HDEC Series®
Backplanes

No. 87-508227-000 Revision G

Technical Reference Manual

HDEC Series®

WARRANTY

The following is an abbreviated version of Trenton Systems warranty policy for HDEC® Series backplanes. For a complete warranty statement, contact Trenton or visit our website at www.TrentonSystems.com.

Trenton HDEC® products are warranted against material and manufacturing defects for five years from date of delivery to the original purchaser. Buyer agrees that if this product proves defective Trenton Systems, Inc. is only obligated to repair, replace or refund the purchase price of this product at Trenton Systems' discretion. The warranty is void if the product has been subjected to alteration, neglect, misuse or abuse; if any repairs have been attempted by anyone other than Trenton Systems, Inc.; or if failure is caused by accident, acts of God, or other causes beyond the control of Trenton Systems, Inc. Trenton Systems, Inc. reserves the right to make changes or improvements in any product without incurring any obligation to similarly alter products previously purchased.

In no event shall Trenton Systems, Inc. be liable for any defect in hardware or software or loss or inadequacy of data of any kind, or for any direct, indirect, incidental or consequential damages arising out of or in connection with the performance or use of the product or information provided. Trenton Systems Inc.'s liability shall in no event exceed the purchase price of the product purchased hereunder. The foregoing limitation of liability shall be equally applicable to any service provided by Trenton Systems, Inc.

RETURN POLICY

Products returned for repair must be accompanied by a Return Material Authorization (RMA) number, obtained from Trenton Systems prior to return. Freight on all returned items must be prepaid by the customer, and the customer is responsible for any loss or damage caused by common carrier in transit. Items will be returned from Trenton Systems via Ground, unless prior arrangements are made by the customer for an alternative shipping method

To obtain an RMA number, call us at (800) 875-6031 or (770) 287-3100. We will need the following information:

Return company address and contact
Model name and model # from the label on the back of the product
Serial number from the label on the back of the product
Description of the failure

An RMA number will be issued. Mark the RMA number clearly on the outside of each box, include a failure report for each board and return the product(s) to our Gainesville, GA facility:

TRENTON Systems, Inc.
1725 MacLeod Drive
Lawrenceville, Georgia 30043
Attn: Repair Department

Contact Trenton for our complete service and repair policy.

TRADEMARKS

LIABILITY DISCLAIMER

E-mail: Support@TrentonSystems.com
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TRENTON Systems, Inc.
1725 MacLeod Drive, Lawrenceville, Georgia 30043
Sales: (800) 875-6031 • Phone: (770) 287-3100 • Fax: (770) 287-3150

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Handling Precautions

WARNING: This product has components which may be damaged by electrostatic discharge.

To protect your backplane from electrostatic damage, be sure to observe the following precautions when handling or storing the backplane:

• Keep the backplane in its static-shielded bag until you are ready to perform your installation.

• Handle the backplane by its edges.

• Do not touch the I/O connector pins. Do not apply pressure or attach labels to the backplane.

• Use a grounded wrist strap at your workstation or ground yourself frequently by touching the metal chassis of the system before handling any components. The system must be plugged into an outlet that is connected to an earth ground.

• Use antistatic padding on all work surfaces.

•Avoid static-inducing carpeted areas.

Before You Begin

INTRODUCTION

It is important to be aware of the system considerations listed below before installing your Trenton HDEC Series® backplane. Overall system performance may be affected by incorrect usage of these features.

PCI EXPRESS® LINKS

PCI Express devices with different PCI Express link configurations can establish communication using a process called auto-negotiation or link training. If a board with a higher number of lanes is placed in a slot with a lower number of lanes (e.g., a x16 board in a x16 mechanical slot electrically configured with a x4 PCIe link) or a board with a lower number of lanes is placed into a slot with a higher number of lanes (e.g., a x4 board into a x8 slot), the PCI Express link auto-negotiates down to the lower link rate to establish communication to the system host board (SHB). The mechanical option card slots on Trenton HDEC® backplanes have PCI Express configuration straps that support the PCIe auto-negotiation process between an option card and the system host board.

Native PCI Express 3.0 root links from the System Host Board (SHB) processors drive a backplane's PCIe option card slots. PCI Express 3.0 link retimers between the processors and the card slots ensure that reliable link communications are established between the CPUs and plug-in cards. The backplane supports industry standard PCI Express 3.0, 2.0, and 1.1 plug-in cards having x1, x4, x8 or x16 link widths. Plug-in cards having a x16 PCIe electrical link width are only supported at the x16 data throughput rate in the backplane slots driven as noted. All plug-in card slots use PCI Express x16 mechanical connectors. The SHB processors will auto-negotiate link communication between the CPUs and the plug-in cards to establish a communication link that best matches the plug-in card's specific interface type and link width.

HDEC® BACKPLANE CONFIGURATIONS

There are multiple "styles" of HDEC® backplane, intended to allow the HDEC® series optimal flexibility in different application environments and system chassis form factors. They are:

HDB8227 | "Butterfly" Form Factor, Supports 2U system designs
HDB8228 | Midsize backplane, Supports 4U system designs
HDB8229 | Full-size, Single-Segment, 5U and select 4U system designs
HDB8231 | Full-size, Single-Segment, 5U and select 4U system designs
HDB8236 | "Shoebox" Small Form Factor, supports custom enclosure and 2-in-1 5U system designs
HDB8237 | Full-size, Quad-Segment, supports 4-in-1 5U system designs
HDB8259 | Full-size, Single-Segment, 5U and select 4U GPU computing system designs

Additional backplane designs are in development. Currently planned backplanes are the HDB8230, and HDB8238.

HDB8230 | Midsize backplane, Supports 4U system designs
HDB8238 | Midsize backplane, Supports 4U system designs

Fan Controls

HDEC Series backplanes contain fan-control circuitry. In some cases, DIP switches may be employed on the backplane to configure how system fans are regulated and monitored. It is important to properly configure fan controls for adequate system cooling based on system load and ambient conditions. See the section specific to your backplane application for more information.

POWER CONNECTION

Trenton's HDEC® backplanes support soft power control signals via the Advanced Configuration and Power Interface (ACPI). When soft control signals are implemented, the type of ATX or EPS power supply used in the system and the operating system software will dictate how system power should be connected to the SHB. It is critical that the correct method be used.

+12V AUXILIARY POWER CONNECTION

Trenton HDEC® backplanes provide one or more +12V power connectors for routing auxiliary power to the SHB's edge connectors, eliminating the need for auxiliary power connections on the system host board.

POWER CAUTIONS

HDEC® backplanes require EPS-compatible power supplies of sufficient wattage and amperage to safely power one or more SHBs and option cards. Contact Trenton for more information about power consumption and recommended power supply units.

CAUTION!

The power needs of backplane option cards, high-performance processors and other system components may result in drawing more than 20A of current from the +12V power supply line. If this occurs, hazardous energy (240VA) could exist inside the system chassis. Final system/equipment suppliers must provide protection to service personnel from these potentially hazardous energy levels.

Standby voltages may be used in the final system design to enable certain system recovery operations. In this case, the power supply may not completely remove power to the system host board when the power switch is turned off. Caution must be taken to ensure that incoming system power is completely disconnected before removing the system host board.

In some systems, the power may appear to be off while the 5VSB signal is still present and supplying power to the SHB, option cards and other system components. The PSON (Power Supply On) LED on a Trenton HDEC® backplane monitors the 5VSB power signal; "green" indicates that the 5VSB signal is present. Trenton backplane LEDs monitor all DC power signals, and all of the LEDs should be off before adding or removing components. Removing boards under power may result in system damage.

BACKPLANE HOLE PATTERNS

The HDEC® backplanes have specific sizes and hole patterns. These hole patterns are not the same as standard motherboard hole patterns. For specific information, please see the "Layout Drawing and Dimensions" figures in the specific chapter for specific backplanes, contained in this document.

FOR MORE INFORMATION

For more information on any of these features, refer to the appropriate sections of the HDEC Series® Technical Reference Manual (#87-508227-000). The latest revision of this manual may be found on Trenton's website - www.TrentonSystems.com

Chapter 1 - Backplane Overview

INTRODUCTION

Trenton HDEC® Series systems represent a fundamental shift in how high-density embedded computing is implemented. Providing a full 80 lanes of PCI Express® 3.0, when equipped with a dual-processor system host board, and HDEC® presents great opportunity in TCO and SWaP optimization to several sectors including, Military, Big Data, Graphical Computing and Oil/Gas exploration.

Refer to the backplane descriptions in the following chapters of this manual for more information about specific backplanes.

MODELS

NOTE: In the chart below, the descriptions of the PCI Express slots include the electrical link rate of the slots, not the mechanical size, which is always a full-size, x16 slot.

Released HDEC® Backplanes	**HDB8237**	**HDB8228**	**HDB8236**	**HDB8227**	**HDB8229**	**HDB8231**	**HDB8259**
Format	Full-size/Quad-Segment	Midsize	Small/"Shoebox"	Small/ "Butterfly"	Large/Single-Segment	Large/Single-Segment	Large/Single Segment GPU Computing
Number of PCIe 3.0 Card Slots	4@x16, 1 per segment	4@x16, 4@x4	4@x16, 1@x8	4@x16	4@x16, 10@x8	2@x8, 16@x4	4@x16, 10@x8
Number of USB 2.0	2 per segment	6	2	2	6	6	6
Number of SATA/600	4 per segment	6	4	5	6	6	6
Target System Chassis	4-in-1 5U Rackmount	4U Rackmount	Custom & 2-in-1 5U Rackmount	2U Rackmount	4 or 5U Rackmount	4 or 5U Rackmount	4U or 5U Rackmount
HDEC® Backplanes Under Development	**HDB8230**	**HDB8238**					
Format	Midsize	Midsize					
Number of PCIe 3.0 Card Slots	5@x16, 1@x8, 2@x4	10@x8					
Number of USB 2.0	6	6					
Number of SATA/600	6	6					
Target System Chassis	4U Rackmount	4U Rackmount					

FEATURES

•More PCI Express links (5x aggregate bandwidth increase)
•Faster network interfaces
•Lower data latencies
•More device and I/O support
•Expanded PCIe Plug-in card support
•Increased adaptability
•COTS option card economies of scale
•Multiple systems (with segmented and shoebox backplanes)
•Fast MTTR (mean time to repair)

Chapter 2 - PCI Express® Overview

INTRODUCTION

PCI Express® is a high-speed, high-bandwidth interface with multiple channels (lanes) bundled together with each lane using full-duplex, serial data transfers with high clock frequencies.

The PCI Express architecture is based on the conventional PCI addressing model, but improves upon it by providing a high-performance physical interface and enhanced capabilities. Whereas the PCI bus architecture provided parallel communication between a processor board and backplane, the PCI Express protocol provides high-speed serial data transfer, which allows for higher clock speeds. The same data rate is available in both directions simultaneously, effectively reducing bottlenecks between the system host board (SHB) and PCI Express option cards.

PCI EXPRESS® LINKS

Several PCI Express channels (lanes) can be bundled for each expansion slot, leaving room for stages of expansion.

A basic PCI Express lane consists of a set of differential signal pairs: one pair for transmission and one pair for reception. A PCI Express link is a collection of one or more PCIe lanes. The most common PCI Express scalable link widths are in 1-, 4-, 8- and 16-lane configurations, generally referred to as x1, x4, x8 and x16 option card slots on a backplane.

A x1 ("by 1") slot indicates that the slot has one PCIe lane, which gives it a base data rate of 1000MBs in each direction for a PCI Express 3.0 implementation like that on a Trenton Systems HEP8225 HDEC Series system host board integrated into a system with an HDEC Series backplane. Since devices connected to an HDEC Series backplane do not compete for bandwidth, the effective bandwidth, counting bandwidth in both directions, for a x16 PCIe 3.0 link is 32GB/s (full-duplex).

The number and configuration of an SHB's PCI Express links is determined in large part by the backplane design, and the PCIe link implementation employed on the cards that are plugged into each backplane slot. The bandwidths achievable for the PCI Express 3.0 implementation supported on Trenton Systems' HDEC Series backplanes are as follows:

Slot Size	PCI Express 3.0 Bandwidth	Full-Duplex PCIe 3.0 Bandwidth
x1	2GB/s	4GB/s
x4	4GB/s	8GB/s
x8	8GB/s	16GB/s
x16	16GB/s	32GB/s

Scalability is a core feature of PCI Express. PCI Express interface scalability enables greater system operational flexibility and efficiency. For more information about the PCI Express® interface, please see:
http://www.trentonsystems.com/applications/pci-express-interface

Chapter 3 - HDEC® Specification Summary

OVERVIEW

The HDEC® Series of backplanes and system host boards were designed with the goal of bringing the very latest in high-throughput innovations provided by server-class Intel® processors to bear on mission-critical industries. In addition, the individual components were designed to fit most current industry-standard form factors for servers, workstations and rugged-environment computing without sacrificing reliability, longevity or performance, all while providing unrivaled flexibility in systems integration.

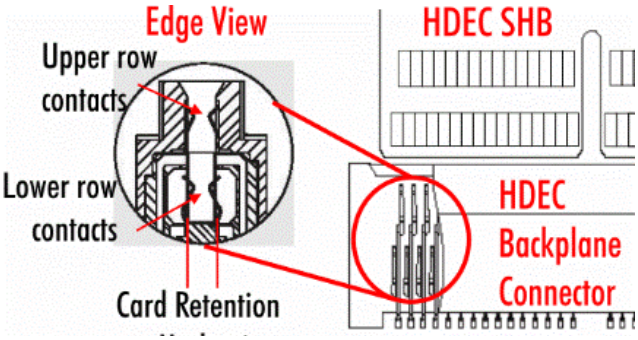


Figure 3.1. Detail of HDEC® Double-Density PCIe Interface.

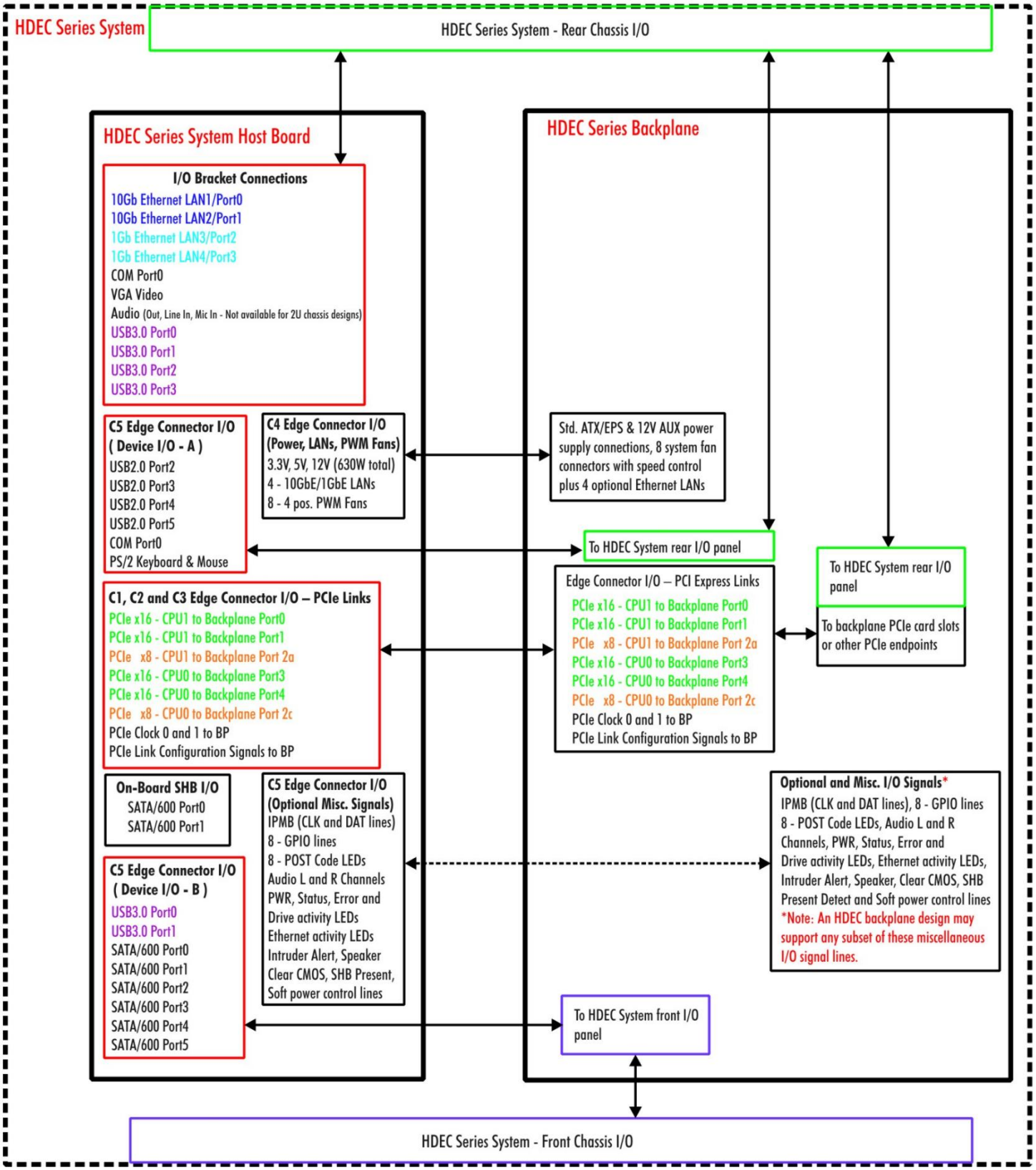
A double-density PCI express connection, consisting of five interfaces, notated C1 through C5, forms the backbone of the HDEC® system, allowing one system host board per backplane SHB slot to communicate with a single backplane with far greater throughput than previous standards. Other benefits of the HDEC® standard include eighty lanes of full PCIe 3.0 support, six SATA 600 ports, six USB 2.0 ports, RS232/422/485 interfaces, and PS/2 mouse and keyboard support. In kind, the backplane provides full power and internal I/O support to the System Host Board(s) through the HDEC® connector, reducing Mean Time to Repair (MTTR), easing cable routing, and ensuring optimal thermal efficiency. Connector C1 contains PCI-Express I/O and a Present pin, Connector C2 contains PCI-Express I/O, Connector C3 contains PCI-Express I/O, Present pins and the PCI-Express reference clocks. Connectors C4 and C5 contain the additional input and output functions. C4 handles power, Ethernet, SMBus, and System Fan control while C5 handles USB, SATA, Serial, Audio, LED, GPIO, fan, miscellaneous control signals and a SHB-present pin. A full accounting of the capabilities and design of the interface is presented in the chart on the following page. Figure 3.2 depicts the system I/O capabilities.

The HDEC® connector consists of four Samtec BEC5 200 connectors for data transmission and 1 Samtec BEC5 160 connector for power connections.

Additional features of the HDEC® SHB interface standard include:

- Intruder Alert function from backplane
- System Host Board detection
- Speaker out to backplane
- Audio Out to backplane
- Line In from backplane
- Microphone In from backplane
- RS232/422/485 to/from backplane
- CMOS clear input from backplane
- Eight (8) fan PWM output to backplane
- Eight (8) fan Tach input from backplane
- Three (3) fan PWM input to SHB
- Three (3) fan tach output from SHB
- Eight (8) GPIO Pins to/from backplane
- Ten (10) additional LED output to backplane
- Optional configuration data EEPROM on backplane

Figure 3.3. The HDEC® Series I/O Block Diagram.
Note: For reference purposes only. Not all system configurations will utilize all interfaces



Chapter 4 - HDB8227 Backplane Details

The HDB8227 is a 2U "Butterfly" backplane supporting one HDEC system host board. It is equipped with four switchless x16 PCIe 3.0 slots, one on the SHB side and three opposite. Additionally it supports two USB 3.0 ports and five SATA/600 ports. Provisions for ATX/EPS and 12V auxiliary power are provided by P1 and P2.

The backplane supports many of the system I/O interfaces brought down to the backplane via the edge card fingers on the HDEC® Series system host board. Use the following backplane connector to ensure the most efficient system I/O wiring possible for the 2U rackmount computer systems.

The HDB8227 has onboard hardware fan control capability, controlled by DIP switches on SW2. When all DIP switches are set to off, no fan control is available and all fans will run at full speed. When one (1) or more switches are set to on, fan control will be available and initialized for all fan headers, however, only the headers that are set to on will have their speeds monitored by the BIOS. All the remaining headers will operate at the commanded speed for the fan set to on. If a fan being monitored, i.e., its switch is set to on, and fails, all other fans will run at full speed until the fan is replaced/returns to commanded operating speed. If a fan fails that is on a circuit that is not being monitored, i.e., its switch is set to off, no action will be taken. See table 4.3 for additional switch information.

Table 4.1 MAIN CONNECTORS

HDB8227 Connectors	Function
P1	ATX/EPS power inputs from system supply
P2	+12V auxiliary power input from system supply
P12	USB 3.0 header for Port0/Port1 front panel interfaces
P24-25	System temperature sensor interfaces
P30-33	System fan connectors (4)
P60-64	SATA/600 interfaces for HDD/SSDs (5)

See figure 4.1 for component location information.

