HEP8225

High Density Embedded Computing Series SHB

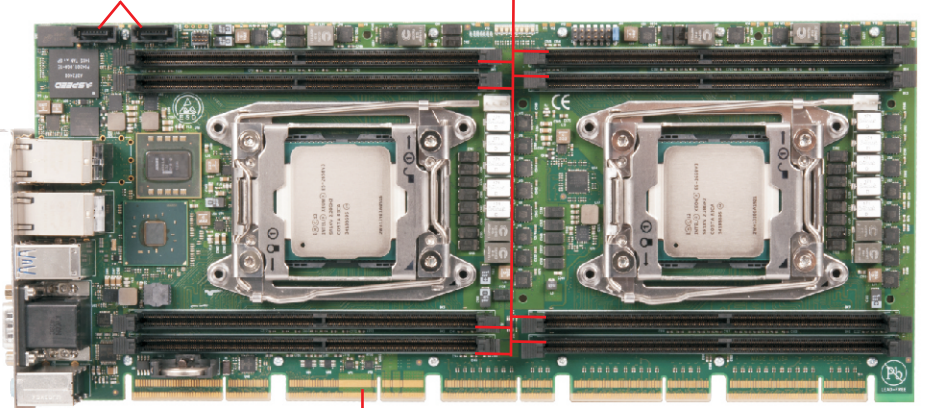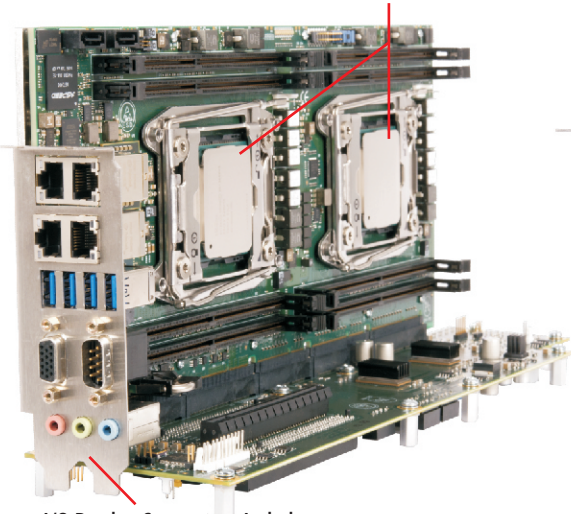# DUAL-PROCESSOR HDEC Series® SYSTEM HOST BOARD

Up to 14-Core Intel® Xeon® E5-2600 Processors

Two Serial ATA/600 Interfaces

Eight Channel DDR4 Memory Interfaces, DDR4-2400 speeds, 256GB capacity

I/O Bracket Connections Include...
- 10G Ethernet (2) • 1G Ethernet (2) • USB 3.0 (4) • VGA & Serial Ports • Audio Ports

Dual-Density PCI Express® Edge Connectors Deliver Expanded PCIe, Device I/O, SHB Power and Diagnostics
- 80-lanes of PCIe 3.0
- Six SATA/600 Interfaces
- Six USB Interfaces
- System Diagnostics and I/O
- System Integration Efficiency
- Standard PCIe I/O Connectors

HDEC Series®

Here's a brief list of the HEP8225 HDEC Series® system host board highlights:

- 14 through 6-core CPU architecture boosts system performance
- Native 10G & 1G Ethernet support enhances comm. flexibility
- 80-lanes of PCIe 3.0 increases I/O bandwidth & lowers latency
- 5-year product warranty & 7+ year availability lowers TCO
- Four-channel DDR4 memory interfaces maximize memory speeds
- New Broadwell-EP integrated storage features & instructions

PROCESSORS:

Intel® Xeon® E5-2600 v3 or v4 Series, 1.7GHz - 2.6GHz*
Processor Package: LGA2011

*14, 12, 10, 8, and 6-core processor

The 14nm Intel® micro-architecture; formally known as Broadwell-EP, features a four-channel DDR4 integrated memory controller for added memory performance. The new memory controllers enable DDR4-2400 memory interface speed support in these latest Intel® Xeon® E5-2600 v4 series processors. A total of eighty (80) PCI Express® 3.0 links are available directly out of the two processors on the HEP8225 system host board to enable HDEC Series® system designs that deliver faster data throughput performance with minimal latency in a wide variety of data intensive applications. Other SHB features include:

