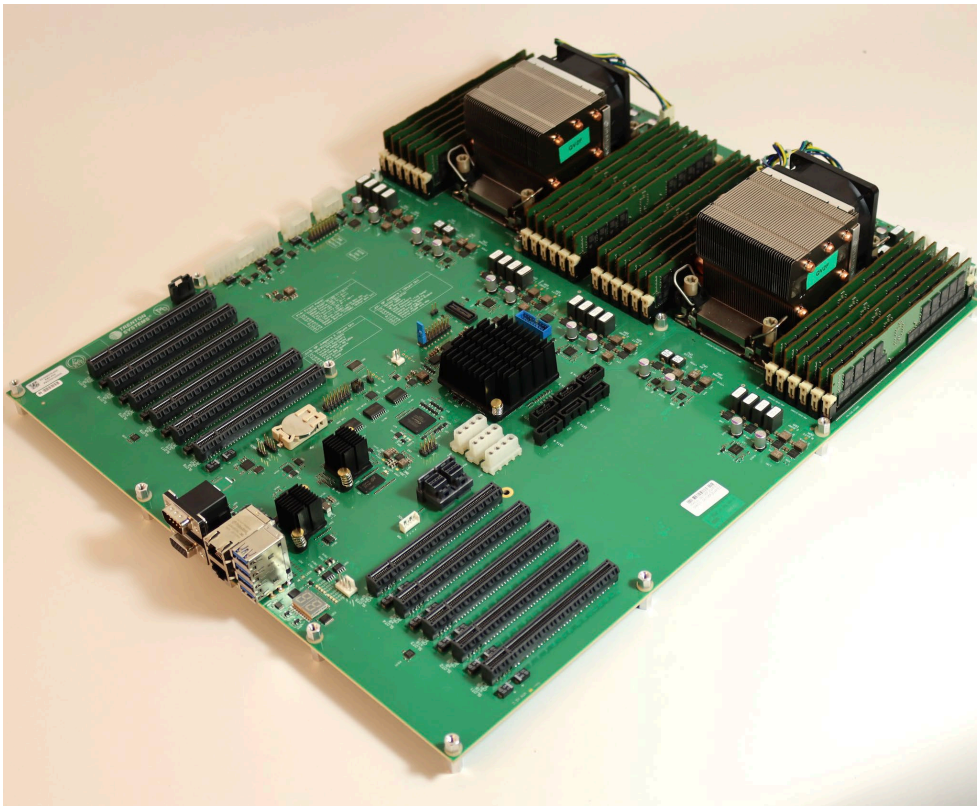




Manual

BAM8270

**Prepared by**

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Model Number: BAM8270

Revision: 1

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Preface

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About Trenton Systems

“Unbelievably light. Unquestionably rugged. Undeniably powerful.”

BACKGROUND

Since its establishment in 1989, Trenton Systems has been the leading, high-performance computer hardware and systems manufacturer dedicated to crafting application-specific solutions for the military, industrial, and commercial markets. Our rugged computing solutions are designed and manufactured in-house at our state-of-the-art facility in Lawrenceville, Georgia, which we relocated to in 2016 after outgrowing our original facility in Gainesville. Versatile, adaptable, and built-to-last, our multi-faceted computing solutions sport completely customizable, ultra-rugged designs, both inside and outside the chassis.

EXPERIENCE

Trenton Systems is trusted by the world’s leading technology companies. Some of our happy customers include Boeing, IBM, L3Harris, Northrop Grumman, Lockheed Martin and Raytheon. We also partner with Intel via the Embedded and Communications Alliance, which provides us with access to Intel’s roadmap, as well as with technical support directly from the company. Throughout the years, we’ve been at the forefront of the industry in numerous capacities. As a founding member of the PCI Industrial Manufacturers Group (PICMG), we redefined the industry in 1994 with our PICMG 1.0 form factor, and redefined it again in 2005, when we wrote the PICMG 1.3 specification. In 2008, we streamlined our design and manufacturing capabilities, allowing us to craft our systems fully in-house and provide customers with a one-stop shop for all things Trenton rugged.

PHILOSOPHY

Trenton Systems believes in stress-testing and certifying its USA-made products to and beyond the highest military and industrial standards. We believe in crafting solutions that last decades, rather than just a few years. We believe in providing rapid and effective follow-up support so that our customers don’t have to spend hours, days, or weeks trying to resolve a simple issue. At Trenton, we believe in setting our customers up for success, both on and off the front lines.



Warranty & Policies

WARRANTY

The following is an abbreviated version of Trenton Systems' warranty policy for motherboard products. For a complete warranty statement, contact Trenton Systems or visit our website at www.trentonsystems.com.

Board-level products manufactured by Trenton Systems 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.