Table 4.2 ADDITIONAL SYSTEM INTERFACE CONNECTIONS, JUMPERS AND LEDS

Connectors		Jumpers		LEDs	
Connector	Function	Jumper	Function	LED	Function
P6	PSON	JU5	Fan Ctrl Enable	1	SHB Present
P8	Reset	JU6	Four-Wire Fans	2-5	System Fans
P9	Power Good	JU7	SHB Fan Ctrl.	6	1V Pwr Reg. Gd.
P7	Power Button			7	1.8V Pwr Reg. Gd.
P29	Clear CMOS			8	+3.3V Supply
P41	Fan Alarm LED			9	+5V Supply
P42	Temp. Alarm			10	+12V Supply
P43	Voltage Alarm			11	+5V Auxiliary
P44	HDD_LED				
P46	3.3V Aux. Slot				

See figure 4.1 for component location information.

Table 4.3 Switches

HDB8227 Switch	Function
SW2	Fan 1 Present Fan 2 Present Fan 3 Present Fan 4 Present

See figure 4.1 for component location information.

ENVIRONMENTAL SPECIFICATIONS*

Operating Temp: 0° C to 60° C
Storage Temp: -40° C to 70° C
Humidity: 5% to 90%, non-condensing
*Note: Environmental specification for system host boards/single board computers are usually lower than those of the backplane. Check with your SHB/SBC vendor.

RoHS Compliant. Designed to meet worldwide EMI emissions requirements. Conforms to CE standards. Contact Trenton for the specific standard numbers for this product. Designed for UL60950 and CAN/CSAC22.2 No. 60950-00.

8227-038 Configuration Jumpers

The setup of the configuration jumpers on the backplane is described below.

NOTE: Refer to the backplane layout drawing for the pin 1 position of the jumpers and connectors as indicated by the black square (▪).

Jumper	Description
JU1	**Microcontroller Enable** (Factory Use Only) 3-pin Jumper, Molex #22-03-2031 Jumper default position is unpopulated Pin Signal 1 PERSET# 2 MCLR 3 Vpp
JU2	**PIC Power Select Enable** (Factory Use Only) 3-pin Jumper, Molex #22-03-2031 Jumper default position is unpopulated Pin Signal 1 +3.3V 2 PICPOWER 3 Vdd
JU5	**System Fan Control Enable** 2-pin Jumper, Tyco (AMP) #5-146280-2 Jumper default position is populated. Remove jumper to have system fans run continuously at full speed. Pin Signal 1 $\overline{OE}$ 2 GND
JU6	**4-Wire System Fan Enable** 2-pin Jumper, Tyco (AMP) #5-146280-2 Jumper default position is populated. Remove jumper for systems that use two or three-wire fans. Pin Signal 1 S (4-wire system fan IN) 2 GND
JU7	**SHB Control of System Fans** 2-pin Jumper, Tyco (AMP) #5-146280-2 Jumper default position is populated. Remove jumper for systems that system fan control form non-SHB signal sources. Pin Signal 1 S (SHB system fan control IN) 2 GND

8227-038 Connectors

NOTE: Pin 1 on the connectors is indicated by the square pad on the PCB.

P1 - ATX/EPS Power Connector

24 pin vertical dual row, Molex #44206-0007

Pin	Signal	Pin	Signal
1	+3.3V	13	+3.3V
2	+3.3V	14	NC
3	GND	15	GND
4	+5V	16	PSON#
5	GND	17	GND
6	+5V	18	GND
7	GND	19	GND
8	PWRGD	20	NC
9	+5VAUX	21	+5V
10	+12V	22	+5V
11	+12V	23	+5V
12	+3.3V	24	GND

P2 - +12V Power Connector

8 pin vertical dual row, Molex #44206-0005

Pin	Signal	Pin	Signal
1	Gnd	8	+12V
2	Gnd	7	+12V
3	Gnd	6	+12V
4	Gnd	5	+12V

P3 - LED Dimmer Connector

2 pin vertical single row header, Tyco (AMP) #640456-2

Pin	Signal
1	PWM LED
2	+12V

P6 - Power-On Connector (PSON)

2 pin vertical single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	PSON#

8227-038 Connectors (continued)

P7 - Power Button Connector
2 pin vertical single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	PWRBT#

P8 - Reset Connector
2 pin vertical single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	SHB_RST#

P9 - Power Good Connector
2 pin vertical single row header, Tyco (AMP) #640456-2

Pin	Signal
1	PWRGD
2	+5V

P12 - Universal Serial Bus 3.0 (USB) Connector
19 pin dual row header, LOTES #ABA-USB-050-K04

Pin	Signal	Pin	Signal
1	+5V-USB0 (VBUS1)	11	USB1-DP
2	USB0-SRXN	12	USB1-DN
3	USB0-SRXP	13	Gnd-USB1
4	Gnd-USB4	14	USB1-STXP
5	USB0-STXN	15	USB1-STXN
6	USB0-STXP	16	Gnd-USB1
7	Gnd-USB0	17	USB1-SRXP
8	USB0-DN	18	USB1-SRXN
9	USB0-DP	19	+5V-USB1 (VBUS19)
10	NC		

P19 - I2C Slot Header (Factory Use Only)
3 pin single row header, Molex #22-23-2031

Pin	Signal
1	I2C_Header_SDA
2	I2C_Header_SCL
3	Gnd

P24 - Temperature Sensor 0 Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	TEMPSENSE0

P25 - Temperature Sensor 1 Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	TEMPSENSE1

8227-038 Connectors (continued)

P29 - Clear CMOS Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	CMOSCLR#

NOTE: To clear the system host board's CMOS using backplane connector P29, power down the system and install the P29 jumper. Wait for at least two seconds, remove the jumper and turn the power on. Clearing CMOS on the System host board will not result in a checksum error on the following boot. If you want to change a BIOS setting, you must press DEL or the F2 key during POST to enter the SHB's BIOS setup after clearing CMOS.
NOTE 2: Backplane Clear CMOS capability is a planned capability for the HDEC specification, to be implemented on future SHB products. The HEP8225 SHB does not support this capability.
For full P29 connector support information, contact Trenton.

P30, P31, P32, P33 12V Chassis Fan Connectors (4)
4 pin right-angle header, Molex #47053-1000

Pin	Signal
1	PWMn_3W (n=0,1,2,or 3)
2	+12V
3	TACHn
4	PWMn_4W

Note: 0=P30, 1=P31, 2=P32, 3=P33

P41 - Fan Alarm LED Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	FF_LED
2	+5V

P42 - Temp Alarm LED Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	TEMP_LED
2	+5V

P43 - Voltage Alarm LED Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	VOLT_LED
2	+5V

P45 - HDD LED Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	HDD_LED
2	+5V

8227-038 Connectors (continued)

P46 - 3.3V AUX Card Slot Enable Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	3.3V_AUX
2	+3.3V

Installing jumper P46 enables +3.3V AUX on all the PCIe card slots

P50 - Micro-Controller Programing Port (Factory Use Only)
5 pin single row header, Tyco (AMP) #87224-5

Pin	Signal
1	Vpp
2	Vdd
3	Gnd
4	ICSPDAT
5	ICSCLK

P57 - Front or Rear Panel LED/Button Connector (Factory Use Only)
7 pin single row header, Tyco (AMP) # 640456-7

Pin	Signal
1	Common from panel
2	Button position 1
3	Button position 2
4	Button position 3
5	Button position 4
6	Button position 5
7	Button position 6

P60, P61, P62, P63, P64 **SATA Connectors (4)**
7 pin vertical connector with latch, Molex # 67800-8005
P60 = Backplane SATA0, P61 = Backplane SATA1
P62 = Backplane SATA2, P63 = Backplane SATA3
P64 = Backplane SATA4

Pin	Signal
1	Gnd
2	TXn_p
3	TXn_n
4	Gnd
5	RXn_p
6	RXn_n
7	Gnd

n = 0, 1, 2, 3, or 4

8227-038 Diagnostic LED Status Indicators

LED Reference Designation	Backplane Silkscreen Wording	LED On	LED Off
LED1 (Red)	SHB Detect	SHB is not properly seated in its socket	Normal operation – SHB Detected
LED2, 3, 4 & 5 (Green)	FAN2, FAN3, FAN4, and FAN1	System fan present	System fan not present
LED6 (Green)	1V	Acceptable voltage level	Voltage level not acceptable
LED7 (Green)	1.8V	Acceptable voltage level	Voltage level not acceptable
LED8 (Green)	3.3V	Acceptable voltage level	Voltage level not acceptable
LED9 (Green)	5V	Acceptable voltage level	Voltage level not acceptable
LED10 (Green)	12V	Acceptable voltage level	Voltage level not acceptable
LED11 (Green)	5V AUX	Acceptable voltage level	Voltage level not acceptable

Figure 4.1. HDB8227 Layout drawing and dimensions.

ENGINEERING NOTES:

1. The power connectors shown in the layout drawing represent backplane model number 8227-038.
2. Mounting holes: 0.156” diameter.
3. Nominal PCB thickness: 0.062”.
4. All dimensions are in inches.
5. The PCI Express 3.0 links on this HDEC® Series backplane are driven directly from the HDEC® Series system host board. PCIe 3.0 link re-timers are used to ensure signal integrity between the SHB and each plug-in PCIe option card.
6. Interfaces denoted in green are x16 PCIe 3.0 driven from the HEP8225 SHB.

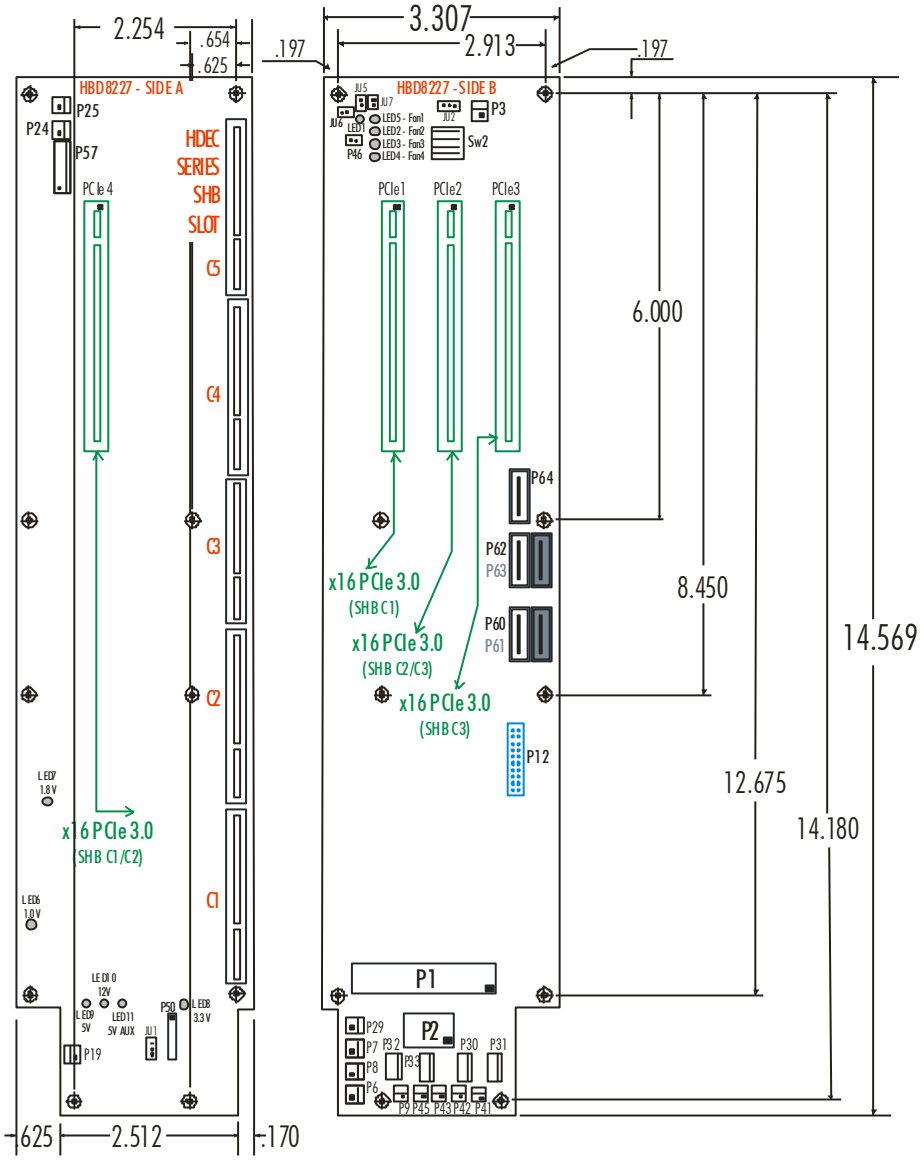
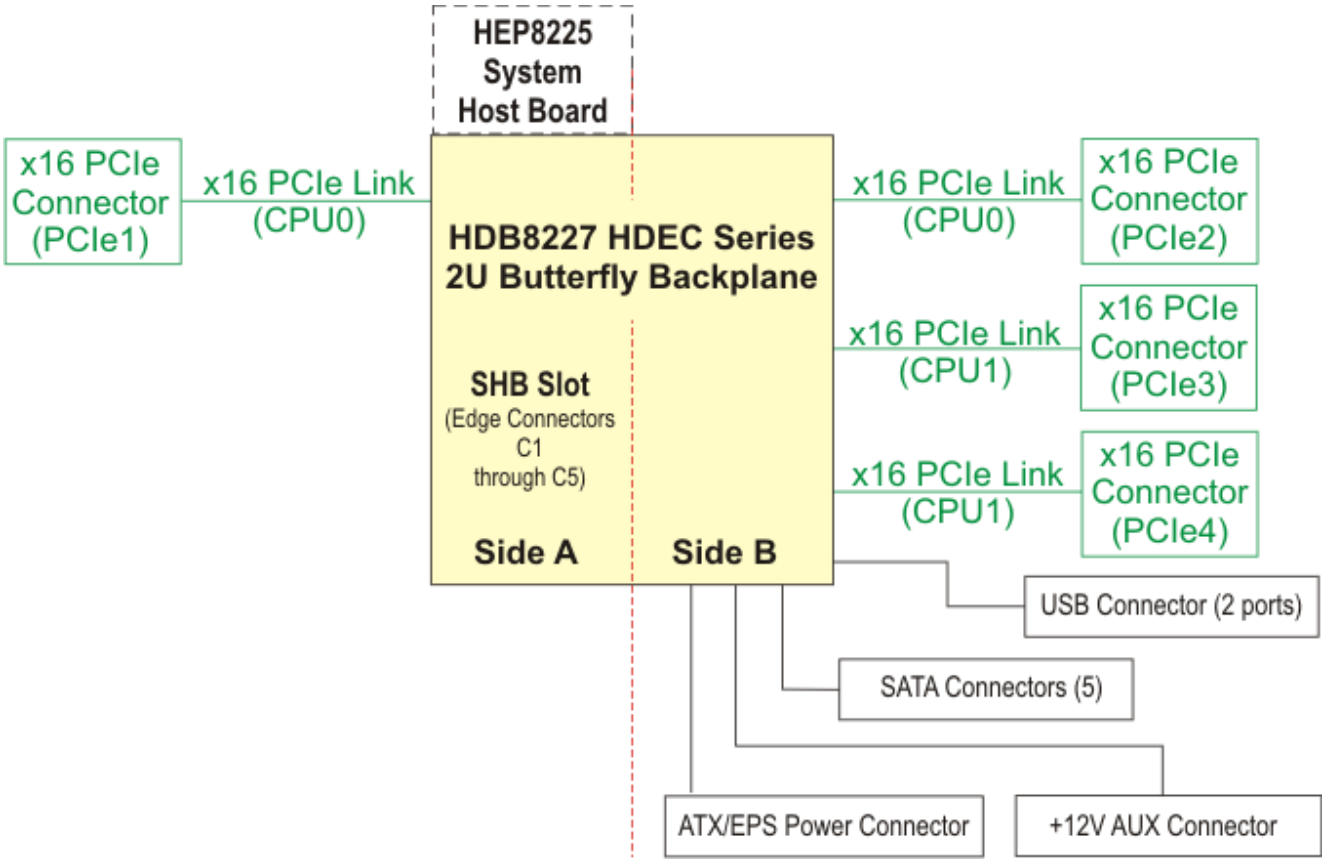


Figure 4.2. HDB8227 system block diagram.



Chapter 5 - HDB8228 Backplane Details

The HDB8228 is a midsize format backplane supporting one HDEC system host board. It is equipped with eight switchless, x16 mechanical PCIe 3.0 slots arranged in banks of four on either side of the SHB connector. Two each of these slots in each bank are electrically x16 and the remaining slots are x4. Additionally it supports four 4 USB 2.0 ports and six SATA/600 ports. Provisions for ATX/EPS and 12V auxiliary power are provided by P1, P2 and P21.

The backplane supports many of the system I/O interfaces brought down to the backplane via the edge card fingers on the HDEC® Series system host board. Use the following backplane connector to ensure the most efficient system I/O wiring possible for 4U rackmount computer embedded systems.'

The HDB8228 has onboard hardware fan control capability, controlled by DIP switches on SW1 and SW2. When all DIP switches are set to off, no fan control is available and all fans will run at full speed. When one (1) or more switches are set to on, fan control will be available and initialized for all fan headers, however, only the headers that are set to on will have their speeds monitored by the BIOS. All the remaining headers will operate at the commanded speed for the fan set to on. If a fan being monitored, i.e., its switch is set to on, and fails, all other fans will run at full speed until the fan is replaced/returns to commanded operating speed. If a fan fails that is on a circuit that is not being monitored, i.e., its switch is set to off, no action will be taken. See table 5.3 for additional switch information.

Table 5.1 MAIN CONNECTORS

HDB8228 Connector	Function
P1	ATX/EPS power inputs from system supply
P2 & P21	+12V auxiliary power input from system supply
P3	LED dimmer interface
P10	Additional +3.3V inputs for extended current applications
P11* (see engineering note 7)	USB 2.0 rear panel I/O Ports 2,3,4,5
P12	USB3.0 header for Port0/Port1 front panel interface
P20	System Speaker Interface
P30-P37	System fan connectors (8)
P39	PS/2 Keyboard header
P40	PS/2 Mouse header
P51	Serial interface header (RS232/422/485)
P53, P55	GPIO interface header (8 signals), JTAG interface header
P57	Keypad header for system front panel
P60-P65	SATA/600 interfaces for HDD/SSDs (6)

See figure 5.1 for component location information.

Table 5.2 ADDITIONAL SYSTEM INTERFACE CONNECTIONS, JUMPERS AND LEDS

Connectors		Jumpers		LEDs	
Connector	Function	Jumper	Function	LED	Function
P6	PSON	JU5	Fan Ctrl Enable	1-8	System Fans
P7	Power Button	JU6	Four-Wire Fans	9	Lower POST codes
P8	Reset	JU7	SHB Fan Ctrl.	10	Upper POST codes
P9	Power Good	JU8	Speaker Enable	11	1v Pwr. Reg. Gd.
P19	SMB	JU9	SMB Enable	12	1.8V Pwr. Reg. Gd.
P24, P25	Temp0, Temp1	JU10	12C Enable	13	SHB Present
P29	Clear CMOS	JU11	Retimer Enable	16	+3.3V Supply
P38	Intruder			19	+5V Supply
P41	Fan Alarm			20	+12V Supply
P42	Temp. Alarm			21	+5V AUX

See figure 5.1 for component location information.

Table 5.3 Switches

HDB8287 Switch	Function
SW2	Fan 0 Present Fan 1 Present Fan 2 Present Fan 3 Present
SW1	Fan 4 Present Fan 5 Present Fan 6 Present Fan 7 Present

See figure 5.1 for component location information.

ENVIRONMENTAL SPECIFICATIONS*

Operating Temp: 0° C to 60° C
Storage Temp: -40° C to 70° C
Humidity: 5% to 90%, non-condensing
*Note: Environmental specification for system host boards/single board computers are usually lower than those of the backplane. Check with your SHB/SBC vendor.

RoHS Compliant. Designed to meet worldwide EMI emissions requirements. Conforms to CE standards. Contact Trenton for the specific standard numbers for this product. Designed for UL60950 and CAN/CSAC22.2 No. 60950-00.

8228-038 Configuration Jumpers

The setup of the configuration jumpers on the backplane is described below.

NOTE: Refer to the backplane layout drawing for the pin 1 position of the jumpers and connectors as indicated by the black square (▪).

Jumper	Description
JU1	**Microcontroller Enable** (Factory Use Only) 3-pin Jumper, Molex #22-03-2031 Jumper default position is unpopulated Pin Signal 1 PERSET# 2 MCLR 3 Vpp
JU2	**PIC Power Select Enable** (Factory Use Only) 3-pin Jumper, Molex #22-03-2031 Jumper default position is unpopulated Pin Signal 1 +3.3V 2 PICPOWER 3 Vdd
JU5	**System Fan Control Enable** 2-pin Jumper, Tyco (AMP) #5-146280-2 Jumper default position is populated. Remove jumper to have system fans run continuously at full speed. Pin Signal 1 +3.3V 2 PICPOWER
JU6	**4-Wire System Fan Enable** 2-pin Jumper, Tyco (AMP) #5-146280-2 Jumper default position is populated. Remove jumper for systems that use two or three-wire fans. Pin Signal 1 4-wire system fan IN 2 Gnd
JU7	**SHB Control of System Fans** 2-pin Jumper, Tyco (AMP) #5-146280-2 Jumper default position is populated. Remove jumper for systems that system fan control form non-SHB signal sources. Pin Signal 1 SHB system fan control IN 2 Gnd

8228-038 Configuration Jumpers (continued)

JU8 **Backplane Speaker (SPK1) Enable**

2-pin Jumper, Tyco (AMP) #5-146280-2
Jumper default position is unpopulated. Install jumper to enable backplane speaker SPK1. Most systems will use a system speaker connected to P20.

