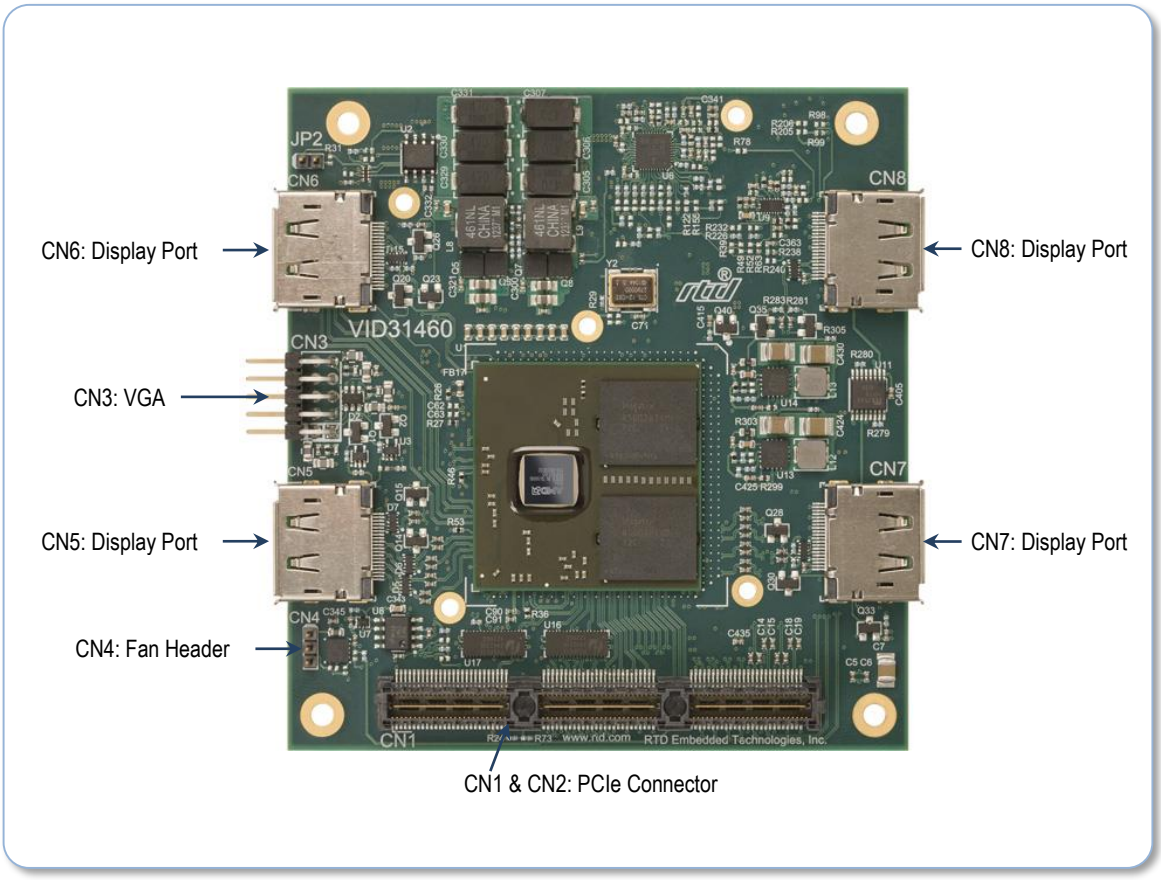


Figure 3: Board Connections

3.3.1 External I/O Connectors

CN3: VGA Connector

The VGA Connector is a 2 x 4, 0.1" spacing right-angle connector. The pin assignments are shown in Table 4 below.

Table 4: CN3 VGA Connector

HSYNC	2	1	VSYNC
RED	4	3	DDCCLK
GREEN	6	5	DDCDATA
BLUE	8	7	+5V
GND	10	9	GND

CN4: Fan Header

The Fan header is a 1 x 3, 2mm spacing vertical connector. The pin assignments are shown in Table 5 below.

Table 5: CN4 Fan Header

1	+5V_ PWM
2	GND
3	N/C

CN5, CN6, CN7 & CN8: DisplayPort Connector

The DisplayPort connector uses a standard DisplayPort Male Receptacle, P/N: Molex 47272-0001.