RETURN POLICY

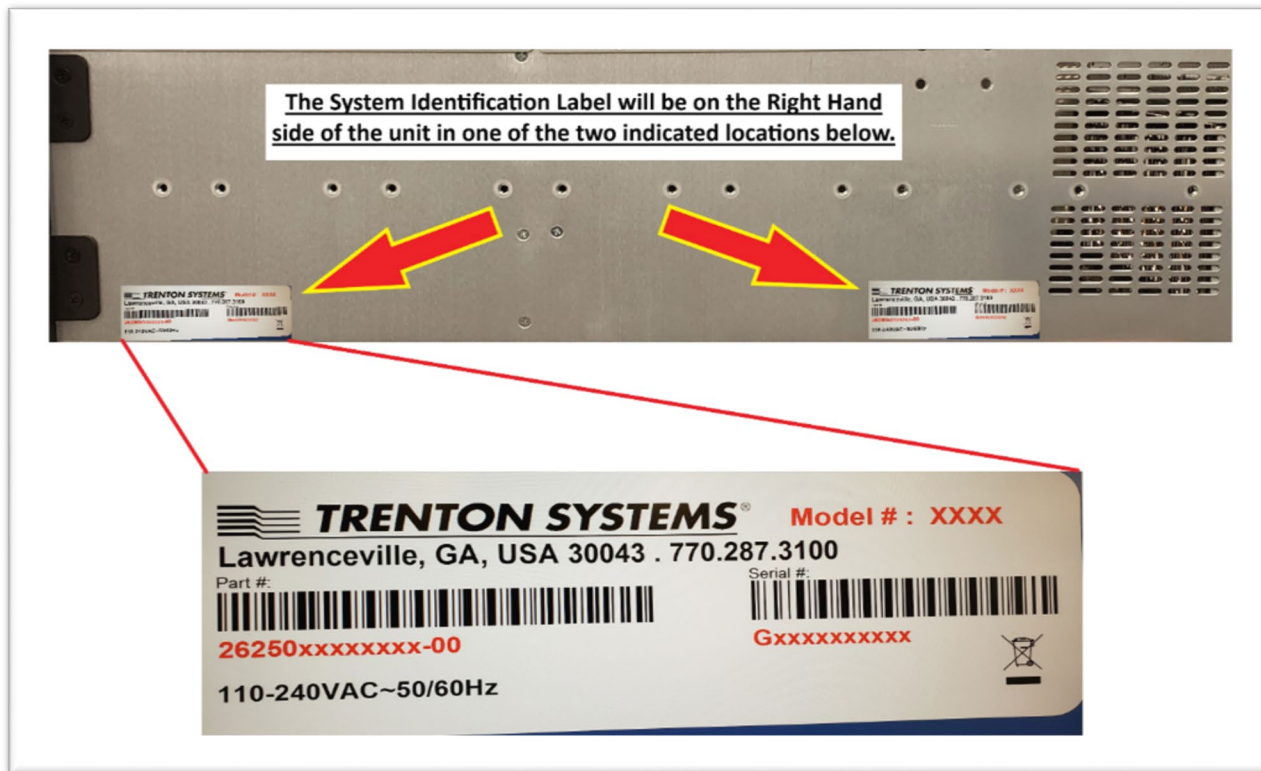
A Service Order Number, obtained from Trenton Systems prior to return, must accompany products returned for repair. The customer must prepay freight on all returned items, and the customer is responsible for any loss or damage caused by common carrier in transit. Items will be returned from Trenton Systems via Ground, unless prior arrangements are made by the customer for an alternative shipping method.

To obtain a Service Order Number, call us at (800) 875-6031 or (770) 287-3100, or open up a ticket at <https://www.trentonsystems.com/>. We will need the following information:

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

The Part Number and Serial Number are listed on the chassis as shown here:





Here is an Example label, which shows the Part Number, Revision, and Serial Number (S/N):



A Service Order Number will be issued. Mark the Service Order Number clearly on the outside of each box, include a copy of the Service Order failure report for each board, and return the product(s) to our Lawrenceville, GA facility:

Trenton Systems, Inc.
1725 MacLeod Drive
Lawrenceville, GA 30043
Attn: Repair Department

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- ▶ IBM, PC/AT, VGA, EGA, OS/2 and PS/2 are trademarks or registered trademarks of International Business Machines Corp.
- ▶ Intel, Xeon, Intel Core, Intel AMT, Intel TXT, Intel Hyper-Threading Technology, and Intel Virtualization Technology are trademarks or registered trademarks of Intel Corporation.



Section 2 / Warranty & Policies

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- ▶ PCI Express is a trademark of the PCI-SIG.
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LIABILITY DISCLAIMER

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E-mail: support@trentonsystems.com

Web: www.trentonsystems.com



Handling Precautions



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

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

- ▶ Keep the motherboard in its static-shielded bag until you are ready to perform your installation.
- ▶ Handle the motherboard by its edges.
- ▶ Do not touch the I/O connector pins.
- ▶ Do not apply pressure or attach labels to the motherboard.
- ▶ 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.

Recommended Motherboard Storage Precautions

This SHB has components on both sides of the PCB. Some of these components are extremely small and subject to damage if the board is not handled properly. It is important for you to observe the following precautions when handling or storing the board to prevent components from being damaged or broken off:

- ▶ Store the board in padded shipping material or in an anti-static board rack.
- ▶ Do not place an unprotected board on a flat surface.



WARNING: There is danger of explosion if the CMOS battery is replaced incorrectly. Disposal of battery into fire or a hot oven, or mechanically crushing or cutting of a battery can result in an explosion.



Regulatory Compliance

DECLARATION OF CONFORMITY

FCC

This device complies with part 15 of the FCC rules as a Class A device. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that might cause undesired operation.

CE

This equipment complies with all applicable European Union (CE) directives if it has a CE marking. For this device to remain CE compliant, only CE compliant parts can be installed, and proper cables and cabling techniques are required.

AGENCY APPROVALS

All standards should be at applicable revision levels at time of test.

- ▶ Electromagnetic Emissions (EMI)
 - ▶ Designed to FCC Class A as a minimum.
 - ▶ Designed for CE Conformity to EN 55032:2015/A11:2020, EN 61000-3-2:2014, EN 61000-3-3:2013, and EN 55035:2017/A11:2020 including EN 61000-4-2:2008, EN 61000-4-3:2006/A1:2007/A2:2010, EN 61000-4-4:2012, EN 61000-4-5:20105, EN 61000-4-6:2008, and EN 61000-4-11:2004.
 - ▶ This product will be approvable for MIL-STD-461G to system test methods RE102, and CE102.

Safety

- ▶ This product will be approvable for safety concerns and designed for EN 62368-1:2018.