Pin	Signal
1	+5V
2	SPK1, Pin2

JU9 **I2C Card Slot Enable**

2-pin Jumper, Tyco (AMP) #5-146280-2
Jumper default position is unpopulated.

Pin	Signal
1	Enable
2	GND

JU10 **I2C SHB Enable**

2-pin Jumper, Tyco (AMP) #5-146280-2
Jumper default position is unpopulated.

Pin	Signal
1	Enable
2	GND

JU11 **I2C Retimer Enable**

2-pin Jumper, Tyco (AMP) #5-146280-2
Jumper default position is unpopulated.

Pin	Signal
1	Enable
2	GND

8228-038 Connectors

NOTE: Pin 1 on the connectors is indicated by the square pad on the PCB.

P1 - ATX/EPS Power Connector

24 pin vertical dual row, Molex #44206-0007

Pin	Signal	Pin	Signal
1	+3.3V	13	+3.3V
2	+3.3V	14	NC
3	Gnd	15	Gnd
4	+5V	16	PSON#
5	Gnd	17	Gnd
6	+5V	18	Gnd
7	Gnd	19	Gnd
8	PWRGD	20	NC
9	+5VAUX	21	+5V
10	+12V	22	+5V
11	+12V	23	+5V
12	+3.3V	24	Gnd

P2, P21 - +12V Power Connectors

Two, 8 pin vertical dual row, Molex #44206-0005

Pin	Signal	Pin	Signal
1	Gnd	8	+12V
2	Gnd	7	+12V
3	Gnd	6	+12V
4	Gnd	5	+12V

P3 - LED Dimmer Connector

4 pin vertical single row header, Molex #47053-1000

Pin	Signal
1	PWM LED
2	PWM LED
3	+12V
4	+12V

P4 - USB 2.0 Redirect Connector (Factory Use Only)

4 pin vertical single row header, Tyco (AMP) #5-146280-4

Pin	Signal
1	VBUS1
2	NC
3	NC
4	Gnd

P5 - SPI Microcontroller Connector (Factory Use Only)

4 pin vertical single row header, Tyco (AMP) #5-146280-4

Pin	Signal
1	SPI_DO
2	SPI_DI
3	SPI_CLK
4	SPI_SS

8228-038 Connectors (continued)

P6 - Power-On Connector (PSON)
2 pin vertical single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	PSON#

P7 - Power Button Connector
2 pin vertical single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	PWRBT#

P8 - Reset Connector
2 pin vertical single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	SHB_RST#

P9 - Power Good Connector
2 pin vertical single row header, Tyco (AMP) #640456-2

Pin	Signal
1	PWRGD
2	+5V

P10 - Terminal Block Connector
4 position terminal block, Tyco (AMP) #796949-4
20 amps per circuit

Pin	Signal
1	+3.3V
2	+3.3V
3	GND
4	GND

8228-038 Connectors (continued)

P11 - Stacked, Quad USB 3.0 Ports (Rear Chassis Access)
4-port USB connector, FOXCONN #UEA1112C-QHD6-4F
Note 1: The A connector is the lowest connector in the stack while the D connector is the upper connector.
Note 2: The backplane routes USB 2.0 interfaces from the HEP8225 system host board to these four USB ports.

Pin	Signal	Pin	Signal
A1	+5V-USB2	B1	+5V-USB3
A2	USB2_N	B2	USB3_N
A3	USB2_P	B3	USB3_P
A4	Gnd-USB2	B4	Gnd-USB3
A5	USB2SSRX_N	B5	USB3SSRX_N
A6	USB2SSRX_P	B6	USB3SSRX_P
A7	Gnd-USB2	B7	Gnd-USB3
A8	USB2SSTX_N	B8	USB3SSTX_N
A9	USB2SSTX_P	B9	USB3SSTX_P

Pin	Signal	Pin	Signal
C1	+5V-USB4	D1	+5V-USB5
C2	USB4_N	D2	USB5_N
C3	USB4_P	D3	USB5_P
C4	Gnd-USB4	D4	Gnd-USB5
C5	USB4SSRX_N	D5	USB5SSRX_N
C6	USB4SSRX_P	D6	USB5SSRX_P
C7	Gnd-USB4	D7	Gnd-USB5
C8	USB4SSTX_N	D8	USB5SSTX_N
C9	USB4SSTX_P	D9	USB5SSTX_P

P12 - Universal Serial Bus 3.0 (USB) Connector
19 pin dual row header, LOTES #ABA-USB-050-K04

Pin	Signal	Pin	Signal
1	+5V-USB4 (VBUS1)	11	USB5-DP
2	USB4-SRXN	12	USB5-DN
3	USB4-SRXP	13	Gnd-USB5
4	Gnd-USB4	14	USB5-STXP
5	USB4-STXN	15	USB5-STXN
6	USB4-STXP	16	Gnd-USB5
7	Gnd-USB4	17	USB5-SRXP
8	USB4-DN	18	USB5-SRXN
9	USB4-DP	19	+5V-USB5 (VBUS19)
10	NC		

P19 - I2C Slot Header (Factory Use Only)
3 pin single row header, Molex #22-23-2031

Pin	Signal
1	I2C_Header_SDA
2	I2C_Header_SCL
3	Gnd

8228-038 Connectors (continued)

P20 - System Speaker Connector
4 pin single row header, Molex #47053-1000

Pin	Signal
1	SPKR_n
2	NC
3	Gnd
4	+5V

P24 - Temperature Sensor 0 Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	TEMPSENSE0

P25 - Temperature Sensor 1 Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	TEMPSENSE1

P29 - Clear CMOS Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	CMOSCLR#

NOTE: To clear the system host board's CMOS using backplane connector P29, power down the system and install the P29 jumper. Wait for at least two seconds, remove the jumper and turn the power on. Clearing CMOS on the System host board will not result in a checksum error on the following boot. If you want to change a BIOS setting, you must press DEL or the F2 key during POST to enter the SHB's BIOS setup after clearing CMOS.
NOTE 2: Backplane Clear CMOS capability is a planned capability for the HDEC specification, to be implemented on future SHB products. The HEP8225 SHB does not support this capability.
For full P29 connector support information, contact Trenton.

P30, P31, P32, P33, P34, P35, P36, P37 **12V Chassis Fan Connectors (8)**
4 pin right-angle header, Molex #47053-1000

Pin	Signal
1	PWMn_3W (n = 0, 1, 2, 3, 4, 5, 6, or 7)
2	+12V
3	TACHn
4	PWMn_4W

Note: 0=P30, 1=P31, 2=P32, 3=P33, 4=P34, 5=P35, 6=P36, 7=P37

8228-038 Connectors (continued)

P38 - Intruder Alert Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	INTRUDER#

P39 - PS/2 Keyboard Connector
5 pin single row header, Tyco (AMP) # 640456-5

Pin	Signal
1	PS2KBDCLK
2	PS2KBDDAT
3	NC
4	Gnd
5	+5V

P40 - PS/2 Mouse Connector
6 pin single row header, Tyco (AMP) # 640456-6

Pin	Signal
1	PS2MSDAT
2	NC
3	Gnd
4	+5V
5	PS2MSCLK
6	NC

P41 - Fan Alarm LED Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	FF_LED
2	+5V

P42 - Temp Alarm LED Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	TEMP_LED
2	+5V

P43 - Voltage Alarm LED Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	VOLT_LED
2	+5V

P44 - Error Alarm LED Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	ERROR_LED
2	+5V

8228-038 Connectors (continued)

P45 - HDD LED Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	HDD_LED
2	+5V

P46 - 3.3V AUX Card Slot Enable Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	3.3V_AUX
2	+3.3V

Installing jumper P46 enables +3.3V AUX on all the PCIe card slots

P47 - I2C Card Slot Disable Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	I2C Enable
2	Gnd

Installing jumper P47 disables the I2C signals on all the PCIe card slots

P48 - Ethernet Activity LED Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	ENET0LED1
2	ENET0LED0

P49 - Ethernet Activity LED Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	ENET1LED1
2	ENET1LED0

P50 - Micro-Controller Programing Port (Factory Use Only)
5 pin single row header, Tyco (AMP) #87224-5

Pin	Signal
1	Vpp
2	Vdd
3	Gnd
4	ICSPDAT
5	ICSPCLK

P51 - RS232 Serial Port Connector
10 pin dual row connector, 3M #N2510-6003-RB

Pin	Signal	Pin	Signal
1	Carrier Detect (DCD)	2	Data Set Ready-I (DSR)
3	Receive Data-I (RX)	4	Request to Sent-O (RTS)
5	Transmit Data-O (TX)	6	Clear To Send (CTS)
7	Data Terminal Ready (DTR)	8	Ring Indicator-I (RI)
9	Gnd	10	NC

8228-038 Connectors (continued)

P53 - GPIO Connector
8 pin dual row connector, 3M #N2508-6003-RB

Pin	Signal	Pin	Signal
1	GPIO2	2	GPIO3
3	GPIO4	4	GPIO5
5	GPIO6	6	GPIO7
7	GPIO1	8	Gnd

P55 - JTAG Connector
10 pin dual row connector, 3M #N2510-6003-RB

Pin	Signal	Pin	Signal
1	TCK	2	Gnd
3	TDOHDR	4	+3.3V
5	TMS	6	RESET#
7	EVTO	8	TRST#
9	TDOPCIE8	10	NC

P57 - Front or Rear Panel LED/Button Connector (Factory Use Only)
7 pin single row header, Tyco (AMP) # 640456-7

Pin	Signal
1	Common from panel
2	Button position 1
3	Button position 2
4	Button position 3
5	Button position 4
6	Button position 5
7	Button position 6

P60, P61, P62, P63, P64, P65 SATA Connectors (6)
7 pin vertical connector with latch, Molex # 67800-8005
P60 = Backplane SATA0, P61 = Backplane SATA1
P62 = Backplane SATA2, P63 = Backplane SATA3
P64 = Backplane SATA4, P65 = Backplane SATA5

Pin	Signal
1	Gnd
2	TXn_p
3	TXn_n
4	Gnd
5	RXn_p
6	RXn_n
7	Gnd

n = 0, 1, 2, 3, 4 or 5

8228-038 Diagnostic LED Status Indicators

LED Reference Designation	Backplane Silkscreen Wording	LED On	LED Off
LED1 thru LED8 (Green)	FAN0 thru FAN7	System fan present	System fan not present
LED9 (7-segment display)	Upper Post Code	SHB Post Code Error*	SHB Boot Complete
LED10 (7-segment display)	Lower Post Code	SHB Post Code Error*	SHB Boot Complete
LED11 (Green)	1V	Acceptable voltage level	Voltage level not acceptable
LED12 (Green)	1.8V	Acceptable voltage level	Voltage level not acceptable
LED13 (Red)	SHB Detect	SHB is not properly seated in its socket	Normal operation – SHB Detected
LED16 (Green)	3.3V	Acceptable voltage level	Voltage level not acceptable
LED19 (Green)	5V	Acceptable voltage level	Voltage level not acceptable
LED20 (Green)	12V	Acceptable voltage level	Voltage level not acceptable
LED21 (Green)	5V AUX	Acceptable voltage level	Voltage level not acceptable

*See the HEP8225 hardware reference manual for a description of the SHB's post code error code numbers

Figure 5.1. HDB8228 Layout drawing and dimensions.

ENGINEERING NOTES:

1. The power connectors shown in the layout drawing represent backplane model number 8228-038.
2. Mounting holes: 0.156” diameter.
3. Nominal PCB thickness: 0.080”.
4. All dimensions are in inches.
5. The PCI Express 3.0 links on this HDEC® Series backplane are driven directly from the HDEC® Series system host board. PCIe 3.0 link re-timers are used to ensure signal integrity between the SHB and each plug-in PCIe option card.
6. Interfaces denoted in green are x16 PCIe 3.0 driven from the HEP8225 SHB. Interfaces denoted in orange are x4 PCIe 3.0 driven from the HEP8225 SHB.
7. * The P11 ports physically support USB 3.0 interfaces; however, the current USB routing for P11 from the SHB only operates at USB 2.0 speeds.

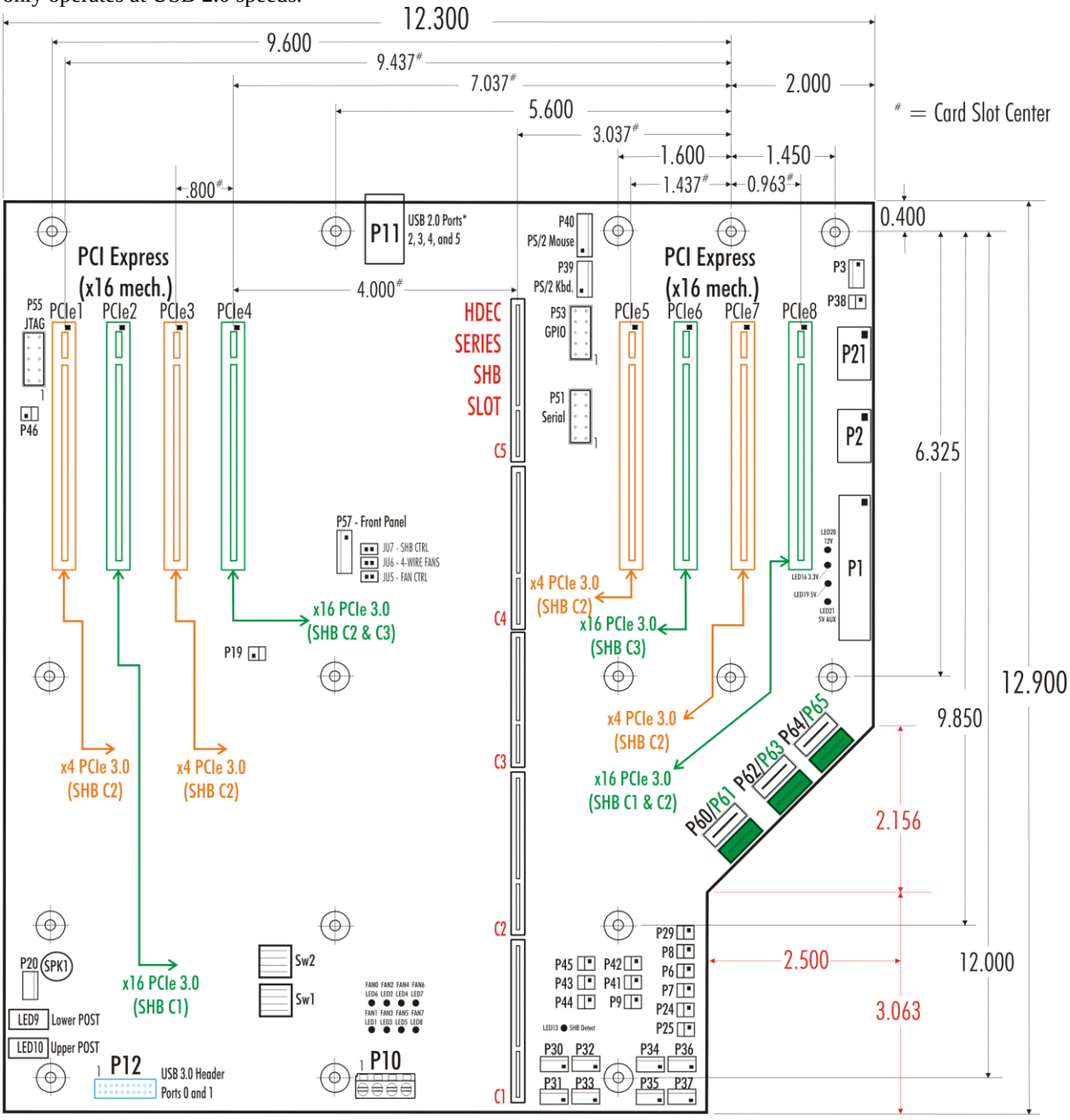
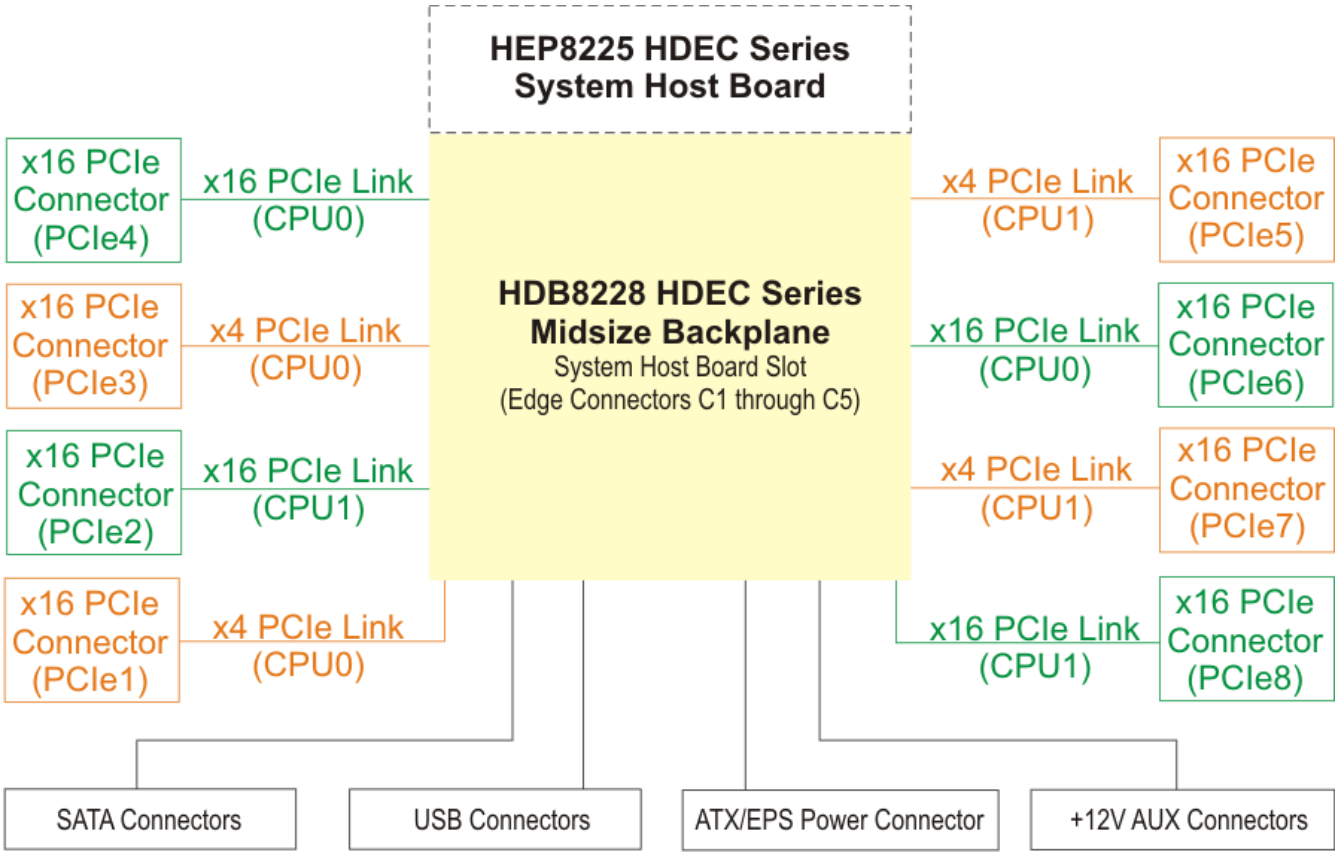


Figure 5.2. HDB8228 system block diagram.



Chapter 6 - HDB8229 Backplane Details

The HDB8229 is a large format backplane supporting one HDEC system host board, targeting 5U and select 4U rackmount computer deployments. It is equipped with fourteen, x16 mechanical PCIe 3.0 slots. Four of these are electrically x16, ten are x8. Additionally it supports four 4 USB 2.0 ports, two USB 3.0 ports via onboard connector P12 and six SATA/600 ports. Provisions for ATX/EPS and 12V auxiliary power are provided by P1, P2, P21, P22 and P23.

The backplane supports many of the system I/O interfaces brought down to the backplane via the edge card fingers on the HDEC® Series system host board.

Table 6.1 MAIN CONNECTORS

HDB8229 Connector	Function
P1	ATX/EPS power inputs from system supply
P2, P21, P22 & P23	+12V auxiliary power input from system supply
P3	LED dimmer interface
P10	Additional +3.3V inputs for extended current applications
P11* (see engineering note 7)	USB 2.0 rear panel I/O Ports 2,3,4,5
P12	USB3.0 header for Port0/Port1 front panel interface
P20	System Speaker Interface
P30-P37	System fan connectors (8)
P39	PS/2 Keyboard header
P40	PS/2 Mouse header
P51	Serial interface header (RS232/422/485)
P53, P55	GPIO interface header (8 signals), JTAG interface header
P57	Keypad header for system front panel
P60-P65	SATA/600 interfaces for HDD/SSDs (6)

See figure 6.1 for component location information.

Table 6.2 ADDITIONAL SYSTEM INTERFACE CONNECTIONS, JUMPERS AND LEDS

Connectors		Jumpers		LEDs	
Connector	Function	Jumper	Function	LED	Function
P6	PSON	JU5	Fan Ctrl Enable	1	SHB Detect
P7	Power Button	JU6	Four-Wire Fans	2	Lower POST codes
P8	Reset	JU7	SHB Fan Ctrl.	3	Upper POST codes
P9	Power Good	JU8	Speaker Enable	4-11	Fan Detect
P19	SMB	JU9	SMB Enable	13-17, 20	Voltage Acceptable.
P24, P25	Temp0, Temp1	JU10	12C Enable	21-30	Port Good
P29	Clear CMOS	JU11	Retimer Enable	31	EEPROM
P38	Intruder	JU12	I2C PEX Switch Disable	32	PCIe Switch Fail
P41	Fan Alarm				
P42	Temp. Alarm				

See figure 6.1 for component location information.