- Extended-life, embedded components provide longevity
- 14nm Intel® Micro-Architecture design (Broadwell-EP) saves power
- Intel® Hyper-Threading doubles the number of execution threads
- Intel® Speed Step Technology balances processor computational demands and thermal efficiency
- Intel® AVX 2.0 instruction set supported
- 80 lanes of native PCI Express 3.0 links support all PCI Express plug-in boards and devices in an HDEC Series system that utilizes an HDEC Series backplane

PLATFORM CONTROLLER HUB (PCH):

The Intel® C612 is the Platform Controller Hub (PCH) that unlocks the device I/O capability of the board's processors. The PCH design saves power while providing enhanced USB3.0, SATA 600 RAID, and USB2.0 interface capabilities to the system.

FOUR ETHERNET INTERFACES - 10GbE & 1GbE (2 each):

Two 10GbE & two 1GbE LAN interfaces are standard on the I/O bracket in 92-82252xx00000 SHB part number configurations.

EIGHTY (80) PCI EXPRESS® 3.0 LINKS:

The HEP8225 represents a new paradigm when it comes to interfacing standard PCI Express plug-in option cards in a computer system. This dual-processor HDEC Series system host board utilizes the 40 native PCI Express 3.0 links available in each SHB's Intel® Xeon® E5-2600 v4 Series Processor to deliver four x16 and two x8 PCIe Gen3 electrical interfaces to an HDEC Series backplane such as the Trenton HDB8228. The six PCIe 3.0 interfaces enable wider bandwidths, faster data throughput with lower data latencies in a typical HDEC Series system configuration. Upon system power-up, the HEP8225 automatically configures all of the direct PCIe links between the SHB and PCIe option cards; as well as any associated backplane target devices, for optimum data communication. This automatic link negotiation process enables data communications between the SHB and the system option cards at either PCI Express 3.0, 2.0 or 1.1 link speeds. PCI Express auto-negotiation between the HEP8225 and the system option cards is fully supported thereby enabling system design support for x1, x4, x8 and x16 PCI Express cards.

PCI EXPRESS CONFIGURATION:

Edge Connectors (C1 through C5) - Four x16, and two x8 PCIe 3.0

Note: Each x16 link may bifurcate down to four x4 links on a Trenton HDEC Series backplane, likewise the x8 links may bifurcate down to two x4 links

- Two reference clocks

VIDEO:

Trenton's HEP8225 features an advanced PCIe graphics and remote management processor driven with a x1 PCIe link from the board's PCH. This graphics processor includes a VGA controller that supports pixel resolutions up to 1920x1200.

EIGHT DDR4-2400 MEMORY INTERFACES:

Up to eight standard DDR4 memory DIMMs are supported on the HEP8225 for a total system memory capacity of 256GB when using 32GB DIMMs. The HEP8225 takes advantage of the four-channel DDR4 memory interface by enabling select Intel® Xeon® E5-2600 v4 Series Processors to deliver system memory speeds with peak data transfer rates up to 2400 MT/s per channel. ECC registered memory is supported on the HEP8225 and Trenton recommends PC4-19200 standard DIMMs for all HEP8225 processor options.

EIGHT SATA/600 INTERFACES:

The board's Intel® C612 Platform Controller Hub (PCH) provides support for a total of eight SATA/600 interfaces in the HEP8225 SHB design. These eight SATA interfaces deliver data transfer rates up to 600MB/s. Six of the interfaces are routed to the SHB's edge connectors to simplify system integration and device interconnect cable management. Two interfaces are available as on-board SATA/600 device headers. Independent SATA storage drive operation and RAID drive array configurations are both supported.
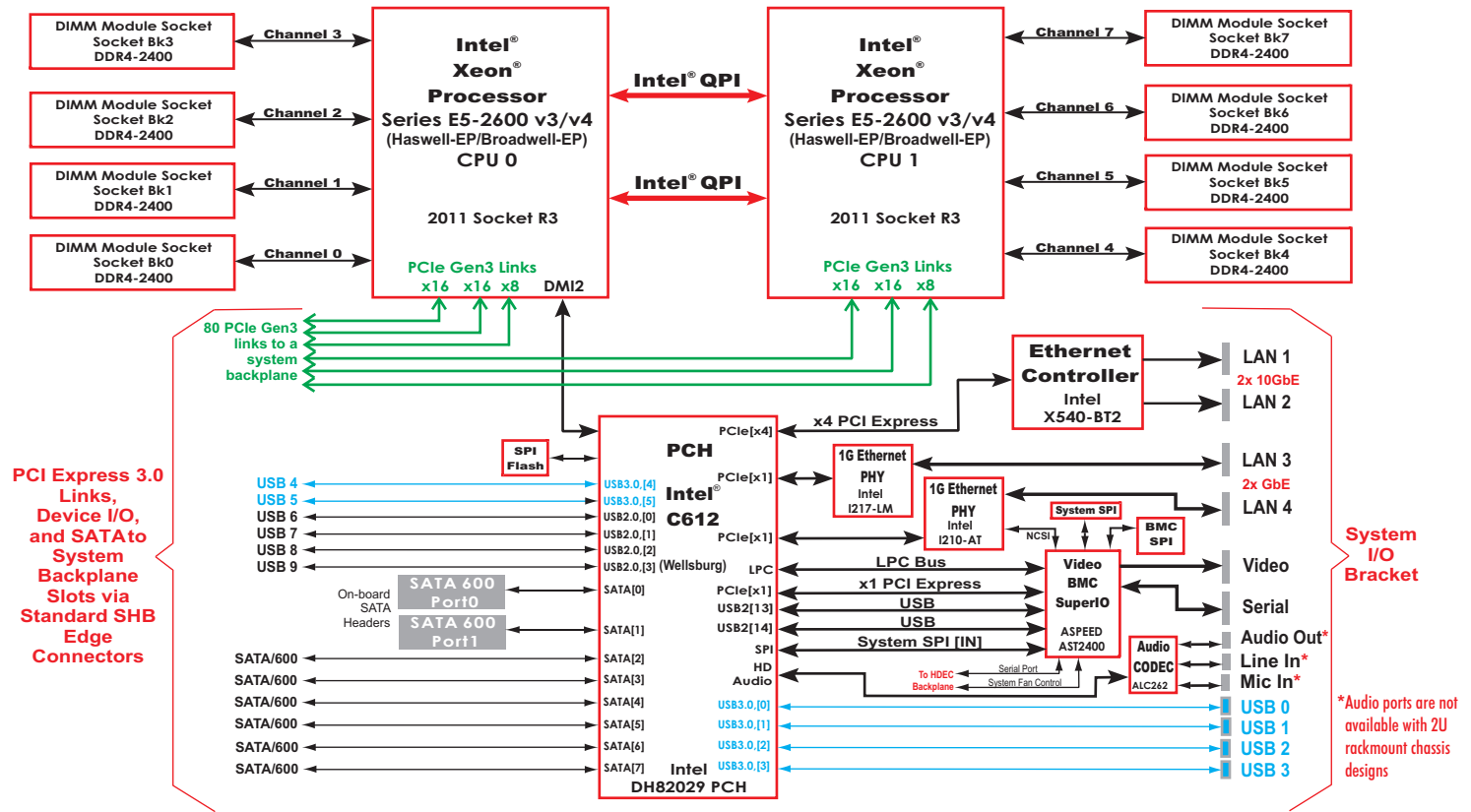
SIX USB 3.0 and FOUR USB 2.0 INTERFACES:

Four of the six USB 3.0 ports are on the SHB's I/O bracket and two USB 3.0 ports are routed to the edge connectors for use on an HDEC Series backplane. The four additional USB 2.0 interfaces are also routed to the HEP8225's edge connectors.