Environmental

- ▶ This product will be approvable for MIL-STD-810H High and Low-Temp Operating and Storage system testing to test methods 501.7 and 502.7, Procedures I and II.
- ▶ This product will be approvable for MIL-STD-810H Altitude Operational and Storage system testing to test method 500.6, Procedures I and II.
- ▶ We are planning to test:
 - Humidity per MIL-STD-810H, Method 507.6, Procedure I with 90% RH max



Section 4 / Regulatory Compliance

- Operational Shock per MIL-STD-810H, Method 516.8, Procedure I, SRS Functional Test at 20G
- Vibration per MIL-STD-810H, Method 514.8, Figure 514.8D-1 with 2.8 g max



System Overview

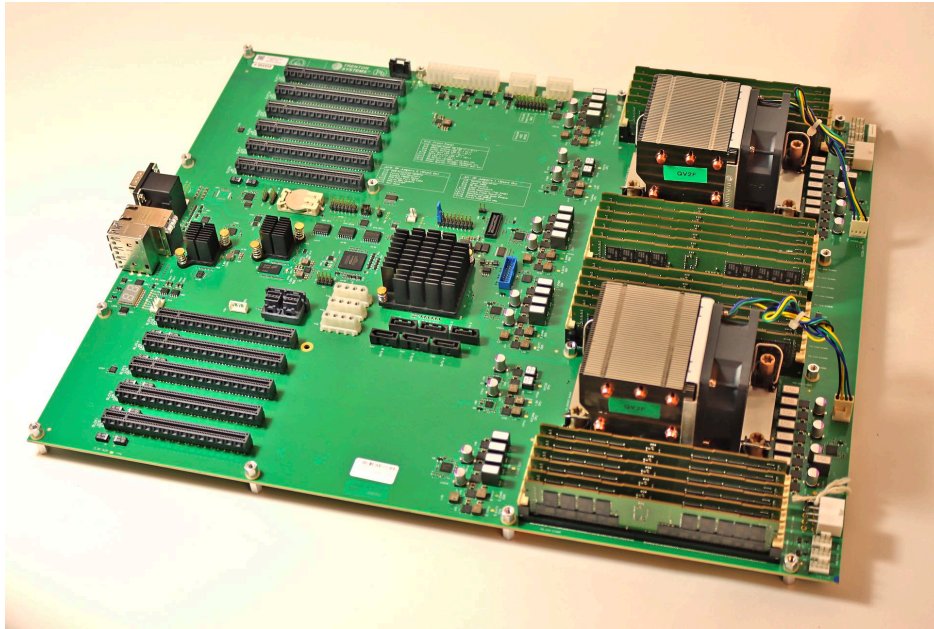


Figure 1: BAM8270

Multi-layer construction for unstoppable ruggedness using the newest Intel® Xeon® Scalable Performance Processors.



INTRODUCTION

It is important to be aware of the system considerations listed below before installing your BAM8270 (8270-xxx) motherboard. Overall system performance may be affected by incorrect usage of these features.

DDR4 MEMORY

Trenton Systems recommends Registered ECC DDR4-3200 PC4-25600 or DDR4-2933 PC4-23400 memory modules for use on the BAM8270. The BAM8270 has been validated with up to 1.5TB of memory across 24 ECC RDIMM slots using eight channels per CPU. Some processor models will only support memory speeds up to 2933 MHz.

- ▶ To maximize memory interface speed, populate each memory channel with DDR4 DIMMs having the same interface speed. The motherboard will support DIMMs with different speeds, but the memory channel interface will operate speed of the slowest DIMM.
- ▶ All memory modules must be Registered.
- ▶ Populate the memory sockets starting with P0-CH1-DIMM0. Refer to the BAM8270 board layout drawing or the board silkscreen and populate the memory sockets using the population order illustrated in the chart below:

POPULATION ORDER	CPU0	CPU1
1	P0-CH1-DIMM0	-
2	-	P1-CH1-DIMM0
3	P0-CH5-DIMM0	-
4	-	P1-CH5-DIMM0
5	P0-CH2-DIMM0	-
6	-	P1-CH2-DIMM0
7	P0-CH6-DIMM0	-
8	-	P1-CH6-DIMM0
9	P0-CH3-DIMM0	-
10	-	P1-CH3-DIMM0
11	P0-CH4-DIMM0	-
12	-	P1-CH4-DIMM0



13	P0-CH0-DIMM0	-
14	-	P1-CH0-DIMM0
15	P0-CH7-DIMM0	-
16	-	P1-CH7-DIMM0
17	P0-CH2-DIMM1	-
18	-	P1-CH2-DIMM1
19	P0-CH6-DIMM1	-
20	-	P1-CH6-DIMM1
21	P0-CH0-DIMM1	-
22	-	P1-CH0-DIMM1
23	P0-CH4-DIMM1	-
24	-	P1-CH4-DIMM1

- ▶ Using a balanced memory population approach ensures maximum memory interface performance. A “balanced approach” means using an even number of DIMMs on the BAM8270 motherboard whenever possible.
- ▶ The memory DIMMs on the motherboard connect directly to the CPU and at least one memory module must be installed in one of the DIMM0 slots for P0.
- ▶ For each channel on the BAM8270, DIMM0 must be installed with memory before DIMM1 may be used.

INTEL® OPTANE™ PERSISTENT MEMORY

The Trenton Systems BAM8270 motherboard has been validated with 128GB Intel® Optane™ Persistent Memory modules. The modules have population rules which are required to enumerate and boot properly. Channels are handled separately and denoted by ‘CHX’ on the board’s silkscreen. Slots are denoted by ‘DIMM0/DIMM1’, and not all channels will utilize a DIMM1/Slot 1 connection. The following table lists the combinations of DDR4 DIMMs and Optane PMMs that can be inserted for each channel.