ENVIRONMENTAL SPECIFICATIONS*

Operating Temp: 0° C to 60° C
Storage Temp: -40° C to 70° C
Humidity: 5% to 90%, non-condensing
*Note: Environmental specification for system host boards/single board computers are usually lower than those of the backplane. Check with your SHB/SBC vendor.

RoHS Compliant. Designed to meet worldwide EMI emissions requirements. Conforms to CE standards. Contact Trenton for the specific standard numbers for this product. Designed for UL60950 and CAN/CSAC22.2 No. 60950-00.

8229-037 Configuration Jumpers

The setup of the configuration jumpers on the backplane is described below.

NOTE: Refer to the backplane layout drawing for the pin 1 position of the jumpers and connectors as indicated by the black square (▪).

Jumper	Description
JU1	**Microcontroller Enable** (Factory Use Only) 3-pin Jumper, Molex #22-03-2031 Jumper default position is unpopulated Pin Signal 1 PERSET# 2 MCLR 3 Vpp
JU2	**PIC Power Select Enable** (Factory Use Only) 3-pin Jumper, Molex #22-03-2031 Jumper default position is unpopulated Pin Signal 1 +3.3V 2 PICPOWER 3 Vdd
JU5	**System Fan Control Enable** 2-pin Jumper, Tyco (AMP) #5-146280-2 Jumper default position is populated. Remove jumper to have system fans run continuously at full speed. Pin Signal 1 +3.3V 2 PICPOWER
JU6	**4-Wire System Fan Enable** 2-pin Jumper, Tyco (AMP) #5-146280-2 Jumper default position is populated. Remove jumper for systems that use two or three-wire fans. Pin Signal 1 4-wire system fan IN 2 Gnd
JU7	**SHB Control of System Fans** 2-pin Jumper, Tyco (AMP) #5-146280-2 Jumper default position is populated. Remove jumper for systems where system fan control is from non-SHB signal sources. Pin Signal 1 SHB system fan control IN 2 Gnd

8229-037 Configuration Jumpers (continued)

JU8 **Backplane Speaker (SPK1) Enable**

2-pin Jumper, Tyco (AMP) #5-146280-2
Jumper default position is populated. Remove jumper to disable backplane speaker SPK1. Most systems will use a system speaker connected to P20.

Pin	Signal
1	+5V
2	SPK1, Pin2

JU9 **I2C Retimer Disable Connector**

2 pin single row header, Tyco (AMP) #640456-2
Installing jumper JU9 disables the PCIe slots.

Pin	Signal
1	I2C Enable
2	Gnd

JU10 **I2C Retimer Disable Connector**

2 pin single row header, Tyco (AMP) #640456-2
Installing jumper JU10 disables the SHB/HDEC port.

Pin	Signal
1	I2C Enable
2	Gnd

JU11 **I2C Retimer Disable Connector**

2 pin single row header, Tyco (AMP) #640456-2
Installing jumper JU11 disables the PCIe retimers.

Pin	Signal
1	I2C Enable
2	Gnd

JU12 **I2C Disable PEX Switch**

2 pin single row header, Tyco (AMP) #640456-2
Installing jumper P49 disables the PCIe switch.

Pin	Signal
1	I2C Enable
2	Gnd

8229-037 Connectors

NOTE: Pin 1 on the connectors is indicated by the square pad on the PCB.

P1 ATX/EPS Power Connector

24 pin right angle dual row, Molex #39-30-1240

Pin	Signal	Pin	Signal
1	+3.3V	13	+3.3V
2	+3.3V	14	NC
3	Gnd	15	Gnd
4	+5V	16	PSON#
5	Gnd	17	Gnd
6	+5V	18	Gnd
7	Gnd	19	Gnd
8	PWRGD	20	NC
9	+5VAUX	21	+5V
10	+12V	22	+5V
11	+12V	23	+5V
12	+3.3V	24	Gnd

P2 +12V Power Connectors

8 pin right angle dual row, Molex #39-30-0080

Pin	Signal	Pin	Signal
1	Gnd	8	+12V
2	Gnd	7	+12V
3	Gnd	6	+12V
4	Gnd	5	+12V

P3 LED Dimmer Connector

4 pin vertical single row header, Molex #47053-1000

Pin	Signal
1	PWM LED
2	PWM LED
3	+12V
4	+12V

P5 SPI Microcontroller Connector (Factory Use Only)

4 pin vertical single row header, Tyco (AMP) #5-146280-4

Pin	Signal
1	SPI_DO
2	SPI_DI
3	SPI_CLK
4	SPI_SS

P6 Power-On Connector (PSON)

2 pin vertical single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	PSON#

8229-037 Connectors (continued)

P7 Power Button Connector

2 pin vertical single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	PWRBT#

P8 Reset Connector

2 pin vertical single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	SHB_RST#

P9 Power Good Connector

2 pin vertical single row header, Tyco (AMP) #640456-2

Pin	Signal
1	PWRGD
2	+5V

P10 Terminal Block Connector

4 position terminal block, Tyco (AMP) #796949-4 (20 Amps per circuit)

Pin	Signal
1	+3.3V
2	+3.3V
3	GND
4	GND

P11 Stacked, Quad USB 2.0 Ports (Rear Chassis Access)

4-port USB connector, FOXCONN #UEA1112C-QHD6-4F

Note 1: The A connector is the lowest connector in the stack while the D connector is the upper connector.

Note 2: The backplane routes USB 2.0 interfaces from the HEP8225 system host board to these four USB ports.

Pin	Signal	Pin	Signal
A1	+5V-USB2	B1	+5V-USB3
A2	USB2_N	B2	USB3_N
A3	USB2_P Gnd-	B3	USB3_P Gnd-
A4	USB2	B4	USB3
A5	USB2SSRX_N	B5	USB3SSRX_N
A6	USB2SSRX_P	B6	USB3SSRX_P
A7	Gnd-USB2	B7	Gnd-USB3
A8	USB2SSTX_N	B8	USB3SSTX_N
A9	USB2SSTX_P	B9	USB3SSTX_P
Pin	Signal	Pin	Signal
B1	+5V-USB4	D1	+5V-USB5
B2	USB4_N	D2	USB5_N
B3	USB4_P Gnd-	D3	USB5_P Gnd-
B4	USB4	D4	USB5
B5	USB4SSRX_N	D5	USB5SSRX_N
B6	USB4SSRX_P	D6	USB5SSRX_P
B7	Gnd-USB4	D7	Gnd_USB5
B8	USB4SSTX_N	D8	USB5SSTX_N
B9	USB4SSTX_P	D9	USB5SSTX_P

8229-037 Connectors (continued)

P12 Universal Serial Bus 3.0 (USB) Connector

19 pin dual row header, LOTES #ABA-USB-050-K04

Pin	Signal	Pin	Signal
1	+5V-USB4 (VBUS1)	11	USB5-DP
2	USB4-SRXN	12	USB5-DN
3	USB4-SRXP	13	Gnd-USB5
4	Gnd-USB4	14	USB5-STXP
5	USB4-STXN	15	USB5-STXN
6	USB4-STXP	16	Gnd-USB5
7	Gnd-USB4	17	USB5-SRXP
8	USB4-DN	18	USB5-SRXN
9	USB4-DP	19	+5V-USB5 (VBUS19)
10	NC		

P15 GPIO Debug Header (Factory Use Only)

4 pin vertical single row header, Tyco (AMP) #5-146280-4

Pin	Signal
1	GPIO_1
2	GPIO_2
3	GPIO_3
4	GPIO_4

P19 I2C Slot Header (Factory Use Only)

3 pin single row header, Molex #22-23-2031

Pin	Signal
1	I2C_Header_SDA
2	I2C_Header_SCL
3	Gnd

P20 System Speaker Connector

4 pin single row header, Molex #47053-1000

Pin	Signal
1	SPKR_n
2	NC
3	Gnd
4	+5V

P21 +12V Power Connector

8 pin right angle dual row, Molex #39-30-0080

Pin	Signal	Pin	Signal
1	Gnd	8	+12V
2	Gnd	7	+12V
3	Gnd	6	+12V
4	Gnd	5	+12V

P22 +12V Power Connector

8 pin right angle dual row, Molex #39-30-0080

Pin	Signal	Pin	Signal
1	Gnd	8	+12V
2	Gnd	7	+12V
3	Gnd	6	+12V
4	Gnd	5	+12V

8229-037 Connectors (continued)

P23 +12V Power Connector

8 pin right angle dual row, Molex #39-30-0080

Pin	Signal	Pin	Signal
1	Gnd	8	+12V
2	Gnd	7	+12V
3	Gnd	6	+12V
4	Gnd	5	+12V

P24 Temperature Sensor 0 Connector

2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	TEMPSENSE0

P25 Temperature Sensor 1 Connector

2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	TEMPSENSE1

P29 Clear CMOS Connector

2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	CMOSCLR#

NOTE: To clear the system host board's CMOS using backplane connector P29, power down the system and install the P29 jumper. Wait for at least two seconds, remove the jumper and turn the power on. Clearing CMOS on the System host board will not result in a checksum error on the following boot. If you want to change a BIOS setting, you must press DEL or the F2 key during POST to enter the SHB's BIOS setup after clearing CMOS

NOTE 2: Backplane Clear CMOS capability is a planned capability for the HDEC specification, to be implemented on future SHB products. The HEP8225 SHB does not support this capability.

For full P29 connector support information, contact Trenton.

P30, P32 P33 P34 P35 P36 P37 12V Chassis Fan Connectors (4)

4 pin right-angle header, Molex #47053-1000

Pin	Signal
1	PWMn_3W
2	+12V
3	TACHn
4	PWMn_4W

Note: n=Fan Number

P38 Intruder Alert Connector

2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	INTRUDER#

8229-037 Connectors (continued)

P39 PS/2 Keyboard Connector

5 pin single row header, Tyco (AMP) # 640456-5

Pin	Signal
1	PS2KBDCLK
2	PS2KBDDAT
3	NC
4	Gnd
5	+5V

P40 PS/2 Mouse Connector

6 pin single row header, Tyco (AMP) # 640456-6

Pin	Signal
1	PS2MSDAT
2	NC
3	Gnd
4	+5V
5	PS2MSCLK
6	NC

P41 Fan Alarm LED Connector

2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	FF_LED
2	+5V

P42 Temp Alarm LED Connector

2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	TEMP_LED
2	+5V

P43 Voltage Alarm LED Connector

2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	VOLT_LED
2	+5V

P44 Error Alarm LED Connector

2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	ERROR_LED
2	+5V

P45 HDD LED Connector

2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	HDD_LED
2	+5V

8229-037 Connectors (continued)

P46 **3.3V AUX Card Slot Enable Connector**
A, B 2 pin single row header, Tyco (AMP) #640456-2
C, D

Pin	Signal
1	3.3V_AUX
2	+3.3V

Note 1: Installing jumper P46n enables +3.3V AUX on four of the PCIe card slots for boards with only one connector.
Note 2: For boards with multiple connectors, enabling will provide +3.3V AUX to only those slots the specific jumper controls.

P51 **RS232 Serial Port Connector**
10 pin dual row connector, 3M #N2510-6003-RB

Pin	Signal	Pin	Signal
1	Carrier Detect (DCD)	2	Data Set Ready-I (DSR)
3	Receive Data-I (RX)	4	Request to Sent-O (RTS)
5	Transmit Data-O (TX)	6	Clear To Send (CTS)
7	Data Terminal Ready (DTR)	8	Ring Indicator-I (RI)
9	Gnd	10	NC

P53 **GPIO Connector**
8 pin dual row connector, 3M #N2508-6003-RB

Pin	Signal	Pin	Signal
1	GPIO2	2	GPIO3
3	GPIO4	4	GPIO5
5	GPIO6	6	GPIO7
7	GPIO1	8	Gnd

P55 **JTAG Connector**
10 pin dual row connector, 3M #N2510-6003-RB

Pin	Signal	Pin	Signal
1	TCK	2	Gnd
3	TDOHDR	4	+3.3V
5	TMS	6	RESET#
7	EVTO	8	TRST#
9	TDOPCIE8	10	NC

P57 **Front or Rear Panel LED/Button Connector (Factory Use Only)**
7 pin single row header, Tyco (AMP) # 640456-7

Pin	Signal
1	Common from panel
2	Button position 1
3	Button position 2
4	Button position 3
5	Button position 4
6	Button position 5
7	Button position 6

8229-037 Connectors (continued)

P60 **SATA Connectors**
P61 7 pin vertical connector with latch, Molex # 67800-8005
P62

Pin	Signal
1	Gnd
2	TXn_p
3	TXn_n
4	Gnd
5	RXn_p
6	RXn_n
7	Gnd

P63
P64
P65

Note: n=SATA port number

8229-037 Diagnostic LED Status Indicators

LED Reference Designation	Backplane Silkscreen Wording	LED On	LED Off
LED1 (Red)	SHB Detect	SHB is not properly seated in its socket	Normal operation – SHB Detected
LED2 (7-segment display)	Lower Post Code	SHB Post Code Error*	SHB Boot Complete
LED3 (7-segment display)	Upper Post Code	SHB Post Code Error*	SHB Boot Complete
LED4,5,6,7,8,9,10,11	FAN n (n=System Fan Number)	System fan present	System fan not present
LED12	PWRGOOD	Acceptable voltage level	Voltage level not acceptable
LED13	+5V AUX	Acceptable voltage level	Voltage level not acceptable
LED14	+12V	Acceptable voltage level	Voltage level not acceptable
LED15	+5V	Acceptable voltage level	Voltage level not acceptable
LED16	+3.3V	Acceptable voltage level	Voltage level not acceptable
LED17	+1.8V for U10, U20, U40	Acceptable voltage level	Voltage level not acceptable
LED18	+1.8V for U21	Acceptable voltage level	Voltage level not acceptable
LED20	+0.9V	Acceptable voltage level	Voltage level not acceptable
LED21	Port Good 0	PCIe Port Functional	PCIe Port NonFunctional
LED22	Port Good 1	PCIe Port Functional	PCIe Port NonFunctional
LED23	Port Good 4	PCIe Port Functional	PCIe Port NonFunctional
LED24	Port Good 5	PCIe Port Functional	PCIe Port NonFunctional
LED25	Port Good 8	PCIe Port Functional	PCIe Port NonFunctional
LED26	Port Good 9	PCIe Port Functional	PCIe Port NonFunctional
LED27	Port Good 12	PCIe Port Functional	PCIe Port NonFunctional
LED28	Port Good 13	PCIe Port Functional	PCIe Port NonFunctional
LED29	Port Good 17	PCIe Port Functional	PCIe Port NonFunctional
LED30	Port Good 16	PCIe Port Functional	PCIe Port NonFunctional
LED31	EEPROM	EEPROM Not Programmed	EEPROM Programmed
LED32	U30 Fatal	PCIe Switch Fail	PCIe Switch Operational

*See the HEP8225 hardware reference manual for a description of the SHB's post code error code numbers

Figure 6.1 HDB8229 Layout drawing and Dimensions

ENGINEERING NOTES:

1. The power connectors shown in the layout drawing represent backplane model number 8229-038.
2. Mounting holes: 0.156” diameter.
3. Nominal PCB thickness: 0.080”.
4. All dimensions are in inches.
5. The PCI Express 3.0 links on this HDEC® Series backplane are driven either directly from the HDEC® Series system host board or via a PCIe 3.0 switch (x8). PCIe 3.0 link re-timers are used to ensure signal integrity between the SHB and each plug-in PCIe option card.
6. Interfaces denoted in green are x16 PCIe 3.0 driven from the HEP8225 SHB. Interfaces denoted in blue are x8 PCIe 3.0 driven from the PCIe 3.0 x8 switch (U30).
7. * The P11 ports physically support USB 3.0 interfaces; however, the current USB routing for P11 from the SHB only operates at USB 2.0 speeds.

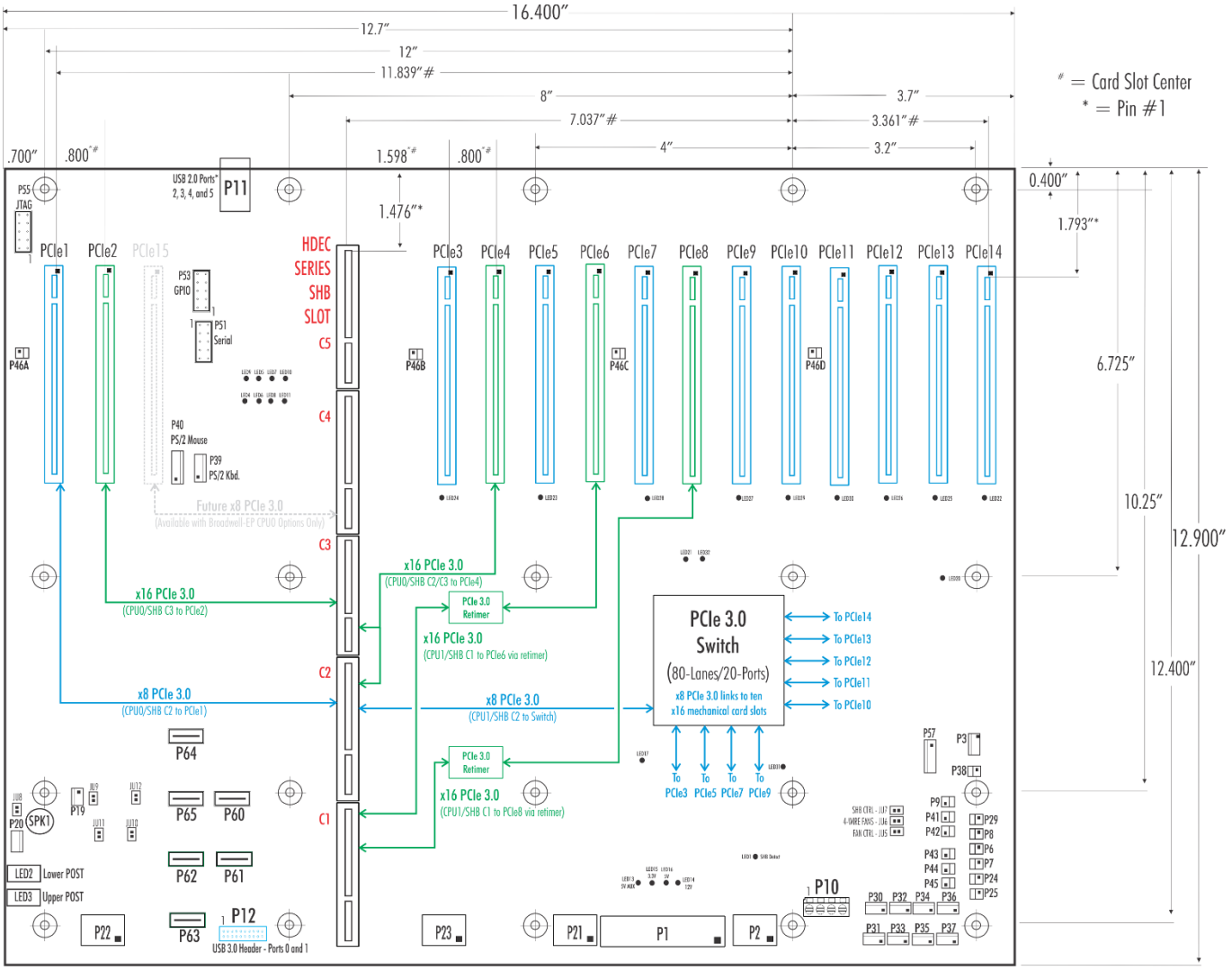
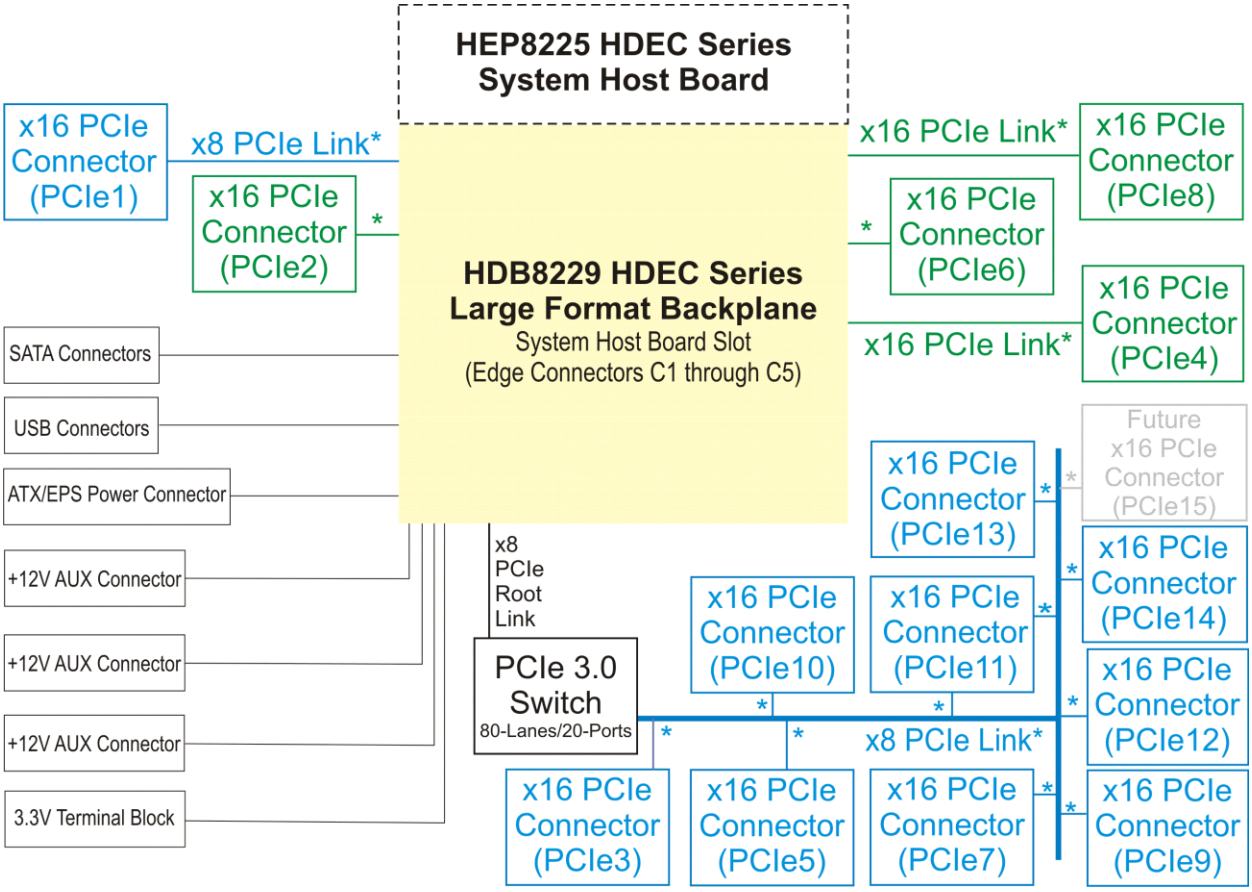


Figure 6.2 HDB8229 system block diagram



Chapter 7 - HDB8231 Backplane Details

The HDB8231 is a large format backplane supporting one HDEC system host board, targeting 5U and select 4U rackmount computer deployments. It is equipped with eighteen, x16 mechanical PCIe 3.0 slots. Two of these are electrically x8, sixteen are x4. Additionally it supports four 4 USB 2.0 ports, two USB 3.0 ports via onboard connector P12 and six SATA/600 ports. Provisions for ATX/EPS and 12V auxiliary power are provided by P1, P2, P21 and P22 with an additional 4 position terminal block for extended current applications.