TRENTON SYSTEMS®

Engineered For Reliability

HEP8225

High Density Embedded Computing Series SHB

Block diagram:

DIMM Module Socket Socket Bk3 DDR4-2400	Channel 3	
DIMM Module Socket Socket Bk2 DDR4-2400	Channel 2	
DIMM Module Socket Socket Bk1 DDR4-2400	Channel 1	
DIMM Module Socket Socket Bk0 DDR4-2400	Channel 0	

Intel® Xeon® Processor Series E5-2600 v3/v4 (Haswell-EP/Broadwell-EP) CPU 0 — 2011 Socket R3

Intel® QPI

Intel® Xeon® Processor Series E5-2600 v3/v4 (Haswell-EP/Broadwell-EP) CPU 1 — 2011 Socket R3

Channel 7	DIMM Module Socket Socket Bk7 DDR4-2400
Channel 6	DIMM Module Socket Socket Bk6 DDR4-2400
Channel 5	DIMM Module Socket Socket Bk5 DDR4-2400
Channel 4	DIMM Module Socket Socket Bk4 DDR4-2400

PCIe Gen3 Links x16 x16 x8 DMI2

PCIe Gen3 Links x16 x16 x8

80 PCIe Gen3 links to a system backplane

PCI Express 3.0 Links, Device I/O, and SATA to System Backplane Slots via Standard SHB Edge Connectors

Ethernet Controller Intel X540-BT2 — LAN 1 / LAN 2 (2x 10GbE)

PCH Intel® C612 (Wellsburg) — **Intel DH82029 PCH**

SPI Flash

x4 PCI Express — PCIe[x4]

USB 4 → USB3.0,[4]
USB 5 → USB3.0,[5]
USB 6 → USB2.0,[0]
USB 7 → USB2.0,[1]
USB 8 → USB2.0,[2]
USB 9 → USB2.0,[3]

PCIe[x1]

1G Ethernet PHY Intel I217-LM — LAN 3 (2x GbE)
1G Ethernet PHY Intel I210-AT — LAN 4

System SPI / NCSI / BMC SPI

On-board SATA Headers: SATA 600 Port0 — SATA[0]
SATA 600 Port1 — SATA[1]

SATA/600 — SATA[2]
SATA/600 — SATA[3]
SATA/600 — SATA[4]
SATA/600 — SATA[5]
SATA/600 — SATA[6]
SATA/600 — SATA[7]

LPC Bus / LPC
x1 PCI Express / PCIe[x1]
USB / USB2[13]
USB / USB2[14]
System SPI [IN] / SPI
HD Audio

Video BMC SuperIO ASPEED AST2400 — Video / Serial
Audio CODEC ALC262 — Audio Out* / Line In* / Mic In*

To HDEC Backplane / Serial Port / System Fan Control

USB3.0,[0] → USB 0
USB3.0,[1] → USB 1
USB3.0,[2] → USB 2
USB3.0,[3] → USB 3

System I/O Bracket

*Audio ports are not available with 2U rackmount chassis designs

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HDEC Series® SYSTEM I/O and DIAGNOSTICS:

The HEP8225 system host board provides a variety of system I/O signals and diagnostic information to an HDEC Series backplane via the SHB's edge connectors. This enhanced system I/O capability maximizes HDEC Series system functionality while streamlining system support. Some of the available signals and diagnostics are:

1. GPIO Signals (8)
2. System Fan Speed Control (8)
3. SHB PRESENT
4. SMBus0
5. SMBus1
6. Speaker
7. HD, Pwr Good and Status LEDs
8. POST Code LEDs
9. CMOS Clear
10. Intruder Alert
11. PERST#, PME#, WAKE#
12. RESET IN, PWRBT, PSON, PWRGDIN

NOTE: IPMI functionality supported with IPMB signaling and appropriate IPMI software

ADDITIONAL PRODUCT FEATURES:

I/O Features:
- Audio
  - Standard Audio Out, Line In and MIC In audio ports are supported on the SHB's I/O bracket
  NOTE: Audio ports are not available with 2U rackmount chassis designs
- The HEP8225 provides a watchdog timer (WDT) with seven programmable timeout periods.

BIOS (FLASH):

The HEP8225 SHB features the Aptio® 5.x BIOS from AMI. The BIOS resides in the SHB's SPI device for easy field updates.

STANDARDS:

The HEP8225 SHB supports all standard plug-in cards that adhere to the PCI Express® Base Specifications 3.0, 2.0, and 1.1.