SLOT 0 MODULE	SLOT 1 MODULE
DDR4 DIMM	DDR4 DIMM



DDR4 DIMM	Optane PMM
DDR4 DIMM	-
Optane PMM	-

SATA RAID OPERATION (WINDOWS O/S SETUP)

The Intel® C621A Platform Controller Hub (PCH) used on the motherboard features Intel® Rapid Storage Technology (Intel® RST) and requires unique drivers. [These drivers can be found on our product downloads page here.](#)

BIOS

The BAM8270 features the InsydeH20® UEFI BIOS from Insyde. The BIOS setup menu can be accessed by striking the Esc key while the system is booting. Advanced setup can be configured here, including peripheral management and boot priority.

OPERATING SYSTEMS

Trenton Systems has tested the BAM8270 motherboard with a wide variety of contemporary operating systems including Linux (Red Hat RHEL 8.0, Ubuntu 20.04 and SUSE), Windows® 10, Windows® 2016 Server, and Windows® 2019 Server.



Section 5 / System Overview

MODEL NUMBER

BAM8270

PROCESSORS

- ▶ Intel® Xeon® 3rd Generation Scalable Performance Processors
- ▶ CPU TDP support up to 205W
- ▶ FCLGA4189 Socket

CPU	Core Speed	Memory Speed	Cores/Threads	TDP
Gold 6330	2.0 GHz	2933 MHz	28/56	205 W
Gold 6338T	2.1 GHz	3200 MHz	24/48	165 W
Gold 6336Y	2.4 GHz	3200 MHz	24/48	185 W
Gold 6326	2.9 Ghz	3200 MHz	16/32	185 W
Gold 5318Y	2.1 GHz	2933 MHz	24/48	165 W
Gold 5320T	2.3 GHz	2933 MHz	20/40	150 W
Gold 5317	3.0 GHz	2933 MHz	12/24	150 W
Gold 5315Y	3.2 GHz	2933 MHz	8/16	140 W
Silver 4316	2.3 GHz	2667 MHz	20/40	150 W
Silver 4314	2.4 GHz	2667 MHz	16/32	135 W
Silver 4310	2.1 GHz	2667 MHz	12/24	120 W
Silver 4310T	2.3 GHz	2667 MHz	10/20	105 W

MEMORY

- ▶ **Slots:** 24x DDR4 RDIMM sockets
- ▶ **Capacity:** Up to 1.5TB
- ▶ **Type:** 2933 or 3200 ECC DDR4 RDIMM
- ▶ **DIMM Sizes:** 128GB, 64GB, 32GB, 16GB, 8GB
- ▶ **Error Detection:** Corrects single-bit errors and detects double-bit errors using ECC memory

ON-BOARD DEVICES

- ▶ **Chipset:** Intel® C621
- ▶ **IPMI:** Support for Intelligent Platform Management Interface v2
 - IPMI 2.0 with virtual media over LAN and KVM-over-LAN support
 - ASPEED AST2500 BMC
- ▶ **SATA:** 6x SATA3 (6 Gbps)
- ▶ **USB:** 1x Quad USB3 headers (4 ports)

- ▶ 1x on-board USB3 header (2 ports)
- ▶ **Network Controllers:**
 - 1x Intel® i350 Dual Gigabit Ethernet
 - Supports 10BASE-T, 100BASE-TX, and 1000BASE-T, RJ-45 output
- ▶ **Graphics:** ASPEED AST2500 BMC; VGA 1920x1200@60Hz 32bpp
- ▶ **PWM:** 7x PWM Fan Headers

INPUT / OUTPUT

- ▶ **USB:** 6x USB 3.0 Ports
- ▶ **LAN:**
 - 2x RJ-45 Gigabit Ethernet LAN ports
 - 2x RJ-45 Shared IPMI LAN port
- ▶ **Serial:** 1x RS232 DB9 Serial Port
- ▶ **Display:** 1x VGA Port 1920x1200@60Hz 32bpp

SYSTEM BIOS

BIOS Type: 128 Mb SPI NOR Flash with INSUDE BIOS

BIOS Features:

- ▶ Plug and Play (PnP)
- ▶ TPM 2.0
- ▶ PCI 2.2
- ▶ ACPI 1.0 / 2.0
- ▶ USB Keyboard Support
- ▶ SMBIOS 2.3
- ▶ UEFI

MANAGEMENT

AST2500 Baseband Management Controller: rKVM, System Monitoring, Out of Band Management, On-board TPM 2.0

ENVIRONMENTALS

- ▶ Operating Temperature: 0°C - 50°C
- ▶ Storage Temperature: -40°C - 70°C
- ▶ Operating Humidity: 8% - 90% Non-Condensing
- ▶ Non-operating Humidity: 5% - 95% Non-Condensing



Technical Specifications

PROCESSORS

- ▶ Intel® Xeon® Scalable Processors (3rd Generation)
- ▶ Processor plugs into an FCLGA4189 socket

Available models:

Model	Cores	TDP	Cache Size	Base Processor Frequency	Maximum Memory Speed
6330	28	205 W	42 MB	2.00 GHz	2933 MHz
6338T	24	165 W	36 MB	2.10 GHz	3200 MHz
6336Y	24	185 W	36 MB	2.40 GHz	3200 MHz
6326	16	185 W	24 MB	2.90 GHz	3200 MHz
5318Y	24	165 W	36 MB	2.10 GHz	2933 MHz
5320T	20	150 W	30 MB	2.30 GHz	2933 MHz
5317	12	150 W	18 MB	3.00 GHz	2933 MHz
5315Y	8	140 W	12 MB	3.20 GHz	2933 MHz
4316	20	150 W	30 MB	2.30 GHz	2667 MHz
4314	16	135 W	24 MB	2.40 GHz	2667 MHz
4310	12	120 W	18 MB	2.10 GHz	2667 MHz
4310T	10	105 W	15 MB	2.30 GHz	2667 MHz

Additional CPU options available upon request. Contact Trenton Systems for more information.