The backplane supports many of the system I/O interfaces brought down to the backplane via the edge card fingers on the HDEC® Series system host board.

Table 7.1 MAIN CONNECTORS

HDB8231 Connector	Function
P1	ATX/EPS power inputs from system supply
P2, P21, & P22	+12V auxiliary power input from system supply
P3	LED dimmer interface
P10	Additional +3.3V inputs for extended current applications
P11* (see engineering note 7)	USB 2.0 rear panel I/O Ports 2,3,4,5
P12	USB3.0 header for Port0/Port1 front panel interface
P20	System Speaker Interface
P30-P37	System fan connectors (8)
P39	PS/2 Keyboard header
P40	PS/2 Mouse header
P51	Serial interface header (RS232/422/485)
P53, P55	GPIO interface header (8 signals), JTAG interface header
P57	Keypad header for system front panel
P60-P65	SATA/600 interfaces for HDD/SSDs (6)

See Figure 6.1 for component location information.

Table 7.2 ADDITIONAL SYSTEM INTERFACE CONNECTIONS, JUMPERS AND LEDS

Connectors		Jumpers		LEDs	
Connector	Function	Jumper	Function	LED	Function
P6	PSON	JU5	Fan Ctrl Enable	1	SHB Detect
P7	Power Button	JU6	Four-Wire Fans	2,3,4,5,6,7,8,9	System Fan Present 0-7
P8	Reset	JU7	SHB Fan Ctrl.	11	5V AUX Good
P9	Power Good	JU8	Speaker Enable	12	12V Good
P19	SMB	JU9	SMB Enable	13	5V Good
P24, P25	Temp0, Temp1	JU10	12C Enable	14	3.3V Good
P29	Clear CMOS	JU11	Retimer Enable	18	Lower Post Code
P38	Intruder			19	Upper Post Code
P41	Fan Alarm				
P42	Temp. Alarm				

See Figure 7.1 for component location information.

Table 7.3 Switches

HDB8231 Switch	Function
SW2	Fan 0 Fan Control On/Off Fan 1 Fan Control On/Off Fan 2 Fan Control On/Off Fan 3 Fan Control On/Off
SW1	Fan 4 Fan Control On/Off Fan 5 Fan Control On/Off Fan 6 Fan Control On/Off Fan 7 Fan Control On/Off

ENVIRONMENTAL SPECIFICATIONS*

Operating Temp: 0° C to 60° C
Storage Temp: -40° C to 70° C
Humidity: 5% to 90%, non-condensing
*Note: Environmental specification for system host boards/single board computers are usually lower than those of the backplane. Check with your SHB/SBC vendor.

RoHS Compliant. Designed to meet worldwide EMI emissions requirements. Conforms to CE standards. Contact Trenton for the specific standard numbers for this product. Designed for UL60950 and CAN/CSAC22.2 No. 60950-00.

8231-037 Configuration Jumpers

The setup of the configuration jumpers on the backplane is described below.

Note: Refer to the backplane layout drawing for the pin 1 position of the jumpers as indicated by the black square. (■)

Jumper	Description
JU1	**Microcontroller Enable** (Factory Use Only) 3-pin Jumper, Molex #22-03-2031 Jumper default position is unpopulated Pin Signal 1 PERSET# 2 MCLR 3 Vpp
JU2	**PIC Power Select Enable** (Factory Use Only) 3-pin Jumper, Molex #22-03-2031 Jumper default position is unpopulated Pin Signal 1 +3.3V 2 PICPOWER 3 Vdd
JU5	**System Fan Control Enable** 2-pin Jumper, Tyco (AMP) #5-146280-2 Jumper default position is populated. Remove jumper to have system fans run continuously at full speed. Pin Signal 1 +3.3V 2 PICPOWER
JU6	**4-Wire System Fan Enable** 2-pin Jumper, Tyco (AMP) #5-146280-2 Jumper default position is populated. Remove jumper for systems that use two or three-wire fans. Pin Signal 1 4-wire system fan IN 2 Gnd
JU7	**SHB Control of System Fans** 2-pin Jumper, Tyco (AMP) #5-146280-2 Jumper default position is populated. Remove jumper for systems where system fan control is from non SHB signal sources. Pin Signal 1 SHB system fan control IN 2 Gnd

8231-037 Configuration Jumpers (Continued)

JU8 Backplane Speaker (SPK1) Enable

2-pin Jumper, Tyco (AMP) #5-146280-2

Jumper default position is populated. Remove jumper to disable backplane speaker SPK1. Most systems will use a system speaker connected to P20.

Pin	Signal
1	+5V
2	SPK1, Pin2

JU9 - I2C Retimer Disable Connector

2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	I2C Enable
2	Gnd

Installing jumper P49 disables the I2C signals to the backplane retimers

JU10 - I2C Retimer Disable Connector

2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	I2C Enable
2	Gnd

Installing jumper P49 disables the I2C signals to the backplane retimers

JU11 - I2C Retimer Disable Connector

2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	I2C Enable
2	Gnd

Installing jumper P49 disables the I2C signals to the backplane retimers

8231-037 Connectors

Note: Pin 1 on the connectors is indicated by the square pad on the PCB.

P1 - ATX/EPS Power Connector

24 pin right angle dual row, Molex #39-30-1240

Pin	Signal	Pin	Signal
1	+3.3V	13	+3.3V
2	+3.3V	14	NC
3	Gnd	15	Gnd
4	+5V	16	PSON#
5	Gnd	17	Gnd
6	+5V	18	Gnd
7	Gnd	19	Gnd
8	PWRGD	20	NC
9	+5VAUX	21	+5V
10	+12V	22	+5V
11	+12V	23	+5V
12	+3.3V	24	Gnd

P2 - +12V Power Connector

8 pin right angle dual row, Molex #39-30-0080

Pin	Signal	Pin	Signal
1	Gnd	8	+12V
2	Gnd	7	+12V
3	Gnd	6	+12V
4	Gnd	5	+12V

P3 - LED Dimmer Connector

4 pin vertical single row header, Molex #47053-1000

Pin	Signal
1	PWM LED
2	PWM LED
3	+12V
4	+12V

P4 - USB 2.0 Redirect Connector (Factory Use Only)

4 pin vertical single row header, Tyco (AMP) #5-146280-4

Pin	Signal
1	VBUS1
2	NC
3	NC
4	Gnd

P5 - SPI Microcontroller Connector (Factory Use Only)

4 pin vertical single row header, Tyco (AMP) #5-146280-4

Pin	Signal
1	SPI_DO
2	SPI_DI
3	SPI_CLK
4	SPI_SS

8231-037 Connectors (continued)

P6 - Power-On Connector (PSON)
2 pin vertical single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	PSON#

P7 - Power Button Connector
2 pin vertical single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	PWRBT#

P8 - Reset Connector
2 pin vertical single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	SHB_RST#

P9 - Power Good Connector
2 pin vertical single row header, Tyco (AMP) #640456-2

Pin	Signal
1	PWRGD
2	+5V

P10 - Terminal Block Connector
4 position terminal block, Tyco (AMP) #796949-4
20 amps per circuit

Pin	Signal
1	+12V
2	Gnd
3	+3.3V
4	Gnd

P12 - Universal Serial Bus 3.0 (USB) Connector
19 pin dual row header, LOTES #ABA-USB-050-K04

Pin	Signal	Pin	Signal
1	+5V-USB4 (VBUS1)	11	USB5-DP
2	USB4-SRXN	12	USB5-DN
3	USB4-SRXP	13	Gnd-USB5
4	Gnd-USB4	14	USB5-STXP
5	USB4-STXN	15	USB5-STXN
6	USB4-STXP	16	Gnd-USB5
7	Gnd-USB4	17	USB5-SRXP
8	USB4-DN	18	USB5-SRXN
9	USB4-DP	19	+5V-USB5 (VBUS19)
10	NC		

P15 - GPIO Debug Header (Factory Use Only)
4 pin vertical single row header, Tyco (AMP) #5-146280-4

Pin	Signal
1	GPIO_1
2	GPIO_2
3	GPIO_3
4	GPIO_4

8231-037 Connectors (continued)

P19 - I2C Slot Header (Factory Use Only)
3 pin single row header, Molex #22-23-2031

Pin	Signal
1	I2C_Header_SDA
2	I2C_Header_SCL
3	Gnd

P20 - System Speaker Connector
4 pin single row header, Molex #47053-1000

Pin	Signal
1	SPKR_n
2	NC
3	Gnd
4	+5V

P21 - +12V Power Connector
8 pin right angle dual row, Molex #39-30-0080

Pin	Signal	Pin	Signal
1	Gnd	8	+12V
2	Gnd	7	+12V
3	Gnd	6	+12V
4	Gnd	5	+12V

P22 - +12V Power Connector
8 pin right angle dual row, Molex #39-30-0080

Pin	Signal	Pin	Signal
1	Gnd	8	+12V
2	Gnd	7	+12V
3	Gnd	6	+12V
4	Gnd	5	+12V

P24 - Temperature Sensor 0 Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	TEMPSENSE0

P25 - Temperature Sensor 1 Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	TEMPSENSE1

8231-037 Connectors (continued)

P29 - Clear CMOS Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	CMOSCLR#

NOTE: To clear the system host board's CMOS using backplane connector P29, power down the system and install the P29 jumper. Wait for at least two seconds, remove the jumper and turn the power on. Clearing CMOS on the System host board will not result in a checksum error on the following boot. If you want to change a BIOS setting, you must press DEL or the F2 key during POST to enter the SHB's BIOS setup after clearing CMOS. P29 will also accept a connection to a front-panel CMOS clear button from the chassis.

NOTE 2: Backplane Clear CMOS capability is a planned capability for the HDEC specification, to be implemented on future SHB products. The HEP8225 SHB does not support this capability.
For full P29 connector support information, contact Trenton.

P30, P31, P32, P33 P34 P35 P36 P37 12V Chassis Fan Connectors (8)
4 pin right-angle header, Molex #47053-1000

Pin	Signal
1	PWMn_3W (n=0,1,2,or 3)
2	+12V
3	TACHn
4	PWMn_4W
	Note: 0=P30, 1=P31, 2=P32, 3=P33

P38 - Intruder Alert Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	INTRUDER#

P39 - PS/2 Keyboard Connector
5 pin single row header, Tyco (AMP) #640456-5

Pin	Signal
1	PS2KBDCLK
2	PS2KBDDAT
3	NC
4	Gnd
5	+5V

P40 - PS/2 Mouse Connector
6 pin single row header, Tyco (AMP) #640456-6

Pin	Signal
1	PS2MSDAT
2	NC
3	Gnd
4	+5V
5	PS2MSCLK
6	NC

8231-037 Connectors (continued)

P41 - Fan Alarm LED Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	FF_LED
2	+5V

P42 - Temp Alarm LED Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	TEMP_LED
2	+5V

P43 - Voltage Alarm LED Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	VOLT_LED
2	+5V

P44 - Error Alarm LED Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	ERROR_LED
2	+5V

P45 - HDD LED Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	HDD_LED
2	+5V

P46 A **3.3V AUX Card Slot Enable Connector**
P46 B 2 pin single row header, Tyco (AMP) #640456-2
P46 C
P46 D

Pin	Signal
1	3.3V_AUX
2	+3.3V

Installing jumper P46 enables +3.3V AUX on all the PCIe card slots

P50 - Micro-Controller Programing Port (Factory Use Only)
5 pin single row header, Tyco (AMP) #87224-5

Pin	Signal
1	Vpp
2	Vdd
3	Gnd
4	ICSPDAT
5	ICSPCLK

8231-037 Connectors (continued)

P51 - RS232 Serial Port Connector
10 pin dual row connector, 3M #N2510-6003-RB

Pin	Signal	Pin	Signal
1	Carrier Detect (DCD)	2	Data Set Ready-I (DSR)
3	Receive Data-I (RX)	4	Request to Sent-O (RTS)
5	Transmit Data-O (TX)	6	Clear To Send (CTS)
7	Data Terminal Ready (DTR)	8	Ring Indicator-I (RI)
9	Gnd	10	NC

P53 - GPIO Connector
8 pin dual row connector, 3M #N2508-6003-RB

Pin	Signal	Pin	Signal
1	GPIO2	2	GPIO3
3	GPIO4	4	GPIO5
5	GPIO6	6	GPIO7
7	GPIO1	8	Gnd

P55 - JTAG Connector
10 pin dual row connector, 3M #N2510-6003-RB

Pin	Signal	Pin	Signal
1	TCK	2	Gnd
3	TDOHDR	4	+3.3V
5	TMS	6	RESET#
7	EVTO	8	TRST#
9	TDOPCIE8	10	NC

P57 - Front or Rear Panel LED/Button Connector (Factory Use Only)
7 pin single row header, Tyco (AMP) #640456-7

Pin	Signal
1	Common from panel
2	Button position 1
3	Button position 2
4	Button position 3
5	Button position 4
6	Button position 5
7	Button position 6

P60, **SATA Connectors (6)**
P61, 7 pin vertical connector with latch, Molex # 67800-8005
P62, P60 = Backplane SATA0, P61 = Backplane SATA1
P63, P62 = Backplane SATA2, P63 = Backplane SATA3
P64, P64 = Backplane SATA4, P65 = Backplane SATA5
P65

Pin	Signal
1	Gnd
2	TXn_p
3	TXn_n
4	Gnd
5	RXn_p
6	RXn_n
7	Gnd

n = 0, 1, 2, 3, or 4

8231-037 Diagnostic LED Status Indicators

LED Reference Designation	Backplane Silkscreen Wording	LED On	LED Off
LED1 (Red)	SHB Detect	SHB is not properly seated in its socket	Normal operation – SHB Detected
LEDs 2, 3 4, 5, 6 7 8 &9 (Green)	FAN0, FAN1, FAN2, FAN3 FAN 4 FAN 5 FAN6 and FAN7	System fan present	System fan not present
LED11 (Green)	5V AUX	Acceptable voltage level	Voltage level not acceptable
LED12 (Green)	12V	Acceptable voltage level	Voltage level not acceptable
LED13 (Green)	5V	Acceptable voltage level	Voltage level not acceptable
LED14 (Green)	3.3V	Acceptable voltage level	Voltage level not acceptable
LED18 (7-segment display)	Lower Post Code	SHB Post Code Error*	SHB Boot Complete
LED19 (7-segment display)	Upper Post Code	SHB Post Code Error*	SHB Boot Complete

*See the HEP8225 hardware reference manual for a description of the SHB's post code error code numbers

Figure 7.1 HDB8231 Layout Drawing

Notes:

1. Backplane layout diagram dimensions are in inches.
2. The right-angle power connectors shown in the layout diagram represents backplane model number 8231-037.
3. The option card slot connector spacing is 0.800 inches.
4. The nominal backplane thickness is 0.080 inches.
5. Mounting holes have a .156” diameter.
6. USB, SATA, Ethernet connectivity, POST code status and system diagnostics provided by the HEP8225 SHB.
7. Refer to the status LED section for functional definition.

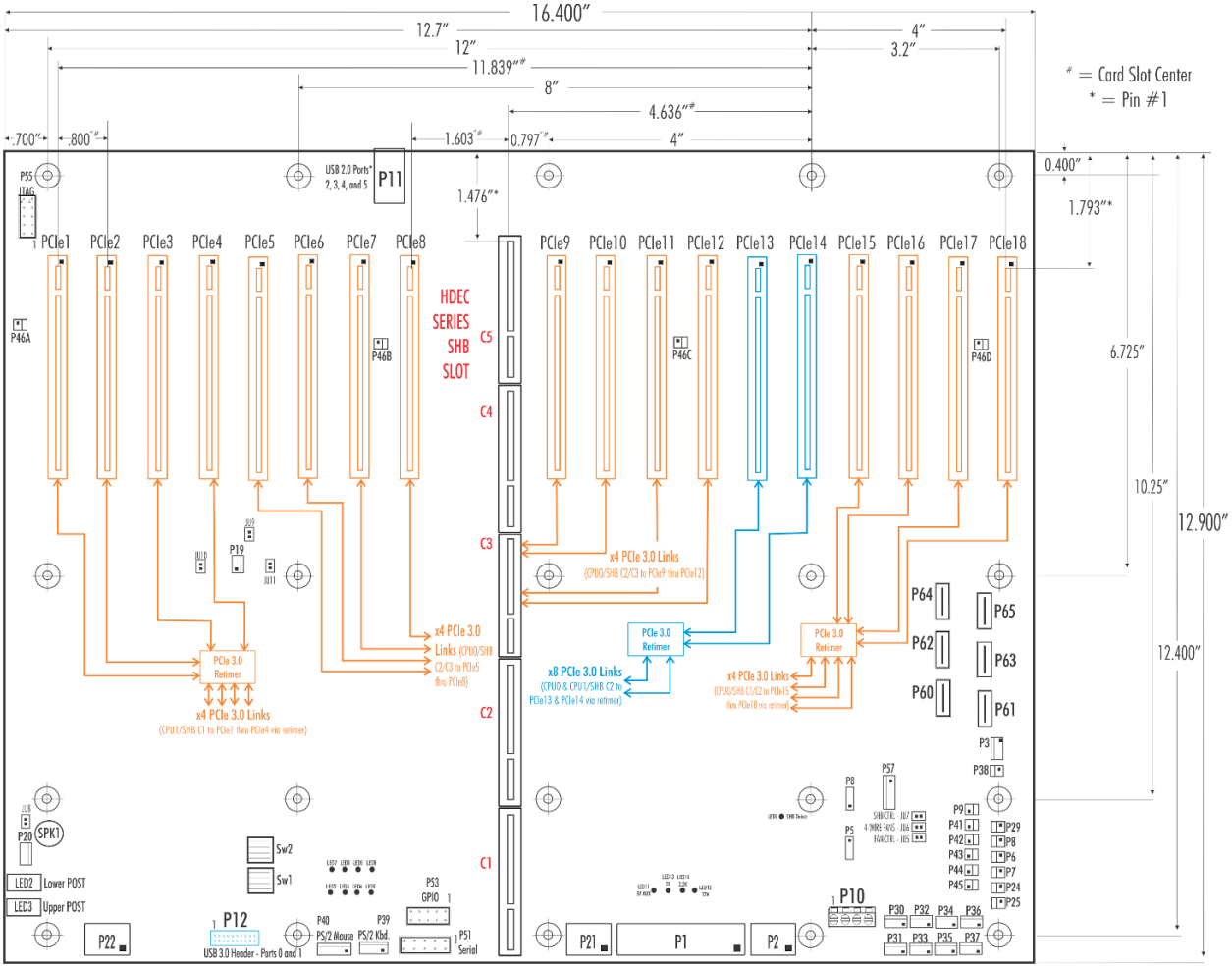
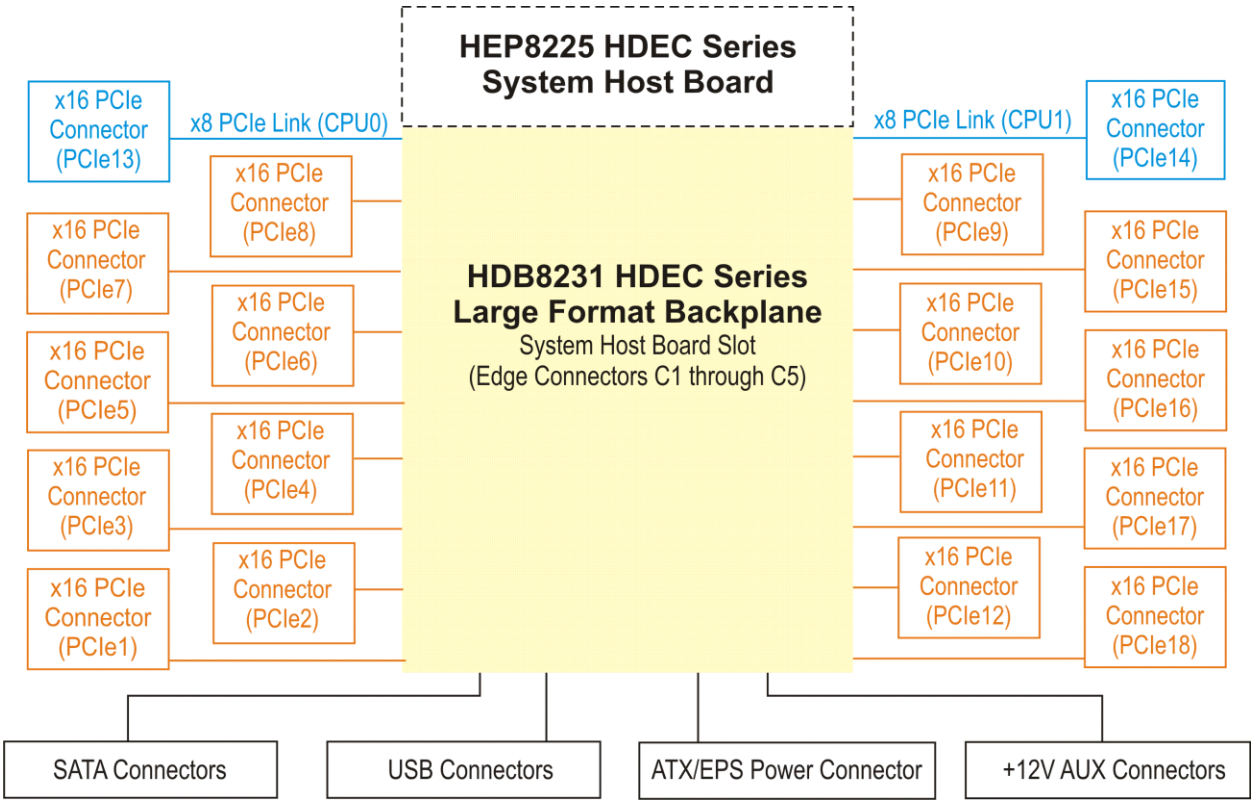