Using off the shelve adaptors these connectors can support Analog VGA, DVI, and HDMI.

3.3.2 BUS CONNECTORS

CN1 (Top) & CN2 (Bottom): PCIe Connector

The PCIe connector is the connection to the system CPU. The position and pin assignments are compliant with the *PCI/104-Express Specification*. (See PC/104 Specifications on page 20)

3.4 Steps for Installing

1. Always work at an ESD protected workstation, and wear a grounded wrist-strap.
2. Turn off power to the PC/104 system or stack.
3. Select and install stand-offs to properly position the module on the stack.
4. Remove the module from its anti-static bag.
5. Check that pins of the bus connector are properly positioned.
6. Check the stacking order; make sure all of the busses used by the peripheral cards are connected to the cpuModule.
7. Hold the module by its edges and orient it so the bus connector pins line up with the matching connector on the stack.
8. Gently and evenly press the module onto the PC/104 stack.
9. If any boards are to be stacked above this module, install them.
10. Attach any necessary cables to the PC/104 stack.
11. Re-connect the power cord and apply power to the stack.
12. Boot the system and verify that all of the hardware is working properly.

NOTE: In Order to maintain maximum performance over the full temperature range, it is recommended that a PCIe spacer be used between the VID34860 and any board immediately above it.

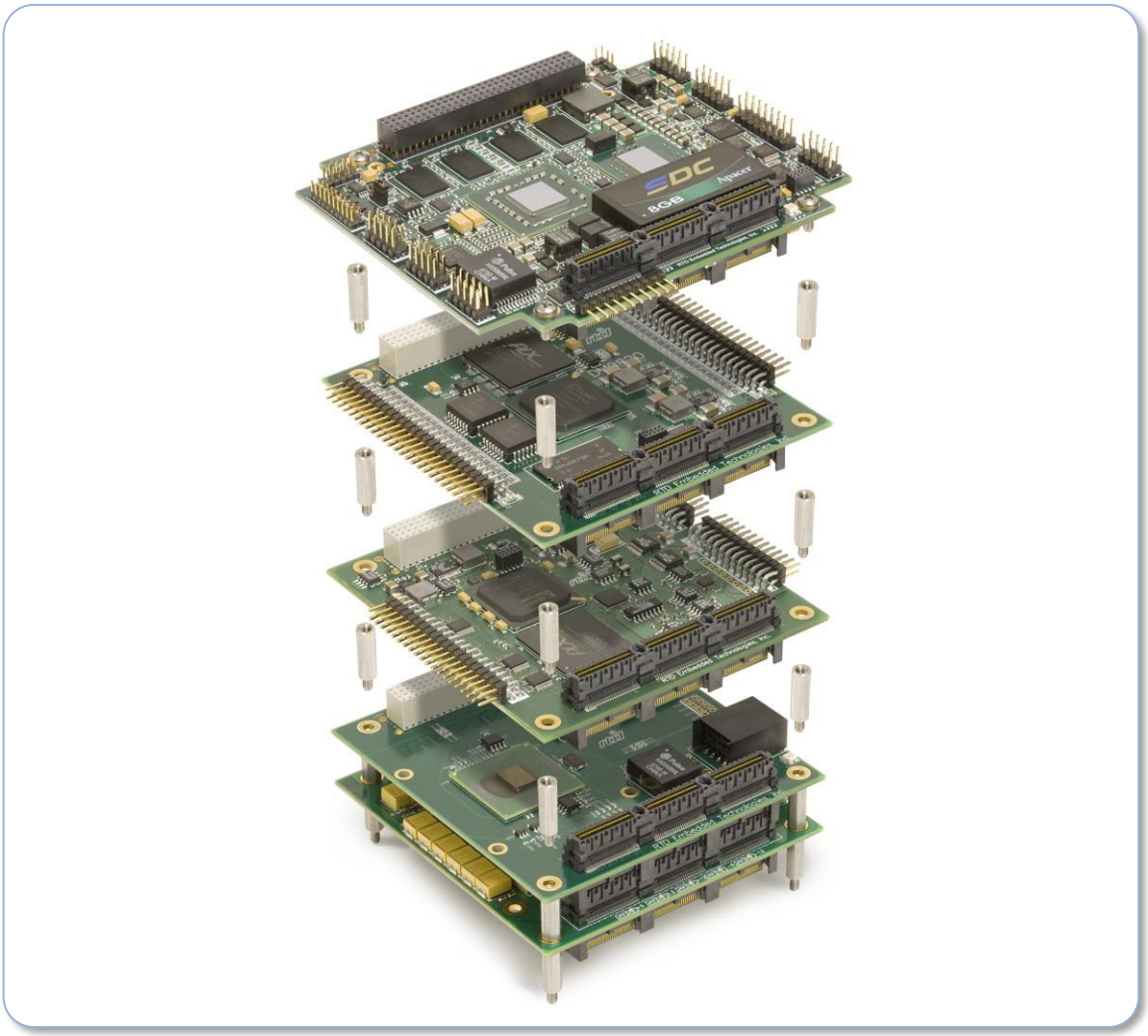


Figure 4: Example 104™ Stack

4 IDAN Connections

4.1 Module Handling Precautions

To prevent damage due to Electrostatic Discharge (ESD), keep your module in its antistatic bag until you are ready to install it into your system. When removing it from the bag, hold the module by the aluminum enclosure, and do not touch the components or connectors. Handle the module in an antistatic environment, and use a grounded workbench for testing and handling of your hardware.

4.2 Physical Characteristics

- Weight: Approximately 0.21 Kg (0.46 lbs.)
- Dimensions: 152 mm L x 130 mm W x 24 mm H (5.98 in L x 5.12 in W x 0.93 in H)

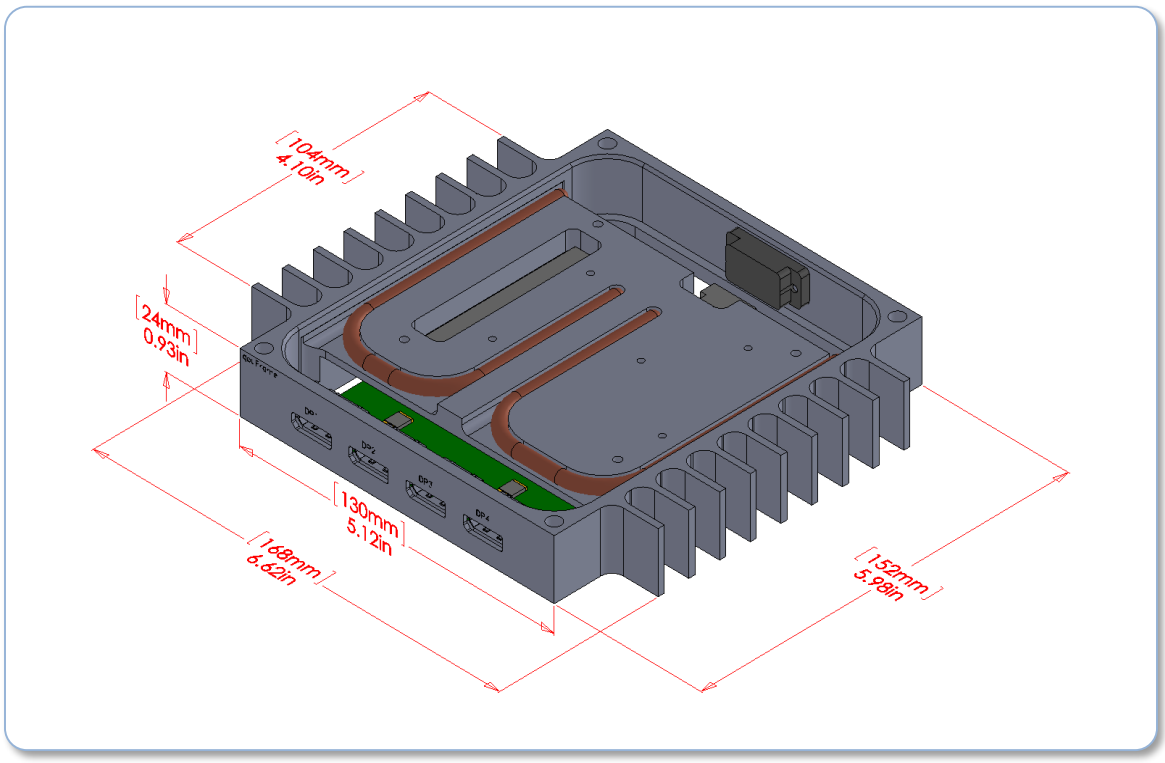
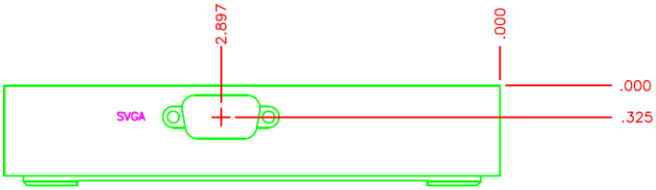