SUPPORTED INTEL® PROCESSOR TECHNOLOGIES - TECHNOLOGIES VARY BETWEEN CPU MODELS



Intel Speed Select Technology – Core Power: Enables flexibility for workloads that benefit from higher base frequency on a subset of the processor's cores. While the max turbo frequency across the cores remain constant across the cores, a subset of the cores can be assigned as to run at a higher base frequency than specified, while the other cores run at lower base frequency.

Intel® Speed Select Technology – Turbo Frequency: Enables flexibility for workloads that benefit from higher turbo frequency on a subset of the processor's cores. While the base frequency remains constant across the cores, a subset of the cores can be assigned to run at a higher turbo frequency than specified, while the other cores run at lower turbo frequency.

Intel® Deep Learning Boost (Intel® DL Boost): A new set of embedded processor technologies designed to accelerate AI deep learning use cases. It extends Intel AVX-512 with a new Vector Neural Network Instruction (VNNI) that significantly increases deep learning inference performance over previous generations.

Intel® Speed Select Technology - Base Frequency: Enables users to increase guaranteed base frequency on certain cores (high priority cores) in exchange for lower base frequency on remaining cores (low priority cores). Improves overall performance by boosting frequency on critical cores.

Intel® Resource Director Technology (Intel® RDT): Intel® RDT brings new levels of visibility and control over how shared resources such as last-level cache (LLC) and memory bandwidth are used by applications, virtual machines (VMs), and containers.

Intel® Speed Shift Technology: Intel® Speed Shift Technology uses hardware-controlled P-states to deliver dramatically quicker responsiveness with single-threaded, transient (short duration) workloads, such as web browsing, by allowing the processor to more quickly select its best operating frequency and voltage for optimal performance and power efficiency.

Intel® Turbo Boost Technology 2.0: Intel® Turbo Boost Technology dynamically increases the processor's frequency as needed by taking advantage of thermal and power headroom to give you a burst of speed when you need it, and increased energy efficiency when you don't.

Intel® Hyper-Threading (Intel® HT): Intel® Hyper-Threading Technology (Intel® HT Technology) delivers two processing threads per physical core. Highly threaded applications can get more work done in parallel, completing tasks sooner.

Intel Virtualization Technology (Intel® VT-x): Intel® Virtualization Technology (VT-x) allows one hardware platform to function as multiple "virtual" platforms. It offers improved manageability by limiting downtime and maintaining productivity by isolating computing activities into separate partitions.

Intel Virtualization Technology for Directed I/O (Intel® VT-d): Intel® Virtualization Technology for Directed I/O (VT-d) continues from the existing support for IA-32 (VT-x) and Itanium® processor (VT-i) virtualization adding new support for I/O-device virtualization. Intel VT-d can help end users improve



security and reliability of the systems and also improve performance of I/O devices in virtualized environments.

Intel® VT-x with Extended Page Tables (EPT): Intel® VT-x with Extended Page Tables (EPT), also known as Second Level Address Translation (SLAT), provides acceleration for memory intensive virtualized applications. Extended Page Tables in Intel® Virtualization Technology platforms reduces the memory and power overhead costs and increases battery life through hardware optimization of page table management.

Intel® Transactional Synchronization Extensions: Intel® Transactional Synchronization Extensions (Intel® TSX) are a set of instructions that add hardware transactional memory support to improve performance of multi-threaded software.

Intel Trusted Execution Technology (Intel® TXT): Intel® Trusted Execution Technology for safer computing is a versatile set of hardware extensions to Intel® processors and chipsets that enhance the digital office platform with security capabilities such as measured launch and protected execution. It enables an environment where applications can run within their own space, protected from all other software on the system.

Intel Turbo Boost Technology 2.0: Intel® Turbo Boost Technology dynamically increases the processor's frequency as needed by taking advantage of thermal and power headroom to give you a burst of speed when you need it, and increased energy efficiency when you don't.

Intel® Advanced Encryption Standard New Instructions (Intel® AES-NI): Seven new instructions available in the Skylake-S micro-architecture makes pervasive encryption in an IT environment possible while enabling implementation that is faster and more affordable by providing advanced data protection and greater hardware platform security.

Intel® Crypto Acceleration: Intel® Crypto Acceleration reduces the performance impact of pervasive encryption and increases the performance of encryption-intensive workloads including SSL web serving, 5G infrastructure, and VPN/firewalls.

Intel® Total Memory Encryption (TME): Total Memory Encryption helps protect data against exposure via physical attack on memory, such as cold-boot attacks.

SERIAL INTERCONNECT INTERFACE

PCI Express® 4.0, 3.0, 2.0, and 1.1 compatible.

SERIAL INTERCONNECT SPEEDS

- ▶ PCI Express 4.0 - 16.0 GHz per lane
- ▶ PCI Express 3.0 – 8.0GHz per lane



- ▶ PCI Express 2.0 – 5.0GHz per lane
- ▶ PCI Express 1.1 - 2.5GHz per lane

SERIAL INTERCONNECT CONFIGURATION

The BAM8270 comes with five 16-lane PCIe slots and six 8-lane PCIe slots. The following table displays the configuration of slots within the system. All slots are PCIe 4.0 compatible:

Board Silkscreen Label	CPU	BIOS Port	Board Silkscreen Reference Designator	Lane Width
PCIE1	Socket 0	Port 5A	PE3	16
PCIE2		Port 4C	PE2C	8
PCIE3		Port 2A	PE1	16
PCIE4		Port 4A	PE2A	8
PCIE5		Port 1A	PE0	16
PCIE6	Socket 1	Port 5A	PE3A	8
PCIE7		Port 4A	PE2	16
PCIE8		Port 5C	PE3C	8
PCIE9		Port 2A	PE1	16
PCIE10		Port 1C	PE0C	8
PCIE11		Port 1A	PE0A	8

PLATFORM CONTROLLER HUB (PCH)

- ▶ Intel® C621 Platform Controller Hub (Lewisburg)

MEMORY INTERFACE

The System BIOS automatically detects memory type, size, and speed. The BAM8270 features eight memory channels of registered DDR4 with up to 2 DIMMs for select channels for a maximum of 24 DIMMs and 1.5TB of memory (across two CPUs). Each CPU socket supports up to twelve registered ECC PC4-25600 or ECC PC4-23400 standard memory RDIMMs. The peak memory interface transfer rate per channel is 3200MT/s when using PC4-25600 DIMMs and 2933MT/s when using PC4-23400 DIMMs.