Figure 7.2. HDB8231 system block diagram



Chapter 8 - HDB8236 Backplane Details

The HDB8236 is a small, "shoebox" style backplane targeted to a variety of deployment scenarios. These include 2-in-1 systems integration into a 5U rackmount system, or a single backplane integrated into a custom, shoebox-style chassis enclosure that may be embedded in a machine for an industrial automation application. The HDB8236 backplane is equipped with five PCI Express x16 mechanical slots. Four of these are driven electrically with sixteen lanes (x16) and one (PCIe4) is driven with four lanes (x4). The interfaces are numbered 1 through 5, left to right, from the front of the backplane. Additionally, it supports four SATA/600 interfaces and two USB 2.0 ports. Provisions for ATX/EPS and 12V auxiliary power are provided by P1, and P2.

The backplane supports many of the system I/O interfaces brought down to the backplane via the edge card fingers on the HDEC® Series system host board. Use the following backplane connector to ensure the most efficient system I/O wiring possible for 2-in-1 or 5U rackmount computers or custom chassis.

Table 8.1 MAIN CONNECTORS

HDB8236 Connector	Function
P1	ATX/EPS power inputs from system supply
P2	+12V auxiliary power input from system supply
P3	LED dimmer interface
P10	Additional +3.3V inputs for extended current applications
P12	USB 2.0 header for Port0/Port1 front panel interface
P20	System Speaker Interface
P30-P33	System fan connectors (4)
P39	PS/2 Keyboard header
P40	PS/2 Mouse header
P51	Serial interface header (RS232/422/485)
P60-P63	SATA/600 interfaces for HDD/SSDs (4)

See Figure 8.1 for component location information.

Table 8.2 ADDITIONAL SYSTEM INTERFACE CONNECTIONS, JUMPERS AND LEDS

Connectors		Jumpers		LEDs	
Connector	Function	Jumper	Function	LED	Function
P6	PSON	JU5	Fan Ctrl Enable	1	SHB Present
P7	Power Button	JU6	Four-Wire Fans	2	Upper POST Codes
P8	Reset	JU7	SHB Fan Ctrl.	3	Lower POST Codes
P9	Power Good	JU8	Speaker Enable	4-7	System Fan Present
P24, P25	Temp0, Temp1			10	1V Pwr. Reg. Gd.
P38	Intruder			11	1.8V Pwr. Reg. Gd.
P41	Fan Alarm			12	+3.3V Supply
P42	Temp Alarm			13	+5V Supply
P43	Volt Alarm			14	+12V Supply
P45	HDD LED			15	+5V AUX
P46	3.3V AUX enable (all slots)				

See Figure 8.1 for component location information.

ENVIRONMENTAL SPECIFICATIONS*

Operating Temp: 0° C to 60° C
Storage Temp: -40° C to 70° C
Humidity: 5% to 90%, non-condensing
*Note: Environmental specification for system host boards/single board computers are usually lower than those of the backplane. Check with your SHB/SBC vendor.

RoHS Compliant. Designed to meet worldwide EMI emissions requirements. Conforms to CE standards. Contact Trenton for the specific standard numbers for this product. Designed for UL60950 and CAN/CSAC22.2 No. 60950-00.

8236-037 Configuration Jumpers

The setup of the configuration jumpers on the backplane is described below.

NOTE: Refer to the backplane layout drawing for the pin 1 position of the jumpers and connectors as indicated by the black square (▪).

Jumper	Description
JU1	**Microcontroller Enable** (Factory Use Only) 3-pin Jumper, Molex #22-03-2031 Jumper default position is unpopulated Pin Signal 1 PERSET# 2 MCLR 3 Vpp
JU2	**PIC Power Select Enable** (Factory Use Only) 3-pin Jumper, Molex #22-03-2031 Jumper default position is unpopulated Pin Signal 1 +3.3V 2 PICPOWER 3 Vdd
JU5	**System Fan Control Enable** 2-pin Jumper, Tyco (AMP) #5-146280-2 Jumper default position is populated. Remove jumper to have system fans run continuously at full speed. Pin Signal 1 +3.3V 2 PICPOWER
JU6	**4-Wire System Fan Enable** 2-pin Jumper, Tyco (AMP) #5-146280-2 Jumper default position is populated. Remove jumper for systems that use two or three-wire fans. Pin Signal 1 4-wire system fan IN 2 Gnd
JU7	**SHB Control of System Fans** 2-pin Jumper, Tyco (AMP) #5-146280-2 Jumper default position is populated. Remove jumper for systems that system fan control form non-SHB signal sources. Pin Signal 1 SHB system fan control IN 2 Gnd

8236-037 Configuration Jumpers (continued)

JU8 **Backplane Speaker (SPK1) Enable**
2-pin Jumper, Tyco (AMP) #5-146280-2
Jumper default position is unpopulated. Install jumper to enable backplane speaker SPK1. Most systems will use a system speaker connected to P20.

Pin	Signal
1	+5V
2	SPK1, Pin2

8236-037 Connectors

NOTE: Pin 1 on the connectors is indicated by the square pad on the PCB.

P1 - ATX/EPS Power Connector
24 pin right angle dual row, Molex #39-30-1240

Pin	Signal	Pin	Signal
1	+3.3V	13	+3.3V
2	+3.3V	14	NC
3	Gnd	15	Gnd
4	+5V	16	PSON#
5	Gnd	17	Gnd
6	+5V	18	Gnd
7	Gnd	19	Gnd
8	PWRGD	20	NC
9	+5VAUX	21	+5V
10	+12V	22	+5V
11	+12V	23	+5V
12	+3.3V	24	Gnd

P2 - +12V Power Connector
8 pin right angle dual row, Molex #39-30-0080

Pin	Signal	Pin	Signal
1	Gnd	8	+12V
2	Gnd	7	+12V
3	Gnd	6	+12V
4	Gnd	5	+12V

P3 - LED Dimmer Connector
4 pin vertical single row header, Molex #47053-1000

Pin	Signal
1	PWM LED
2	PWM LED
3	+12V
4	+12V

8236-037 Connectors (continued)

P4 - USB 2.0 Redirect Connector (Factory Use Only)
4 pin vertical single row header, Tyco (AMP) #5-146280-4

Pin	Signal
1	VBUS1
2	NC
3	NC
4	Gnd

P5 - SPI Microcontroller Connector (Factory Use Only)
4 pin vertical single row header, Tyco (AMP) #5-146280-4

Pin	Signal
1	SPI_DO
2	SPI_DI
3	SPI_CLK
4	SPI_SS

P6 - Power-On Connector (PSON)
2 pin vertical single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	PSON#

P7 - Power Button Connector
2 pin vertical single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	PWRBT#

P8 - Reset Connector
2 pin vertical single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	SHB_RST#

P9 - Power Good Connector
2 pin vertical single row header, Tyco (AMP) #640456-2

Pin	Signal
1	PWRGD
2	+5V

P10 - Terminal Block Connector
4 position terminal block, Tyco (AMP) #796949-4
20 amps per circuit

Pin	Signal
1	+12V
2	Gnd
3	+3.3V
4	Gnd

8236-037 Connectors (continued)

P12 - Universal Serial Bus 3.0 (USB) Connector
19 pin dual row header, LOTES #ABA-USB-050-K04

Pin	Signal	Pin	Signal
1	+5V-USB4 (VBUS1)	11	USB5-DP
2	USB4-SRXN	12	USB5-DN
3	USB4-SRXP	13	Gnd-USB5
4	Gnd-USB4	14	USB5-STXP
5	USB4-STXN	15	USB5-STXN
6	USB4-STXP	16	Gnd-USB5
7	Gnd-USB4	17	USB5-SRXP
8	USB4-DN	18	USB5-SRXN
9	USB4-DP	19	+5V-USB5 (VBUS19)
10	NC		

P15 - GPIO Debug Header (Factory Use Only)
4 pin vertical single row header, Tyco (AMP) #5-146280-4

Pin	Signal
1	GPIO_1
2	GPIO_2
3	GPIO_3
4	GPIO_4

P17 - +12V Terminal Block
2 position terminal block, Tyco (AMP) #796949-2
20 amps per circuit

Pin	Signal
1	+12V
2	Gnd

P19 - I2C Slot Header (Factory Use Only)
3 pin single row header, Molex #22-23-2031

Pin	Signal
1	I2C_Header_SDA
2	I2C_Header_SCL
3	Gnd

P20 - System Speaker Connector
4 pin single row header, Molex #47053-1000

Pin	Signal
1	SPKR_n
2	NC
3	Gnd
4	+5V

P24 - Temperature Sensor 0 Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	TEMPSENSE0

8236-037 Connectors (continued)

P25 - Temperature Sensor 1 Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	TEMPSENSE1

P29 - Clear CMOS Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	CMOSCLR#

NOTE: To clear the system host board's CMOS using backplane connector P29, power down the system and install the P29 jumper. Wait for at least two seconds, remove the jumper and turn the power on. Clearing CMOS on the System host board will not result in a checksum error on the following boot. If you want to change a BIOS setting, you must press DEL or the F2 key during POST to enter the SHB's BIOS setup after clearing CMOS.
NOTE 2: Backplane Clear CMOS capability is a planned capability for the HDEC specification, to be implemented on future SHB products. The HEP8225 SHB does not support this capability.
For full P29 connector support information, contact Trenton.

P30, P31, P32, P33 12V Chassis Fan Connectors (4)
4 pin right-angle header, Molex #47053-1000

Pin	Signal
1	PWMn_3W (n=0,1,2,or 3)
2	+12V
3	TACHn
4	PWMn_4W
	Note: 0=P30, 1=P31, 2=P32, 3=P33

P38 - Intruder Alert Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	INTRUDER#

P39 - PS/2 Keyboard Connector
5 pin single row header, Tyco (AMP) # 640456-5

Pin	Signal
1	PS2KBDCLK
2	PS2KBDDAT
3	NC
4	Gnd
5	+5V

8236-037 Connectors (continued)

P40 - PS/2 Mouse Connector
6 pin single row header, Tyco (AMP) # 640456-6

Pin	Signal
1	PS2MSDAT
2	NC
3	Gnd
4	+5V
5	PS2MSCLK
6	NC

P41 - Fan Alarm LED Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	FF_LED
2	+5V

P42 - Temp Alarm LED Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	TEMP_LED
2	+5V

P43 - Voltage Alarm LED Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	VOLT_LED
2	+5V

P44 - Error Alarm LED Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	ERROR_LED
2	+5V

P45 - HDD LED Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	HDD_LED
2	+5V

P46 - 3.3V AUX Card Slot Enable Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	3.3V_AUX
2	+3.3V

Installing jumper P46 enables +3.3V AUX on all the PCIe card slots

8236-037 Connectors (continued)

P47 - I2C Card Slot Disable Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	I2C Enable
2	Gnd

Installing jumper P47 disables the I2C signals on all the PCIe card slots

P48 - I2C Card SHB Disable Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	I2C Enable
2	Gnd

Installing jumper P48 disables the I2C signals to the SHB card slot

P49 - I2C Retimer Disable Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	I2C Enable
2	Gnd

Installing jumper P49 disables the I2C signals to the backplane retimers

P50 - Micro-Controller Programing Port (Factory Use Only)
5 pin single row header, Tyco (AMP) #87224-5

Pin	Signal
1	Vpp
2	Vdd
3	Gnd
4	ICSPDAT
5	ICSPCLK

P51 - RS232 Serial Port Connector
10 pin dual row connector, 3M #N2510-6003-RB

Pin	Signal	Pin	Signal
1	Carrier Detect (DCD)	2	Data Set Ready-I (DSR)
3	Receive Data-I (RX)	4	Request to Sent-O (RTS)
5	Transmit Data-O (TX)	6	Clear To Send (CTS)
7	Data Terminal Ready (DTR)	8	Ring Indicator-I (RI)
9	Gnd	10	NC

P53 - GPIO Connector
8 pin dual row connector, 3M #N2508-6003-RB

Pin	Signal	Pin	Signal
1	GPIO2	2	GPIO3
3	GPIO4	4	GPIO5
5	GPIO6	6	GPIO7
7	GPIO1	8	Gnd

8236-037 Connectors (continued)

P55 - JTAG Connector
10 pin dual row connector, 3M #N2510-6003-RB

Pin	Signal	Pin	Signal
1	TCK	2	Gnd
3	TDOHDR	4	+3.3V
5	TMS	6	RESET#
7	EVTO	8	TRST#
9	TDOPCIE8	10	NC

P57 - Front or Rear Panel LED/Button Connector (Factory Use Only)
7 pin single row header, Tyco (AMP) # 640456-7

Pin	Signal
1	Common from panel
2	Button position 1
3	Button position 2
4	Button position 3
5	Button position 4
6	Button position 5
7	Button position 6

P60, P61, P62, P63 SATA Connectors (4)
7 pin vertical connector with latch, Molex # 67800-8005
P60 = Backplane SATA0, P61 = Backplane SATA1
P62 = Backplane SATA2, P63 = Backplane SATA3

Pin	Signal
1	Gnd
2	TXn_p
3	TXn_n
4	Gnd
5	RXn_p
6	RXn_n
7	Gnd

n = 0, 1, 2, 3, or 4

8236-037 Diagnostic LED Status Indicators

LED Reference Designation	Backplane Silkscreen Wording	LED On	LED Off
LED1 (Red)	SHB Detect	SHB is not properly seated in its socket	Normal operation – SHB Detected
LED2 (7-segment display)	Upper Post Code	SHB Post Code Error*	SHB Boot Complete
LED3 (7-segment display)	Lower Post Code	SHB Post Code Error*	SHB Boot Complete
LED4, 5, 6 & 7 (Green)	FAN0, FAN1, FAN2, and FAN3	System fan present	System fan not present
LED10 (Green)	1V	Acceptable voltage level	Voltage level not acceptable
LED11 (Green)	1.8V	Acceptable voltage level	Voltage level not acceptable
LED12 (Green)	3.3V	Acceptable voltage level	Voltage level not acceptable
LED13 (Green)	5V	Acceptable voltage level	Voltage level not acceptable
LED14 (Green)	12V	Acceptable voltage level	Voltage level not acceptable
LED15 (Green)	5V AUX	Acceptable voltage level	Voltage level not acceptable

*See the HEP8225 hardware reference manual for a description of the SHB's post code error code numbers

Figure 8.1. HDB8236 Layout drawing and dimensions.

ENGINEERING NOTES:

1. The power connectors shown in the layout drawing represent backplane model number 8236-037.
2. Mounting holes: 0.156" diameter.
3. Nominal PCB thickness: 0.080".
4. All dimensions are in inches.
5. The PCI Express 3.0 links on this HDEC® Series backplane are driven directly from the HDEC® Series system host board. PCIe 3.0 link re-timers are used to ensure signal integrity between the SHB and each plug-in PCIe option card.
6. Interfaces denoted in green are x16 PCIe 3.0 driven from the HEP8225 SHB. Interfaces denoted in blue are x4 PCIe 3.0 driven from the HEP8225 SHB.

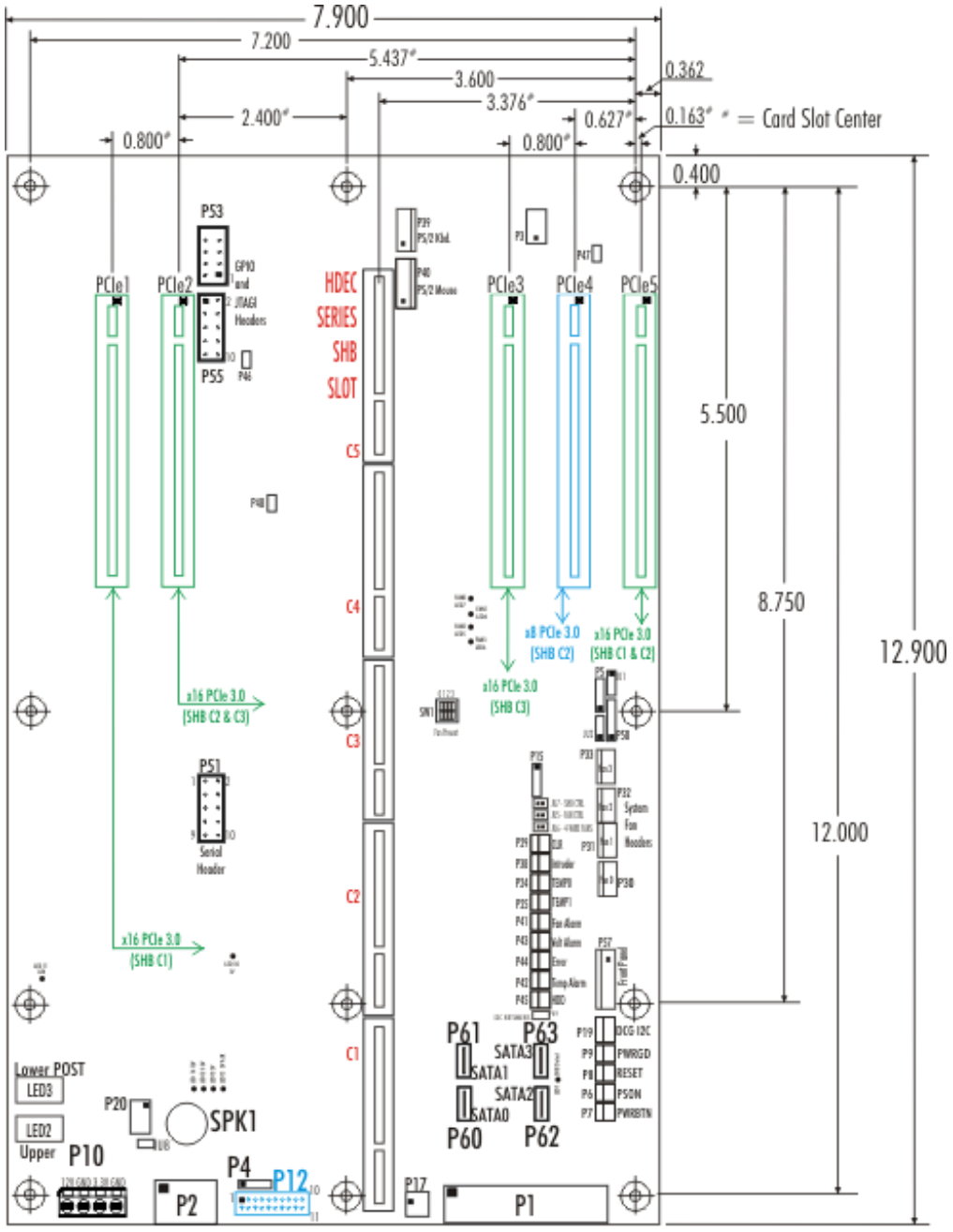
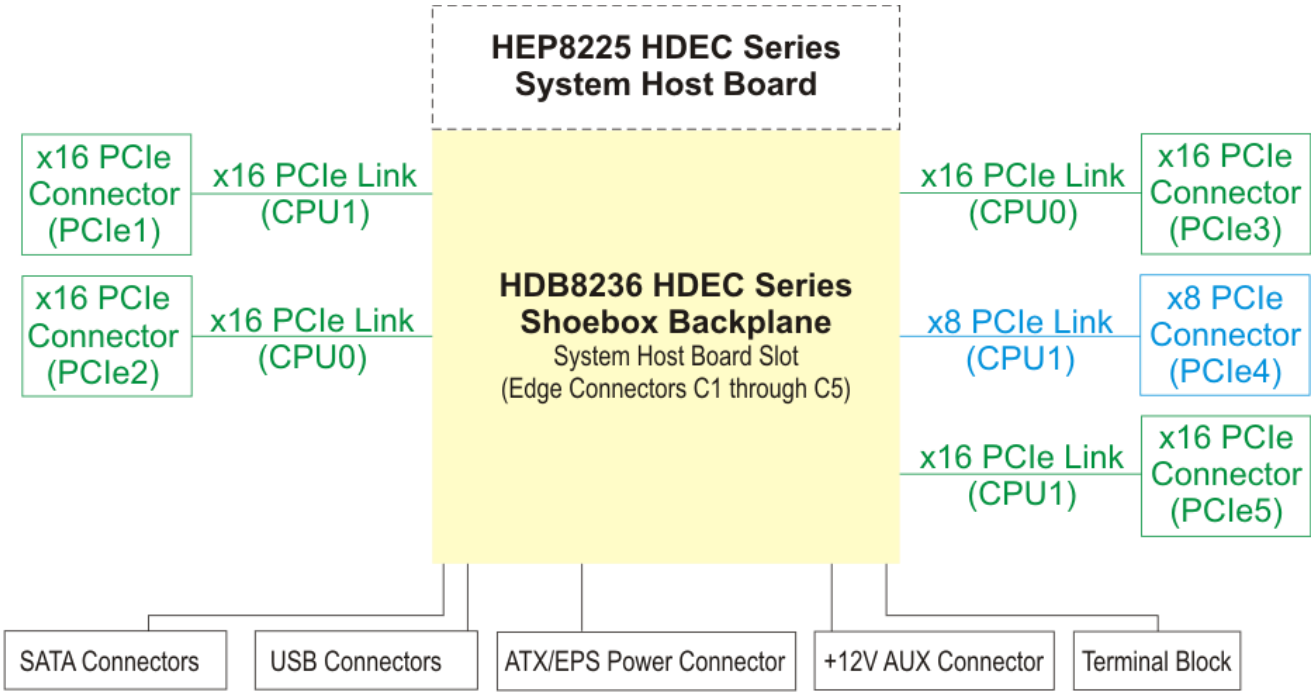