Figure 5: IDAN Dimensions

4.3 Connectors

4.3.1 External I/O Connectors

VGA Connector

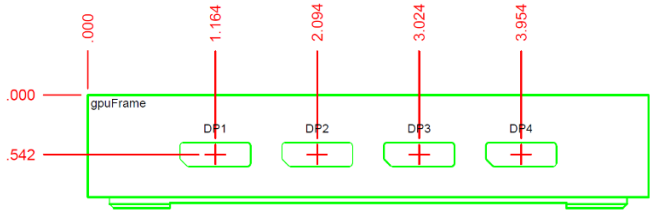


Connector Part #: AMP 5747229-8 **Sample Mating Connector:** AMP 747531-8

Table 6: IDAN-VID34860 15-Pin High Density "D" Connector

IDAN Pin#	Signal	VID34860 CN3 Pin #
1	Red	4
2	Green	6
3	Blue	8
4	Reserved	-
5	GND	9
6	GND	9
7	GND	9
8	GND	10
9	+5V	7
10	GND	10
11	Reserved	-
12	DDCDATA	5
13	HSYNC	2
14	VSYNC	1
15	DDCCLK	3

DisplayPort Connector



The DisplayPort connector uses a standard DisplayPort Male Receptacle, P/N: Molex 47272-0001.

4.3.2 Bus Connectors

CN1 (Top) & CN2 (Bottom): PCIe Connector

The PCIe connector is the connection to the system CPU. The position and pin assignments are compliant with the *PCI/104-Express Specification*. (See PC/104 Specifications on page 20)

4.4 Steps for Installing

1. Always work at an ESD protected workstation, and wear a grounded wrist-strap.
2. Turn off power to the IDAN system.
3. Remove the module from its anti-static bag.
4. Check that pins of the bus connector are properly positioned.
5. Check the stacking order; make sure all of the busses used by the peripheral cards are connected to the cpuModule.
6. Hold the module by its edges and orient it so the bus connector pins line up with the matching connector on the stack.
7. Gently and evenly press the module onto the IDAN system.
8. If any boards are to be stacked above this module, install them.
9. Finish assembling the IDAN stack by installing screws of an appropriate length.
10. Attach any necessary cables to the IDAN system.
11. Re-connect the power cord and apply power to the stack.
12. Boot the system and verify that all of the hardware is working properly.