INTERRUPTS

The motherboard is fully PC compatible with interrupt steering for PCI plug and play compatibility.



BIOS (FLASH)

The BAM8270 board uses an InsydeH20® UEFI BIOS from Insyde. The BIOS features built-in advanced CMOS setup for system parameters, peripheral management for configuring on-board peripherals and other system parameters. The BIOS resides in two 512Mb Macronix MX25L51245G SPI Serial EEPROMs. Should you have a custom BIOS request please contact us for assistance.

ETHERNET INTERFACES

The BAM8270 supports four Ethernet interfaces using two physical ports.

- The interfaces are implemented using two Intel® i350 Dual Gigabit Ethernet Controllers.
- Each physical port is shared with the BMC via NC-SI (network controller sideband interface).

All interfaces support 10/100/1000Base-T Ethernet modes and are compliant with the IEEE 802.3 Specification.

The main components of the Ethernet interfaces are:

- ▶ Intel® i350 controllers for 10/100/1000-Mb/s Ethernet.
- ▶ Integrated RJ-45/Magnetics module connectors on the motherboard's I/O bracket for direct connection to the network. The connectors require category 5 (CAT5) unshielded twisted-pair (UTP) 2-pair cables for a 100-Mb/s network connection or category3 (CAT3) or higher UTP 2-pair cables for a 10-Mb/s network connection. Category 5e (CAT5e) or higher UTP 2-pair cables are recommended for a 1000-Mb/s (Gigabit) network connection.
- ▶ MAC addresses on the board are mapped to the interfaces following the table below:

MAC1	I350 Gbit – Top Port
MAC2	I350 Gbit – Bottom Port
MAC3	BMC – Top Port
MAC4	BMC – Bottom Port

- ▶ Link status and activity LEDs on the I/O bracket for status indication (See Ethernet LEDs and Connectors later in this chapter.)

SATA INTERFACES

There are 6 Serial ATA (SATA) interfaces available on the BAM8270 motherboard. All of the SATA interfaces are driven with a built-in SATA controller from the Intel® C621 PCH. The board's SATA ports can support up to six independent storage devices such as hard disks, solid state drives, and CD/DVD-RW devices at data rates up to 600 MB per second on each port. The board's PCH features the Intel® Rapid Storage Systems functionality, which allows a third BIOS-selectable SATA controller configuration that enables RAID array configurations capable of supporting RAID 0, 1, and 10 implementations.



TRUSTED PLATFORM MODULE

The BAM8270 provides support for Trusted Platform Module 2.0 operations via an Infineon SLB9670 controller. This feature aids in assuring platform integrity by providing a system designer the capability to form a root of trust in conjunction with the BIOS and system firmware.

WATCHDOG TIMER (WDT)

The BAM8270 provides a watchdog timer functionality via the AST2500 BMC. The timer can be set to timeouts ranging from 0.1 seconds to 6553.5 seconds. The timer can be configured to cause a system hard reset, system power off, or system power cycle. A copy of Insyde's IPMI tool is required to access this watchdog. The tool has executables for Windows, Linux, FreeBSD DOS, and UEFI shell. If running on Linux, the executable flag must be added to the tool before sending the following command:

```
sudo chmod +x spv_ipmi
```

In Linux, format commands like this:

```
sudo spv_ipmi <command> <values>
```

In UEFI shell, format commands like this:

```
spv_ipmi.efi <command> <values>
```

Commands:

- `spv_ipmi mc watchdog get`
 - This returns the current status of the watchdog timer, including timeout condition, time remaining until timeout and on/off status.
- `spv_ipmi mc watchdog reset`
 - This command resets or restarts the timer on the watchdog to the configured timeout period.
- `spv_ipmi mc watchdog off`
 - This command shuts off the watchdog timer.
- `spv_ipmi raw 0x06 0x24 0x04 0xXX 0x00 0x00 0xYY 0xZZ`
 - This command configures the watchdog timer's timeout period and timeout action.
 - The timeout action is set by the 4th byte, denoted as 0xXX. Follow the table below to set the desired action.

Value (Hex)	Timeout Action
0x00	No action
0x01	System Hard Reset
0x02	System Power Off



0x03	System Power Cycle
------	--------------------

- The watchdog's timeout period is set by the final two bytes, 0xYY and 0xZZ. 0xYY denotes the least significant byte, and 0xZZ denotes the most significant byte. The timer ranges from 0.1(0x0001 to 0xFFFF), or 0.1 to 6553.5 seconds.
- For example, the following command would configure the watchdog timer to issue a system power cycle after seeing no resets issued for 115 (0x0073) seconds:
 - `spv_ipmi raw 0x06 0x24 0x04 0x03 0x00 0x00 0x73 0x00`
- After issuing this command, the watchdog timer will need to be reset to take effect.

POWER

The BAM8270 motherboard requires an ATX/EPS power supply. Power required from the system will depend on the CPUs installed, the quantity and model of memory installed, as well as the I/O and function for the system. Contact Trenton Systems for more information on power requirements.

BATTERY

A replaceable Panasonic lithium coin cell CR2032 battery is provided for four to five years of data retention for CMOS memory.

CAUTION: There is a danger of explosion if the battery is incorrectly replaced. Replace it only with the same or equivalent type recommended by the battery manufacturer. Dispose of used batteries according to the battery manufacturer's instructions.