7.900
7.200
5.437"
3.600
3.376"
2.400"
0.800"
0.800"
0.627"
0.362
0.163" = Card Slot Center
0.400
5.500
8.750
12.000
12.900
PCIe1
PCIe2
PCIe3
PCIe4
PCIe5
HDEC SERIES SHB SLOT
C5
C4
C3
C2
C1
P53
P55
P51
P1
P2
P4
P12
P10
P17
P20
SPK1
P61
P63
P60
P62
SATA3
SATA1
SATA2
SATA0
x16 PCIe 3.0 (SHB C2 & C3)
x16 PCIe 3.0 (SHB C1)
x8 PCIe 3.0 (SHB C2)
x16 PCIe 3.0 (SHB C1 & C2)
x16 PCIe 3.0 (SHB C3)
Lower POST LED3
LED2 Upper

Figure 8.2. HDB8236 system block diagram.



Chapter 9 - HDB8237 Backplane Details

The HDB8237 is a large-format, multi-segment design. This particular multi-segment backplane design supports up to four independent system host boards, providing unparalleled system flexibility, SWaP and TCO optimization. Today, a fully laden HDB8237 will provide 24 execution cores of proven Intel® Xeon® processing power per backplane segment, resulting in up to 96 execution cores in a single enclosure. Thus, several divergent processor and bandwidth intensive applications can now easily be housed in a single 5U enclosure. Each segment has a full-speed x16 PCIe 3.0 expansion slot, four SATA/600 HDD interfaces and headers for USB 3.0, providing two ports apiece.

The backplane supports many of the system I/O interfaces brought down to the backplane via the edge card fingers on the HDEC® Series system host board. Use the following backplane connector to ensure the most efficient system I/O wiring possible for 4-in-1 rackmount computers.
Note: System connectors are denoted as their connector number-n, i.e. P1-n, where "n" is the number referring to the system host board that the segment port or connector corresponds to. SHB segments are numbered 1 through 4, left to right.

HDEC Series multi-segment backplanes, like the HDB8237, have independent microcontrollers for each segment's fan controls. Power for each segment's fan microcontroller is shared on a common bus throughout the backplane, allowing for all chassis fan ports to operate should not all segments be initialized.

Table 9.1 MAIN CONNECTORS

HDB8237 Connector	Function
P1-n*	ATX/EPS power inputs from system supply
P2-n*	+12V auxiliary power input from system supply
P4-n*	USB 2.0 Redirect
P12-n*	USB 3.0 header for Port0/Port1 front panel interface
P30-P33	System fan connectors (4)
P60-n* through P63-n*	SATA/600 interfaces for HDD/SSDs (4)

See Figure 9.1 for component location information. *n=Backplane Segment Number

Table 9.2 ADDITIONAL SYSTEM INTERFACE CONNECTIONS, JUMPERS AND LEDS

Connectors		LEDs	
Connector	Function	LED	Function
P6-n	PSON	1	SHB Present
P7-n	Power Button	4-8	System Fan Present
P8-n	Reset	9-12	Segment 3 Power LEDs (see Table 8.3)
P9-n	Power Good	15-18	Segment 1 Power LEDs (see Table 8.3)
P29-n	Clear CMOS	19-22	Segment 2 Power LEDs (see Table 8.3)
P45-n	HDD LED	23-26	Segment 4 Power LEDs (see Table 8.3)
P46-n	3.3V AUX enable		
P41	Fan Alarm (system -wide)		

N = segment number 1,2,3 or 4
See Figure 9.1 for component location information.

ENVIRONMENTAL SPECIFICATIONS*

Operating Temp: 0° C to 60° C
Storage Temp: -40° C to 70° C
Humidity: 5% to 90%, non-condensing
*Note: Environmental specification for system host boards/single board computers are usually lower than those of the backplane. Check with your SHB/SBC vendor.

RoHS Compliant. Designed to meet worldwide EMI emissions requirements. Conforms to CE standards. Contact Trenton for the specific standard numbers for this product. Designed for UL60950 and CAN/CSAC22.2 No. 60950-00.

8237-037 Connectors

The setup of the for each backplane connector is described below.

NOTE: Refer to the backplane layout drawing for the pin 1 position of the connectors as indicated by the black square (▪).

Connector Description

P1 - **Micro-Controller Programing Port** (Factory Use Only)
5 pin single row header, Tyco (AMP) #87224-5

Pin	Signal
1	Vpp
2	Vdd
3	Gnd
4	ICSPDAT
5	ICSPCLK

P2 - **PIC Power Select Enable** (Factory Use Only)
3 pin single row header, Molex #22-03-2031

Pin	Signal
1	+3.3V
2	PICPOWER
3	Vdd

P4 - **I2C Card Slot Disable Connector**
2 pin single row header, Molex #10-89-7082
Installing jumpers across the following P4 pins disables the I2C signals to a backplane segment's retimer

Pin	Signal	Pin	Signal
1	I2C_EN1	2	Gnd
3	I2C_EN2	4	Gnd
5	I2C_EN3	6	Gnd
7	I2C_EN4	8	Gnd

P19 - **I2C Slot Header** (Factory Use Only)
3 pin single row header, Molex #22-23-2031

Pin	Signal
1	I2C_Header_SDA
2	I2C_Header_SCL
3	Gnd

P41 - **Fan Alarm LED Connector**
2 pin single row header, Tyco (AMP) #640546-2

Pin	Signal
1	FF_LED
2	+5V

8237-037 Connectors (continued)

NOTE: Pin 1 on the connectors is indicated by the square pad on the PCB.

P1-1, - ATX/EPS Power Connector
P1-2, 24 pin right angle dual row, Molex #39-30-1240

P1-3,	Pin	Signal	Pin	Signal
P1-4	1	+3.3V	13	+3.3V
	2	+3.3V	14	NC
	3	Gnd	15	Gnd
	4	+5V	16	PSON#
	5	Gnd	17	Gnd
	6	+5V	18	Gnd
	7	Gnd	19	Gnd
	8	PWRGD	20	NC
	9	+5VAUX	21	+5V
	10	+12V	22	+5V
	11	+12V	23	+5V
	12	+3.3V	24	Gnd

P2-1, - +12V Power Connector
P2-2, 8 pin right angle dual row, Molex #39-30-0080

P2-3,	Pin	Signal	Pin	Signal
P2-4	1	Gnd	8	+12V
	2	Gnd	7	+12V
	3	Gnd	6	+12V
	4	Gnd	5	+12V

P4-1, - USB 2.0 Redirect Connector (Factory Use Only)
P4-2, 4 pin vertical single row header, Tyco (AMP) #5-146280-4

P4-3,	Pin	Signal
P4-4	1	VBUSn
	2	NC
	3	NC
	4	Gnd

n = the segment/SHB number

P6-1, - Power-On Connector (PSON)
P6-2, 2 pin vertical single row header, Tyco (AMP) #640456-2

P6-3,	Pin	Signal
P6-4	1	Gnd
	2	n-PSON#

n = segment/SHB number

P7-1, - Power Button Connector (PWRBTN)
P7-2, 2 pin vertical single row header, Tyco (AMP) #640456-2

P7-3,	Pin	Signal
P7-4	1	Gnd
	2	n-PWRBTN#

n = segment/SHB number

8237-037 Connectors (continued)

P8-1, - Reset Connector
P8-2, 2 pin vertical single row header, Tyco (AMP) #640456-2
P8-3, **P8-4**

Pin	Signal
1	Gnd
2	n-SHB_RST#

n = segment/SHB number

P9-1, - Power Good Connector
P9-2, 2 pin vertical single row header, Tyco (AMP) #640456-2
P9-3, **P9-4**

Pin	Signal
1	n-PWRGD_LED
2	+5V

n = segment/SHB number

P12-1, - Universal Serial Bus 3.0 (USB) Connector
P12-2, 19 pin dual row header, LOTES #ABA-USB-050-K04
P12-3, **P12-4**

Pin	Signal	Pin	Signal
1	+5=USB4n (VBUS1n)	11	USB5n-DP
2	USB4n-SRXN	12	USB5n-DN
3	USB4n-SRXP	13	Gnd-USB5n
4	Gnd-USB4n	14	USB5n-STXP
5	USB4n-STXN	15	USB5n-STXN
6	USB4n-STXP	16	Gnd-USB5n
7	Gnd-USB4n	17	USB5n-SRXP
8	USB4n-DN	18	USB5n-SRXN
9	USB4n-DP	19	+5V-USB5n (VBUS19)
10	NC		n = segment/SHB number

P29-1, - Clear CMOS Connector
P29-2, 2 pin single row header, Tyco (AMP) #640456-2
P29-3, **P29-4**

Pin	Signal
1	Gnd
2	n-CMOSCLR#

n = segment/SHB number

NOTE: To clear a system host board's CMOS using backplane connector P29-n, power down the system segment and install the P29-n jumper. Wait for at least two seconds, remove the jumper and turn the power on. Clearing CMOS on the system host board will not result in a checksum error on the following boot. If you want to change a BIOS setting, you must press DEL or the F2 key during POST to enter the SHB's BIOS setup after clearing CMOS.
NOTE 2: Backplane Clear CMOS capability is a planned capability for the HDEC specification, to be implemented on future SHB products. The HEP8225 SHB does not support this capability.
For full P29 connector support information, contact Trenton.

8237-037 Connectors (continued)

P30, - +12V 12V Chassis Fan Connectors
P31, 4 pin right-angle header, Tyco (AMP) #640456-3
P32, Pin Signal
P33 1 PWMn_3W (n=0,1,2,or 3)
2 +12V
3 Gnd
Note: 0=P30, 1=P31,
2=P32, 3=P33

P45-1, - HDD LED Connector
P45-2, 2 pin single row header, Tyco (AMP) #5-146280-2
P45-3, Pin Signal
P45-4 1 n_HDD_LED (n = segment/SHB number)
2 +5V

P46-1, - 3.3V AUX Card Slot Enable Connector
P46-2, 2 pin single row header, Tyco (AMP) #5-146280-2
P46-3, Pin Signal
P46-4 1 3.3V_AUX
2 +3.3V_n (n = segment/SHB number)
Installing jumper P46-n enables +3.3V AUX on the segment's PCIe card slot

P60-n, - SATA Connectors (4 per SHB segment)
P61-n, 7 pin vertical connector with latch, Molex # 67800-8005
P62-n, P60-n = SHB Segment SATA0, P61-n = SHB Segment SATA1
P63-n P62-n = SHB Segment SATA2, P63-n = SHB Segment SATA3
Pin Signal
1 n_Gnd
2 n_TXn_p
3 n_TXn_n
4 n_Gnd
5 n_RXn_p
6 n_RXn_n
7 n_Gnd
n = segment/SHB
number

8237-037 Diagnostic LED Status Indicators

LED Reference Designation	Backplane Silkscreen Wording	LED On	LED Off
LED1, LED2, LED3, LED4 (Red)	Segment SHB Detect	SHB is not properly seated in the segment's socket	Normal operation – SHB Detected
LED5, LED6, LED7, LED8 (Green)	LED5=FAN1, LED6=FAN2, LED7=FAN3, LED8=FAN0	System fan present	System fan not present
LED9, LED10, LED11, LED12(Green)	BP Segment 3 Power LEDs LED9=3.3V, LED10=5V, LED11=12V, LED12=5V AUX	Acceptable voltage level	Voltage level not acceptable
LED15, LED16, LED17, LED18(Green)	BP Segment 1 Power LEDs LED15=3.3V, LED16=5V, LED17=12V, LED18=5V AUX	Acceptable voltage level	Voltage level not acceptable
LED19, LED20, LED21, LED22(Green)	BP Segment 2 Power LEDs LED19=3.3V, LED20=5V, LED21=12V, LED22=5V AUX	Acceptable voltage level	Voltage level not acceptable
LED23, LED24, LED25, LED26(Green)	BP Segment 4 Power LEDs LED23=3.3V, LED24=5V, LED25=12V, LED26=5V AUX	Acceptable voltage level	Voltage level not acceptable

*See the HEP8225 hardware reference manual for a description of the SHB's post code error code numbers

Figure 9.1. HDB8237 Layout drawing and dimensions.

ENGINEERING NOTES:

1. The power connectors shown in the layout drawing represent backplane model number 8237-037.
2. Mounting holes: 0.156” diameter.
3. Nominal PCB thickness: 0.080”.
4. All dimensions are in inches.
5. The PCI Express 3.0 links on this HDEC® Series backplane are driven directly from the HDEC® Series system host board. PCIe 3.0 link re-timers are used to ensure signal integrity between the SHB and each plug-in PCIe option card.
6. PCIe 3.0 x16 interfaces are notated in green and are driven by a non-switched link from the SHB. 7. In some system designs, a backplane segments PCIe card slot may not be available due to processor cooling considerations.

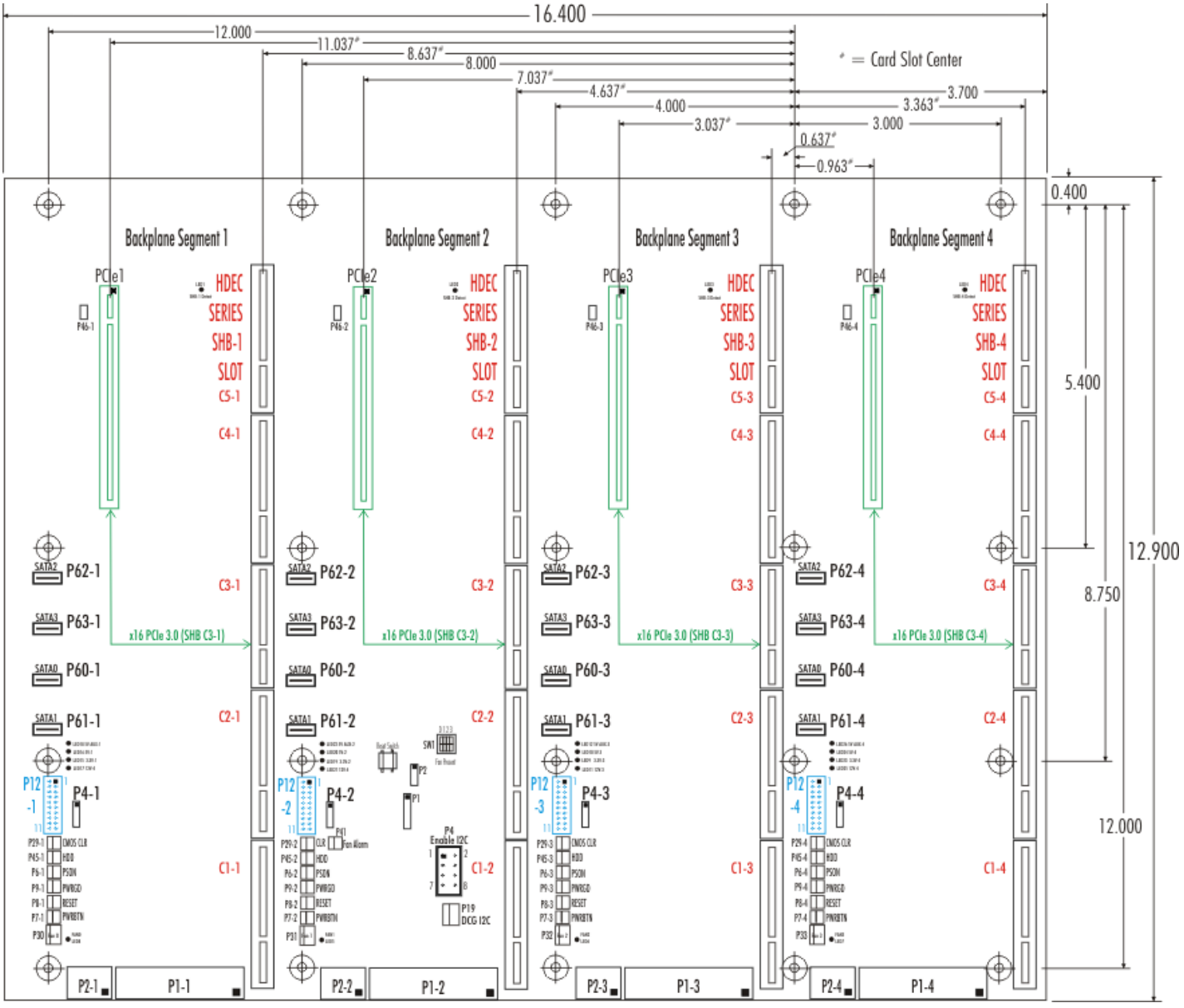
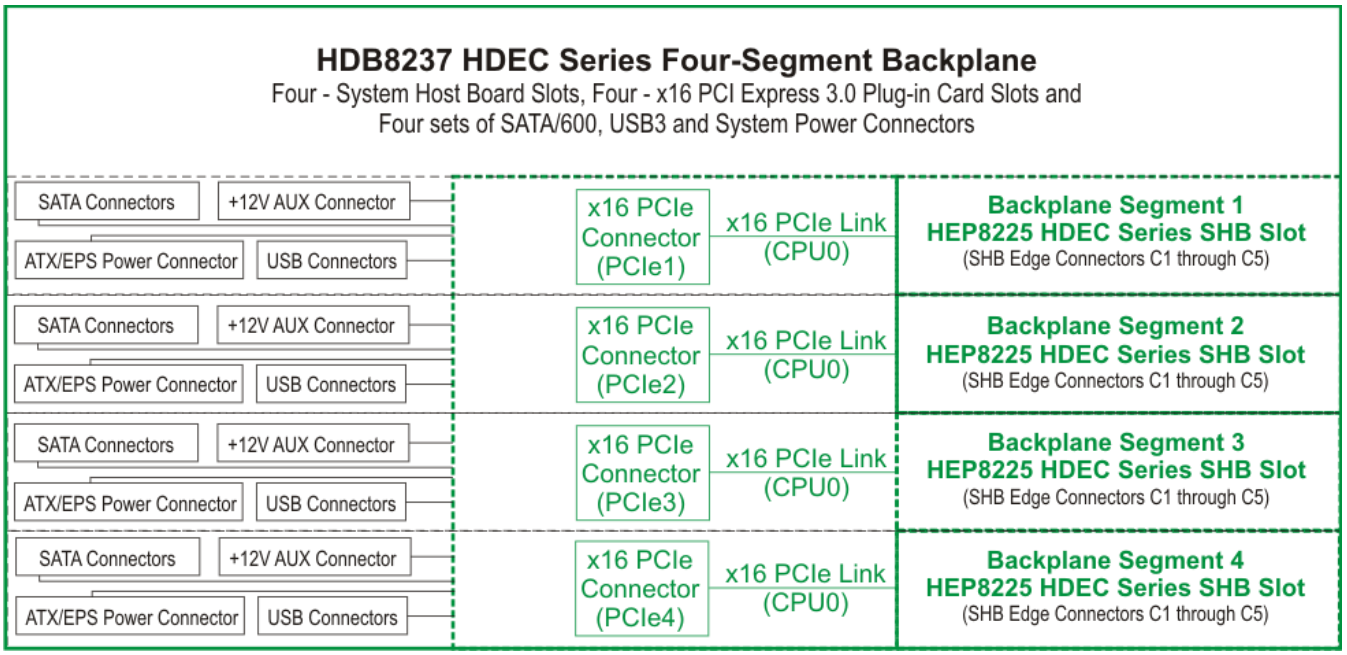


Figure 9.2. HDB8237 system block diagram.