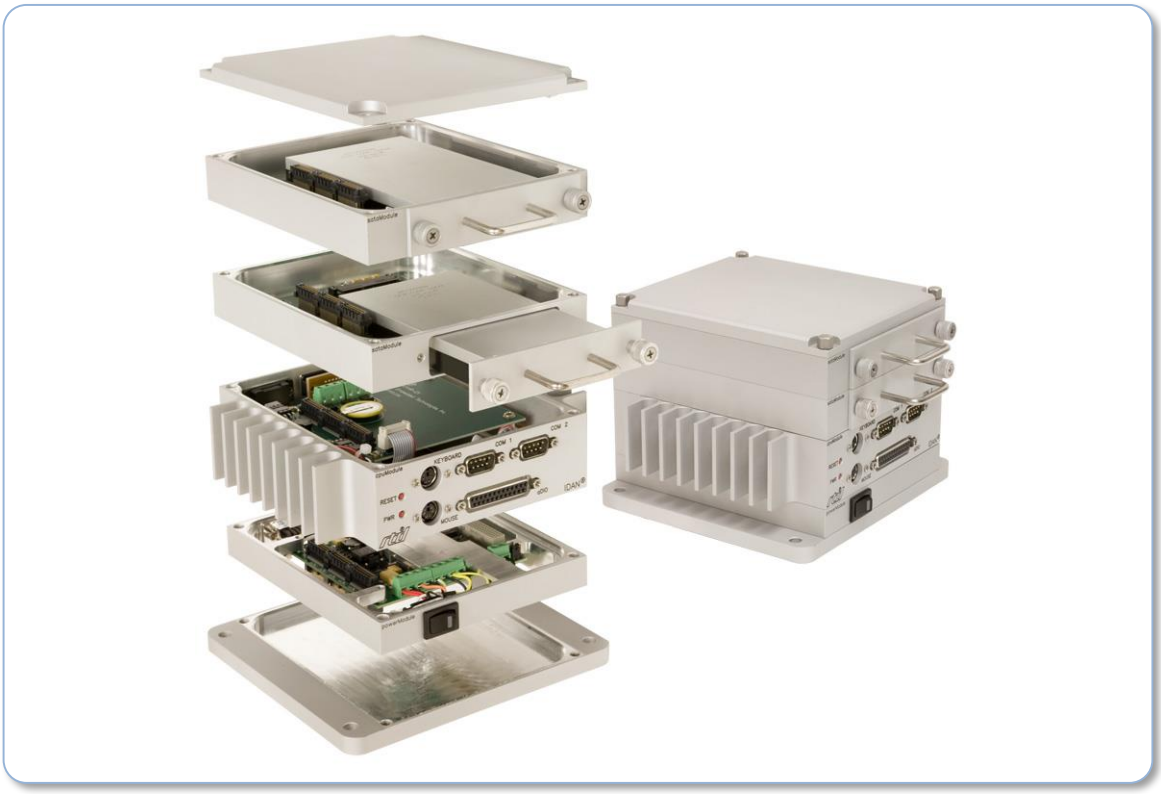


Figure 6: Example IDAN System

5 Functional Description

5.1 Block Diagram

The Figure below shows the functional block diagram of the VID34860. The various parts of the block diagram are discussed in the following sections.

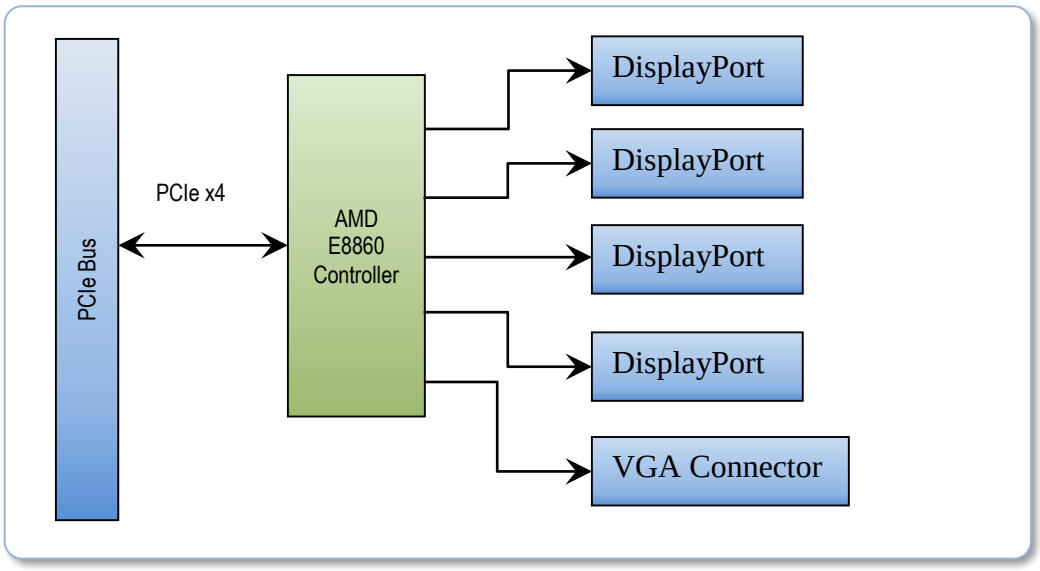


Figure 7: VID34860 Block Diagram

5.2 AMD GPU Controller

The VID34860 features the AMD E8860 GPU controller. This controller features up to 5 displays, 640 shader processors and 2GB GDDR5 memory. It's unified video decoder and integrated HD-Audio codec allows for superior multimedia experience. The VID34860 use the Type 2 PCIe connector to allow commutation with CPUs with only PCIe x4 link