AGENCY APPROVALS:

Designed for UL60950, CAN/CSA C22.2 No. 60950-00, EN55022:1998 Class B, EN61000-4-2:1995, EN61000-4-3:1997, EN61000-4-4:1995, EN61000-4-5:1995, EN61000-4-6:1996, EN61000-4-11:1994

APPLICATION CONSIDERATIONS:

Power Requirements:

Typical Values* - Static Desktop (Idle) with 64GB of system

CPU	Intel® No.	+5V	+12V	+3.3V
2.4GHz	E5-2680 v4[14]	4.69A	5.84A	2.43A
2.5GHz	E5-2680 v3[12]	4.30A	5.62A	2.28A
2.3GHz	E5-2658 v4[14]	3.73A	4.63A	2.59A
2.2GHz	E5-2658 v3[12]	4.35A	5.41A	2.28A
1.8GHz	E5-2648L v4[14]	3.55A	4.58A	2.42A
1.8GHz	E5-2648L v3[12]	4.24A	5.24A	2.29A
1.9GHz	E5-2628L v4[12]	4.65A	3.14A	2.45A
2.2GHz	E5-2618L v4[10]	3.43A	3.19A	2.20A
2.0GHz	E5-2608L v3[6]	3.80A	3.52A	2.61A

Typical Values* - 100% Stress State with 64GB of system memory

CPU	Intel® No.	+5V	+12V	+3.3V
2.4GHz	E5-2680 v4[14]	5.20A	27.56A	2.92A
2.5GHz	E5-2680 v3[12]	5.28A	27.67A	2.79A
2.3GHz	E5-2658 v4[14]	4.14A	24.32A	2.68A
2.2GHz	E5-2658 v3[12]	5.08A	24.81A	2.77A
1.8GHz	E5-2648L v4[14]	4.01A	17.95A	2.59A
1.8GHz	E5-2648L v3[12]	4.88A	18.20A	2.59A
1.9GHz	E5-2628L v4[12]	5.07A	17.32A	2.93A
2.2GHz	E5-2618L v4[10]	4.06A	17.39A	2.78A
2.0GHz	E5-2608L v3[6]	4.10A	12.51A	2.93A

*Actual power numbers will vary.

Temperature/Environment:
Operating*: 0⁰ to 50⁰ C. / Storage: -20⁰ to 70⁰ C.
Air Flow Requirement: 350LFM continuous airflow
Humidity: 5% to 90% non-condensing
*Max. operating temp. is 45⁰ C. for high-end processors like the E5-2680 v3 or v4.

Mechanical:
Designed for 2U, 4U and 5U rackmount systems. HEP8225 dimensions: 13.345"/33.896cm (L) x 5.750"/14.605cm (H).

ORDERING INFORMATION:

Part Number	CPU Speed	Intel® No.
92-8225207000000	2.4GHz	E5-2680 v4[14,D]
92-8225218000000	2.5GHz	E5-2680 v3[12, A]
92-8225204000000	2.3GHz	E5-2658 v4[14,D]
92-8225216000000	2.2GHz	E5-2658 v3[12,A]
92-8225253000000	2.1GHz	E5-2620 v4[10,A]
92-8225221000000	1.8GHz	E5-2648L v4[14,D]
92-8225222000000	1.8GHz	E5-2648L v3[12, A]
92-8225241000000	1.9GHz	E5-2628L v4[12,A]
92-8225243000000	2.0GHz	E5-2628L v3[10, B]
92-8225265000000	2.2GHz	E5-2618L v4[10,A]
92-8225266000000	2.3GHz	E5-2618L v3[8, B]
92-8225281000000	1.6GHz	E5-2608L v4[8,B]

All processor options listed have long-life support. A 14, 12, 10, 8 or 6 indicates the number of available processor cores, while maximum DDR4 interface speed is indicated by A=DDR4-2133, B=DDR4-1886, C=DDR4-1600, or D=DDR4-2400. A green v4 is a Broadwell-EP processor option. A red 2 in the 8th part number position indicates an SHB configuration with 2-10GbE, 2-1GbE LANs and audio ports. Audio ports are not available with 2U rackmount chassis designs.

The stated processing, memory and communication interface speeds and bandwidths are component maximums; actual system performance may vary.

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