Chapter 10 - HDB8259 Backplane Details

The HDB8259 is a large format backplane supporting one HDEC system host board, targeting 5U and select 4U rackmount computer deployments. It is equipped with fourteen, x16 mechanical PCIe 3.0 slots. Four of these are electrically x16, ten are x8. Additionally it supports four 4 USB 2.0 ports, two USB 3.0 ports via onboard connector P12 and six SATA/600 ports. Provisions for ATX/EPS and 12V auxiliary power are provided by P1, P2, P21, P22 and P23. Unique to the HDB8259 is the implementation of I^2C Bus isolation on all PCIe interfaces. This is especially useful in high performance and GPGPU deployments where querying information from option cards can contribute valuable data to system validation and health monitoring.

The backplane supports many of the system I/O interfaces brought down to the backplane via the edge card fingers on the HDEC® Series system host board.

Table 6.1 MAIN CONNECTORS

HDB8259 Connector	Function
P1	ATX/EPS power inputs from system supply
P2, P21, P22 & P23	+12V auxiliary power input from system supply
P3	LED dimmer interface
P10	Additional +3.3V inputs for extended current applications
P11* (see engineering note 7)	USB 2.0 rear panel I/O Ports 2,3,4,5
P12	USB3.0 header for Port0/Port1 front panel interface
P20	System Speaker Interface
P30-P37	System fan connectors (8)
P55	JTAG interface header
P57	Keypad header for system front panel
P60-P65	SATA/600 interfaces for HDD/SSDs (6)

Table 10.2 ADDITIONAL SYSTEM INTERFACE CONNECTIONS, JUMPERS AND LEDS

Connectors		Jumpers		LEDs	
Connector	Function	Jumper	Function	LED	Function
P6	PSON	P42	Temp. Alarm	1	SHB Detect
P7	Power Button	JU5	Fan Ctrl Enable	2	Lower POST codes
P8	Reset	JU7	SHB Fan Ctrl.	3	Upper POST codes
P9	Power Good	JU8	Speaker Enable	4-11	Fan Detect
P19	SMB	JU9	SMB Enable	13-17, 20	Voltage Acceptable.
P24, P25	Temp0, Temp1	JU10	12C Enable	21-30	Port Good
P29	Clear CMOS	JU11	Retimer Enable	31	EEPROM
P38	Intruder	JU12	I2C PEX Switch Disable	32	PCIe Switch Fail
P41	Fan Alarm				

See figure 10.1 for component location information.

ENVIRONMENTAL SPECIFICATIONS*

Operating Temp: 0° C to 60° C
Storage Temp: -40° C to 70° C
Humidity: 5% to 90%, non-condensing
*Note: Environmental specification for system host boards/single board computers are usually lower than those of the backplane. Check with your SHB/SBC vendor.

RoHS Compliant. Designed to meet worldwide EMI emissions requirements. Conforms to CE standards. Contact Trenton for the specific standard numbers for this product. Designed for UL60950 and CAN/CSAC22.2 No. 60950-00.

8259-037 Configuration Jumpers

The setup of the configuration jumpers on the backplane is described below.

NOTE: Refer to the backplane layout drawing for the pin 1 position of the jumpers and connectors as indicated by the black square (▪).

Jumper	Description
JU1	**Microcontroller Enable** (Factory Use Only) 3-pin Jumper, Molex #22-03-2031 Jumper default position is unpopulated Pin Signal 1 PERSET# 2 MCLR 3 Vpp
JU2	**PIC Power Select Enable** (Factory Use Only) 3-pin Jumper, Molex #22-03-2031 Jumper default position is unpopulated Pin Signal 1 +3.3V 2 PICPOWER 3 Vdd
JU5	**System Fan Control Enable** 2-pin Jumper, Tyco (AMP) #5-146280-2 Jumper default position is populated. Remove jumper to have system fans run continuously at full speed. Pin Signal 1 +3.3V 2 PICPOWER
JU7	**SHB Control of System Fans** 2-pin Jumper, Tyco (AMP) #5-146280-2 Jumper default position is populated. Remove jumper for systems where system fan control is from non-SHB signal sources. Pin Signal 1 SHB system fan control IN 2 Gnd

8259-037 Configuration Jumpers (continued)

JU8 **Backplane Speaker (SPK1) Enable**

2-pin Jumper, Tyco (AMP) #5-146280-2
Jumper default position is populated. Remove jumper to disable backplane speaker SPK1. Most systems will use a system speaker connected to P20.

Pin	Signal
1	+5V
2	SPK1, Pin2

JU9 **I2C Retimer Disable Connector**

2 pin single row header, Tyco (AMP) #640456-2
Installing jumper JU9 disables the PCIe slots.

Pin	Signal
1	I2C Enable
2	Gnd

JU10 **I2C Retimer Disable Connector**

2 pin single row header, Tyco (AMP) #640456-2
Installing jumper JU10 disables the SHB/HDEC port.

Pin	Signal
1	I2C Enable
2	Gnd

JU11 **I2C Retimer Disable Connector**

2 pin single row header, Tyco (AMP) #640456-2
Installing jumper JU11 disables the PCIe retimers.

Pin	Signal
1	I2C Enable
2	Gnd

JU12 **I2C Disable PEX Switch**

2 pin single row header, Tyco (AMP) #640456-2
Installing jumper P49 disables the PCIe switch.

Pin	Signal
1	I2C Enable
2	Gnd

8259-037 Connectors

NOTE: Pin 1 on the connectors is indicated by the square pad on the PCB.

P1 ATX/EPS Power Connector

24 pin right angle dual row, Molex #39-30-1240

Pin	Signal	Pin	Signal
1	+3.3V	13	+3.3V
2	+3.3V	14	NC
3	Gnd	15	Gnd
4	+5V	16	PSON#
5	Gnd	17	Gnd
6	+5V	18	Gnd
7	Gnd	19	Gnd
8	PWRGD	20	NC
9	+5VAUX	21	+5V
10	+12V	22	+5V
11	+12V	23	+5V
12	+3.3V	24	Gnd

P2 +12V Power Connectors

8 pin right angle dual row, Molex #39-30-0080

Pin	Signal	Pin	Signal
1	Gnd	8	+12V
2	Gnd	7	+12V
3	Gnd	6	+12V
4	Gnd	5	+12V

P3 LED Dimmer Connector

4 pin vertical single row header, Molex #47053-1000

Pin	Signal
1	PWM LED
2	PWM LED
3	+12V
4	+12V

P5 SPI Microcontroller Connector (Factory Use Only)

4 pin vertical single row header, Tyco (AMP) #5-146280-4

Pin	Signal
1	SPI_DO
2	SPI_DI
3	SPI_CLK
4	SPI_SS

P6 Power-On Connector (PSON)

2 pin vertical single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	PSON#

8259-037 Connectors (continued)

P7 Power Button Connector

2 pin vertical single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	PWRBT#

P8 Reset Connector

2 pin vertical single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	SHB_RST#

P9 Power Good Connector

2 pin vertical single row header, Tyco (AMP) #640456-2

Pin	Signal
1	PWRGD
2	+5V

P10 Terminal Block Connector

4 position terminal block, Tyco (AMP) #796949-4 (20 Amps per circuit)

Pin	Signal
1	+3.3V
2	+3.3V
3	GND
4	GND

P11 Stacked, Quad USB 2.0 Ports (Rear Chassis Access)

4-port USB connector, FOXCONN #UEA1112C-QHD6-4F

Note 1: The A connector is the lowest connector in the stack while the D connector is the upper connector.

Note 2: The backplane routes USB 2.0 interfaces from the HEP8225 system host board to these four USB ports.

Pin	Signal	Pin	Signal
A1	+5V-USB2	B1	+5V-USB3
A2	USB2_N	B2	USB3_N
A3	USB2_P Gnd-	B3	USB3_P Gnd-
A4	USB2	B4	USB3
A5	USB2SSRX_N	B5	USB3SSRX_N
A6	USB2SSRX_P	B6	USB3SSRX_P
A7	Gnd-USB2	B7	Gnd-USB3
A8	USB2SSTX_N	B8	USB3SSTX_N
A9	USB2SSTX_P	B9	USB3SSTX_P
Pin	Signal	Pin	Signal
B1	+5V-USB4	D1	+5V-USB5
B2	USB4_N	D2	USB5_N
B3	USB4_P Gnd-	D3	USB5_P Gnd-
B4	USB4	D4	USB5
B5	USB4SSRX_N	D5	USB5SSRX_N
B6	USB4SSRX_P	D6	USB5SSRX_P
B7	Gnd-USB4	D7	Gnd_USB5
B8	USB4SSTX_N	D8	USB5SSTX_N
B9	USB4SSTX_P	D9	USB5SSTX_P

8259-037 Connectors (continued)

P12 Universal Serial Bus 3.0 (USB) Connector

19 pin dual row header, LOTES #ABA-USB-050-K04

Pin	Signal	Pin	Signal
1	+5V-USB4 (VBUS1)	11	USB5-DP
2	USB4-SRXN	12	USB5-DN
3	USB4-SRXP	13	Gnd-USB5
4	Gnd-USB4	14	USB5-STXP
5	USB4-STXN	15	USB5-STXN
6	USB4-STXP	16	Gnd-USB5
7	Gnd-USB4	17	USB5-SRXP
8	USB4-DN	18	USB5-SRXN
9	USB4-DP	19	+5V-USB5 (VBUS19)
10	NC		

P15 GPIO Debug Header (Factory Use Only)

4 pin vertical single row header, Tyco (AMP) #5-146280-4

Pin	Signal
1	GPIO_1
2	GPIO_2
3	GPIO_3
4	GPIO_4

P19 I2C Slot Header (Factory Use Only)

3 pin single row header, Molex #22-23-2031

Pin	Signal
1	I2C_Header_SDA
2	I2C_Header_SCL
3	Gnd

P20 System Speaker Connector

4 pin single row header, Molex #47053-1000

Pin	Signal
1	SPKR_n
2	NC
3	Gnd
4	+5V

P21 +12V Power Connector

8 pin right angle dual row, Molex #39-30-0080

Pin	Signal	Pin	Signal
1	Gnd	8	+12V
2	Gnd	7	+12V
3	Gnd	6	+12V
4	Gnd	5	+12V

P22 +12V Power Connector

8 pin right angle dual row, Molex #39-30-0080

Pin	Signal	Pin	Signal
1	Gnd	8	+12V
2	Gnd	7	+12V
3	Gnd	6	+12V
4	Gnd	5	+12V

8259-037 Connectors (continued)

P23 +12V Power Connector
8 pin right angle dual row, Molex #39-30-0080

Pin	Signal	Pin	Signal
1	Gnd	8	+12V
2	Gnd	7	+12V
3	Gnd	6	+12V
4	Gnd	5	+12V

P24 Temperature Sensor 0 Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	TEMPSENSE0

P25 Temperature Sensor 1 Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	TEMPSENSE1

P29 Clear CMOS Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	CMOSCLR#

NOTE: To clear the system host board's CMOS using backplane connector P29, power down the system and install the P29 jumper. Wait for at least two seconds, remove the jumper and turn the power on. Clearing CMOS on the System host board will not result in a checksum error on the following boot. If you want to change a BIOS setting, you must press DEL or the F2 key during POST to enter the SHB's BIOS setup after clearing CMOS
NOTE 2: Backplane Clear CMOS capability is a planned capability for the HDEC specification, to be implemented on future SHB products. The HEP8225 SHB does not support this capability.
For full P29 connector support information, contact Trenton.

P30, P32 P33 P34 P35 P36 P37 12V Chassis Fan Connectors (4)
4 pin right-angle header, Molex #47053-1000

Pin	Signal
1	PWMn_3W
2	+12V
3	TACHn
4	PWMn_4W

Note: n=Fan Number

P38 Intruder Alert Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	Gnd
2	INTRUDER#

8259-037 Connectors (continued)

P41 Fan Alarm LED Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	FF_LED
2	+5V

P42 Temp Alarm LED Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	TEMP_LED
2	+5V

P43 Voltage Alarm LED Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	VOLT_LED
2	+5V

P44 Error Alarm LED Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	ERROR_LED
2	+5V

P45 HDD LED Connector
2 pin single row header, Tyco (AMP) #640456-2

Pin	Signal
1	HDD_LED
2	+5V

8259-037 Connectors (continued)

P46 **3.3V AUX Card Slot Enable Connector**
A, B 2 pin single row header, Tyco (AMP) #640456-2
C, D

Pin	Signal
1	3.3V_AUX
2	+3.3V

Note 1: Installing jumper P46n enables +3.3V AUX on four of the PCIe card slots for boards with only one connector.
Note 2: For boards with multiple connectors, enabling will provide +3.3V AUX to only those slots the specific jumper controls.

P53 **GPIO Connector**
8 pin dual row connector, 3M #N2508-6003-RB

Pin	Signal	Pin	Signal
1	GPIO2	2	GPIO3
3	GPIO4	4	GPIO5
5	GPIO6	6	GPIO7
7	GPIO1	8	Gnd

P57 **Front or Rear Panel LED/Button Connector (Factory Use Only)**
7 pin single row header, Tyco (AMP) # 640456-7

Pin	Signal
1	Common from panel
2	Button position 1
3	Button position 2
4	Button position 3
5	Button position 4
6	Button position 5
7	Button position 6

P60 **SATA Connectors**
P61 7 pin vertical connector with latch, Molex # 67800-8005
P62
P63
P64
P65

Pin	Signal
1	Gnd
2	TXn_p
3	TXn_n
4	Gnd
5	RXn_p
6	RXn_n
7	Gnd

Note: n=SATA port number

8259-037 Diagnostic LED Status Indicators

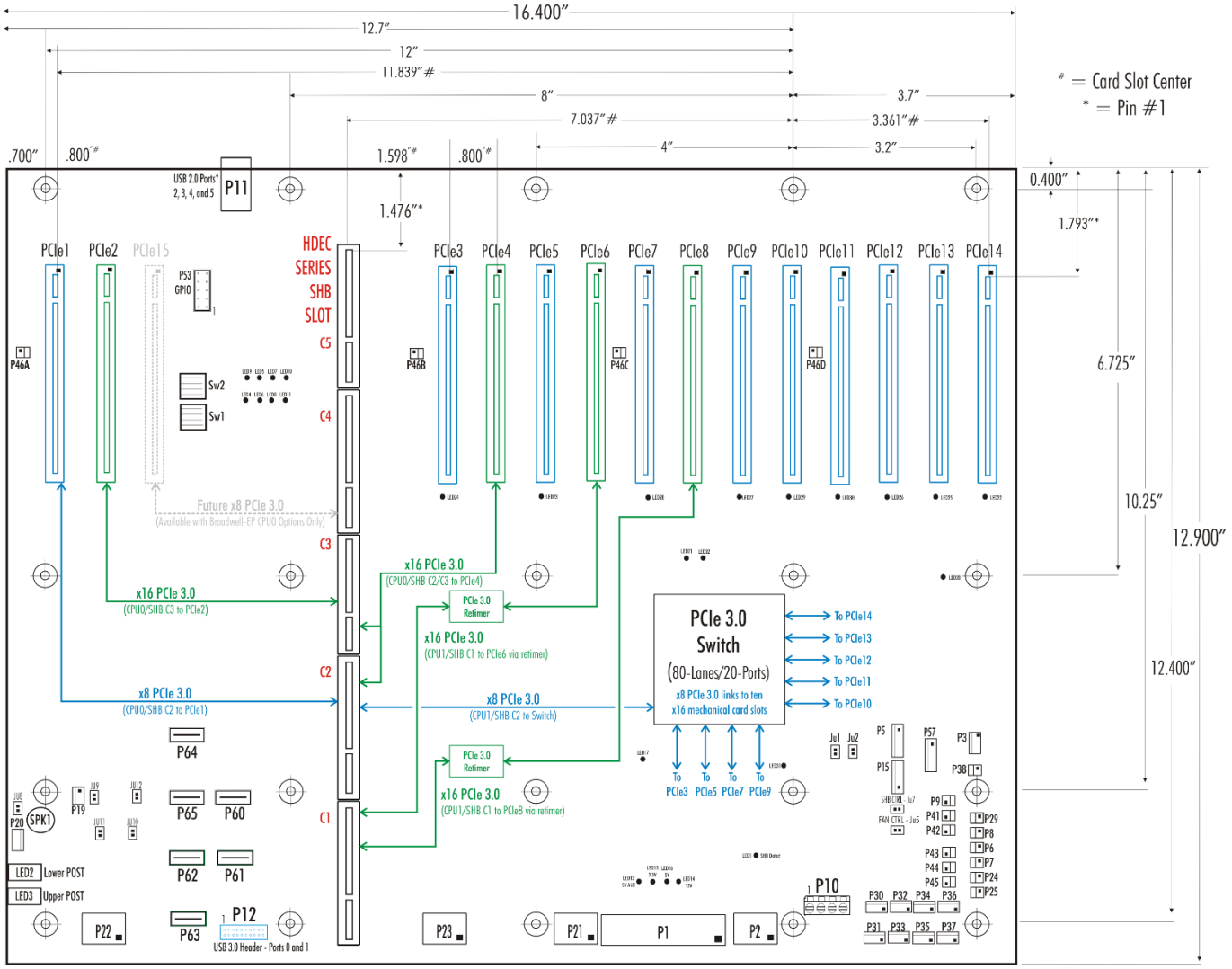
LED Reference Designation	Backplane Silkscreen Wording	LED On	LED Off
LED1 (Red)	SHB Detect	SHB is not properly seated in its socket	Normal operation – SHB Detected
LED2 (7-segment display)	Lower Post Code	SHB Post Code Error*	SHB Boot Complete
LED3 (7-segment display)	Upper Post Code	SHB Post Code Error*	SHB Boot Complete
LED4,5,6,7,8,9,10,11	FAN n (n=System Fan Number)	System fan present	System fan not present
LED12	PWRGOOD	Acceptable voltage level	Voltage level not acceptable
LED13	+5V AUX	Acceptable voltage level	Voltage level not acceptable
LED14	+12V	Acceptable voltage level	Voltage level not acceptable
LED15	+5V	Acceptable voltage level	Voltage level not acceptable
LED16	+3.3V	Acceptable voltage level	Voltage level not acceptable
LED17	+1.8V for U10, U20, U40	Acceptable voltage level	Voltage level not acceptable
LED18	+1.8V for U21	Acceptable voltage level	Voltage level not acceptable
LED20	+0.9V	Acceptable voltage level	Voltage level not acceptable
LED21	Port Good 0	PCIe Port Functional	PCIe Port NonFunctional
LED22	Port Good 1	PCIe Port Functional	PCIe Port NonFunctional
LED23	Port Good 4	PCIe Port Functional	PCIe Port NonFunctional
LED24	Port Good 5	PCIe Port Functional	PCIe Port NonFunctional
LED25	Port Good 8	PCIe Port Functional	PCIe Port NonFunctional
LED26	Port Good 9	PCIe Port Functional	PCIe Port NonFunctional
LED27	Port Good 12	PCIe Port Functional	PCIe Port NonFunctional
LED28	Port Good 13	PCIe Port Functional	PCIe Port NonFunctional
LED29	Port Good 17	PCIe Port Functional	PCIe Port NonFunctional
LED30	Port Good 16	PCIe Port Functional	PCIe Port NonFunctional
LED31	EEPROM	EEPROM Not Programmed	EEPROM Programmed
LED32	U30 Fatal	PCIe Switch Fail	PCIe Switch Operational

*See the HEP8225 hardware reference manual for a description of the SHB's post code error code numbers

8259-037 Switches

HDB8259 Switch	Function
SW2	Fan 0 Fan Control On/Off Fan 1 Fan Control On/Off Fan 2 Fan Control On/Off Fan 3 Fan Control On/Off
SW1	Fan 4 Fan Control On/Off Fan 5 Fan Control On/Off Fan 6 Fan Control On/Off Fan 7 Fan Control On/Off

Figure 6.1 HDB8259 Layout drawing and Dimensions



ENGINEERING NOTES:

1. The power connectors shown in the layout drawing represent backplane model number 8229-038.
2. Mounting holes: 0.156” diameter.
3. Nominal PCB thickness: 0.080”.
4. All dimensions are in inches.
5. The PCI Express 3.0 links on this HDEC® Series backplane are driven either directly from the HDEC® Series system host board or via a PCIe 3.0 switch (x8). PCIe 3.0 link re-timers are used to ensure signal integrity between the SHB and each plug-in PCIe option card.
6. Interfaces denoted in green are x16 PCIe 3.0 driven from the HEP8225 SHB. Interfaces denoted in blue are x8 PCIe 3.0 driven from the PCIe 3.0 x8 switch (U30).
7. * The P11 ports physically support USB 3.0 interfaces; however, the current USB routing for P11 from the SHB only operates at USB 2.0 speeds.

Figure 6.2 HDB8259 system block diagram