TEMPERATURE/ENVIRONMENT

TYPE	DESCRIPTION
Operating Temperature	0°C to 50°C
Storage Temperature	-40°C to 70°C
Humidity	5% to 90% non-condensing

INDUSTRY CERTIFICATIONS

Certifications for the BAM8270 motherboard are in process for testing currently. Check with Trenton Systems for the latest information regarding industry certifications.

CONFIGURATION JUMPERS

The setup of the configuration jumpers on the motherboard is described below. An asterisk (*) indicates the default value of each jumper.



Jumper JU1: OP Jumpers 1

NOTE: Jumper JU1 is a dual-row, 18-pin jumper. Each position controls the operation of a specific function.

PINS	PURPOSE
1:2	Install on pins 1:2 for normal operation.
3:4	To clear CMOS: Remove and drain AC power. Move the shunt on PINs 1:2 to 3:4 for a couple of seconds. Return the shunt from PINs 3:4 back to 1:2. Apply AC power and permit the system to land on the first boot device. The system will cycle power 2-3 times as part of this procedure. Do not attempt to power on the machine with a shunt in pins 3:4.
5:6	ME Recovery.
7:8	Password clear. For use: Drain AC power. Install a shunt on PINs 7:8 and boot to first boot device. Drain AC power, remove this shunt and boot as normal.
9:10	BIOS Recovery – top swap enabled.
11:12	Disable Flash Descriptor Security. (Factory Use Only)
13:14	Manufacturing Mode Enable. (Factory Use Only)
15:16	Disable VR SMBUS. (Factory Use Only)
17:18	Force PSON# and VRs on. (Factory Use Only)

Jumper JU10: OP Jumpers 2

NOTE: Jumper JU1 is a dual-row, 14-pin jumper. Each position controls the operation of a specific function.

PINS	PURPOSE
1:2	PFR Provision Update
3:4	Force PFR Recovery
5:6	Disable PWROK Delay (Factory Use Only)
7:8	PCH Owns Port 80 LEDs (Factory Use Only)
9:10	Force BMC Update
11:12	PFR_ACTIVE#
13:14	Not used



FRONT PANEL INTERFACE - P14

PINS	PURPOSE
1-2	System Power OK LED 1(-) 2(+)
3-4	AMBER STATUS LED 3(-) 4(+)
5-6	GREEN STATUS LED 5(-) 6(+) This LED indicated that AC power is supplied and the system is powered on.
7-8	FAN FAULT LED 7(-) 8(+)
9-10	SATA Activity LED 3(-) 4(+)
11-12	ID LED 11(-) 12(+)
13-14	ID SWITCH 13(GND) 14(ID Btn In)
15-16	RESET SWITCH 15(GND) 16(Reset In)
17-18	POWER BUTTON 17(GND) 18(Pwr Btn In)

JU2 - Disable BMC Jumper

PINS	PURPOSE
1-2	Shunt removed: BMC Enabled Shunt installed: BMC Disabled

CONNECTORS

P21, P22, P23, P24, P25, P26 - SATA III 600 Ports

7 pin Vertical Connector with latch

Pin	Signal	Pin	Signal
1	Gnd	5	RX-
2	TX+	6	RX+
3	TX-	7	Gnd
4	Gnd	-	



P27 - Right Angle Quad USB 3.0 Stacked Connector, Type A, Rear Panel

Four right angle stacked USB ports

Pin	Signal	Pin	Signal
A1	+5V_USB0	B1	+5V_USB1
A2	USB0_P-	B2	USB1_P-
A3	USB0_P+	B3	USB1_P+
A4	GND	B4	GND
A5	USB0_RX-	B5	USB1_RX-
A6	USB0_RX+	B6	USB1_RX+
A7	GND	B7	GND
A8	USB0_TX-	B8	USB1_TX-
A9	USB0_TX+	B9	USB1_TX+
Pin	Signal	Pin	Signal
C1	+5V_USB3	D1	+5V_USB2
C2	USB3_P-	D2	USB2_P-
C3	USB3_P+	D3	USB2_P+
C4	GND	D4	GND
C5	USB3_RX-	D5	USB2_RX-
C6	USB3_RX+	D6	USB2_RX+
C7	GND	D7	GND
C8	USB3_TX-	D8	USB2_TX-
C9	USB3_TX+	D9	USB2_TX+

P28 Dual USB 3.0 Header, On-board

Pin	Signal	Pin	Signal
1	+5V_USB4	11	USB5_P+



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2	USB4_RX-	12	USB5_P-
3	USB4_RX+	13	GND
4	GND	14	USB5_TX+
5	USB4_TX-	15	USB5_TX-
6	USB4_TX+	16	GND
7	GND	17	USB5_RX+
8	USB4_P-	18	USB5_RX-
9	USB4_P+	19	+5V_USB5
10	No Connect	-	

P44 - Right Angle Stacked DB9/DB15 Video, Rear Panel

Pin	Signal	Pin	Signal
1	VGA0_RED	9	+5V_VGA0
2	VGA0_GREEN	10	GND
3	VGA0_BLUE	11	No Connect
4	Reserved	12	VGA0_DDCDAT
5	GND	13	VGA0_HSYNC
6	GND	14	VGA0_VSYNC
7	GND	15	VGA0_DDCCLK
8	GND	-	
Pin	Signal	Pin	Signal
T1	SERIAL0_DCD	T6	SERIAL0_DSR
T2	SERIAL0_RXD	T7	SERIAL0_RTS
T3	SERIAL0_TXD	T8	SERIAL0_CTS
T4	SERIAL0_DTR	T9	SERIAL0_RI
T5	GND	-	



P45A/P45B - Right Angle Dual Ethernet Stacked Connector

Pin	Signal	Pin	Signal
1A	L1_MD1-	1B	L2_MD1-
2A	L1_MD1+	2B	L2_MD1+
3A	L1_MD2-	3B	L2_MD2-
4A	L1_MD2+	4B	L2_MD2+
5A	L1_MD3-	5B	L2_MD3-
6A	L1_MD3+	6B	L2_MD3+
7A	L1_MD4-	7B	L2_MD4-
8A	L1_MD4+	8B	L2_MD4+
9A	VCC	9B	VCC
10A	GND	10B	GND