5.2.1 MULTIPLE DISPLAYS

The AMD E8860 supports up to 5 displays. The VID34860 provides 4 DisplayPorts and one VGA connector to utilize this capability of the E8860. All displays may be used simultaneously.

6 Software

6.1 Drivers

VID34860 uses the standard AMD Embedded Radeon E8860 drivers. Drivers can be found on the RTD companion CD or at RTD's website, http://www.rtd.com. For the latest AMD drivers, refer to AMD's website, http://www.amd.com.

7 Troubleshooting

If you are having problems with your system, please try the following initial steps:

- **Simplify the System** – Remove modules one at a time from your system to see if there is a specific module that is causing a problem. Perform you troubleshooting with the least number of modules in the system possible.

- **Swap Components** – Try replacing parts in the system one at a time with similar parts to determine if a part is faulty or if a type of part is configured incorrectly.

If problems persist, or you have questions about configuring this product, contact RTD Embedded Technologies via the following methods:

Phone: +1-814-234-8087
E-Mail: techsupport@rtd.com

Be sure to check the RTD web site (http://www.rtd.com) frequently for product updates, including newer versions of the board manual and application software.

8 Additional Information

8.1 PC/104 Specifications

A copy of the latest PC/104 specifications can be found on the webpage for the PC/104 Embedded Consortium:

www.pc104.org

8.2 PCI and PCI Express Specification

A copy of the latest PCI and PCI Express specifications can be found on the webpage for the PCI Special Interest Group:

www.pcisig.com

9 Limited Warranty

RTD Embedded Technologies, Inc. warrants the hardware and software products it manufactures and produces to be free from defects in materials and workmanship for one year following the date of shipment from RTD Embedded Technologies, Inc. This warranty is limited to the original purchaser of product and is not transferable.

During the one year warranty period, RTD Embedded Technologies will repair or replace, at its option, any defective products or parts at no additional charge, provided that the product is returned, shipping prepaid, to RTD Embedded Technologies. All replaced parts and products become the property of RTD Embedded Technologies. Before returning any product for repair, customers are required to contact the factory for a Return Material Authorization (RMA) number.

This limited warranty does not extend to any products which have been damaged as a result of accident, misuse, abuse (such as: use of incorrect input voltages, improper or insufficient ventilation, failure to follow the operating instructions that are provided by RTD Embedded Technologies, “acts of God” or other contingencies beyond the control of RTD Embedded Technologies), or as a result of service or modification by anyone other than RTD Embedded Technologies. Except as expressly set forth above, no other warranties are expressed or implied, including, but not limited to, any implied warranties of merchantability and fitness for a particular purpose, and RTD Embedded Technologies expressly disclaims all warranties not stated herein. All implied warranties, including implied warranties for merchantability and fitness for a particular purpose, are limited to the duration of this warranty. In the event the product is not free from defects as warranted above, the purchaser's sole remedy shall be repair or replacement as provided above. Under no circumstances will RTD Embedded Technologies be liable to the purchaser or any user for any damages, including any incidental or consequential damages, expenses, lost profits, lost savings, or other damages arising out of the use or inability to use the product.

Some states do not allow the exclusion or limitation of incidental or consequential damages for consumer products, and some states do not allow limitations on how long an implied warranty lasts, so the above limitations or exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

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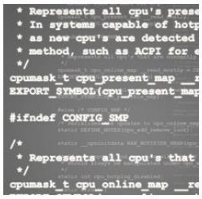

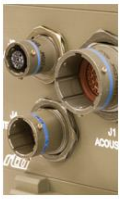
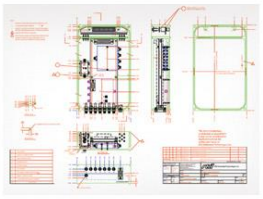

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