Fan connectors

P42, P43 - CPU Fan Power Connector, 4 pin single row

Pin	Signal	Pin	Signal
1	GND	3	Fan Tach
2	+12V	4	PWM Control

P36, P37, P38, P39, P40, P41, P46 - Chassis Fan Power Connector, 4 pin single row

Pin	Signal	Pin	Signal
1	GND	3	Fan Tach
2	+12V	4	PWM Control

STATUS LEDs

POST Code LEDs 1 – 8



As the POST (Power On Self-Test) routines are performed during boot-up, test codes are displayed on Port 80 POST Code LEDs 0, 1, 2, 3, 4, 5, 6 and 7. These LEDs are located near the rear USB ports on the motherboard.

Note: Access to Insyde Software POST codes is contingent upon a signed non-disclosure agreement (NDA) between Trenton Systems, Insyde Software, and all other parties requesting access.

P45 ETHERNET LEDS

The I/O bracket houses the two RJ-45 network connectors for Ethernet LAN1, LAN2. Each LAN interface connector has two LEDs that indicate activity status and Ethernet connection speed. Listed below are the possible LED conditions and status indications for each LAN connector:

LED/CONNECTOR	DESCRIPTION
Activity LED	This LED identifies the validity of a link on the specific interface. This is the upper LED on the LAN connector (i.e., toward the upper memory sockets).
Off	No valid link exists on this interface.
On (flashing)	Indicates network transmit or receive activity.
On (solid)	Indicates a valid link with no transmit or receive activity.
Speed LED	This multi-color LED identifies the connection speed of the SHB's P4A (LAN2) and P4B (LAN1) Ethernet interfaces. These are the lower LEDs on the dual LAN connector (i.e., toward the edge connectors).
Green	Indicates a valid link at 1000 Mb/s
Amber	Indicates a valid link at 100 Mb/s.
Off	Indicates a valid link at 10 Mb/s.
RJ-45 Network Connectors	The RJ-45 network connector requires a Connector category 5 (CAT5) unshielded twisted-pair (UTP) 2-pair cable for a 100-Mb/s network connection or a category 3 (CAT3) or higher UTP 2-pair cable for a 10-Mb/s network connection. A category 5e (CAT5e) or higher UTP 2-pair cable is recommended for a 1000-Mb/s (Gigabit) network connection.



SYSTEM BIOS SETUP UTILITY

The BAM8270 features the InsydeH20® UEFI BIOS from Insyde with a setup menu that allows the user to configure system settings. The following keys are used to navigate the following menus:

Key	Function
Esc	<p>The <Esc> key allows you to discard changes and exit the setup utility. This action can be aborted by selecting <i>No</i> when prompted.</p> <p>The <Esc> key is also used to move one level up in the menu structure.</p>
Arrow Keys ↑↓ →←	The arrow keys are used to navigate the options and selections for any particular BIOS menu or sub-menu page.
F5/F6	The <F5/F6> keys allow the user to toggle or cycle through options for a highlighted setting.
Enter	The <Enter> key selects the highlighted option in the BIOS menu. This is used to select a setting to edit its value or access a sub-menu.
F1	The <F1> key is used to view the controls for a particular menu screen.
F9	The <F9> key is used to reset BIOS settings to their default values. In the setup utility the BIOS menu will prompt the user and allow the action to be aborted before resetting options.
F10	The <F10> key is used to save changes and exit to the first boot device. The user is prompted and allowed to abort this action before changes are saved.

Upon entering the setup screen, the following options are displayed:

- ▶ Continue
 - Selecting this option will have the system boot to the first detected or configured boot device. If no boot device is installed, the system will boot to UEFI built-in shell.
- ▶ Boot Manager
 - Selecting this option will display a menu of available boot devices on the system. Selecting “manage custom boot options” will allow a custom boot file to be configured here as well.
- ▶ Device Management

- ▶ Boot From File
 - Selecting this option allows the user to boot from a file on a connected storage device.
- ▶ Administer Secure Boot
 - This option may only be accessed before booting to any device. If the BIOS menu has been entered by exiting UEFI shell, the user must reset the system and enter BIOS directly to access this menu.
- ▶ Setup Utility
 - Selecting this option will bring the user to the Setup Utility menu for peripheral configuration and setup features. The following section(s) will cover highlighted options and areas for the Setup Utility

Advanced --> Trenton Systems will display information about the system, including the platform and BIOS version.

Advanced --> Video Configuration --> Display Mode

- This setting allows the user to switch between on-board video or plug-in video as the default video source.

Advanced --> Socket Configuration --> Processor Configuration

- This menu displays information about the system's processors, as well as some configuration options.

Advanced --> Socket Configuration --> I/O Configuration --> Socket 0/1

- This menu will allow for configuration of the system's PCIe. Under each Socket, there will be several ports for each PCIe slot in the system. The mapping for these ports can be found above on the section on Serial Interconnect Configuration. Within each port are options to set the maximum port width and speed.

Each of these options allows you to review and/or change various setup features of your system. Contact Trenton for application-specific BIOS information and support.

To enter the BIOS setup menu, power the system on and begin striking the <Esc> key.

Locating the BIOS version on the BAM8270

To locate the BIOS version, perform the following:

1. Enter the BIOS menu by striking ESC while booting.
2. Select the Setup Utility option
3. Select the Advanced menu.
4. Select the Trenton Systems submenu

5. The BIOS version will be displayed under SMBIOS OEM Strings as "Trenton BIOS version"
- a. The name of the BIOS that the system has should look similar to
BIOS_BAM8270.Main.001.002.release

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