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User Manual
BAM8300

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Table of Contents

Preface

This product is still in development. The information in this user's manual has been carefully reviewed and is believed to be accurate. Trenton Systems assumes no responsibility for any inaccuracies that may be contained in this document and makes no commitment to update or to keep the information in this manual current, or to notify any person or organization of the updates.

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Please Note: For the most up-to-date version of this manual, please use the "Contact Us" page on www.trentonsystems.com or use the contact information below.

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About Trenton Systems

“Unbelievably light. Unquestionably rugged. Undeniably powerful.”

BACKGROUND

Located in Atlanta, GA, USA, Trenton Systems is an OEM/ODM of advanced, ruggedized high-performance computing solutions for the defense, government, industrial, and commercial sectors. Our team works with customers in a consultative relationship to craft configurable and custom solutions for their most complex application or program needs. Each solution is engineered within a vetted and transparent supply chain with proactive risk management methodologies while providing multi-layer cybersecurity across the hardware, firmware, software, and network stack.

EXPERIENCE

Trenton Systems is trusted by the world’s leading technology companies. We partner with Intel via the Embedded and Communications Alliance, which provides us with access to Intel’s roadmap, as well as with direct technical support. 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 and 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 modular blade server products. For a complete warranty statement, contact Trenton Systems or visit our website at http://www.trentonsystems.com/.

All BAM8300 configurations carry a 5-year warranty. All non-Trenton Systems boards and system sub-components including but not limited to power supplies, DVDs, CD-ROMS, etc. are covered under their original manufacturer's warranty. All systems built by Trenton Systems are warranted against defects in material, workmanship and design for a period of one year from the date of delivery. Repair or replacement products will be warranted for a period of three months from the date of shipment or for the remainder of the original warranty period for that particular product, whichever is longer. Any software or firmware that is delivered by Trenton Systems will be warranted for a period of one year to perform in accordance with published specifications prepared, approved and issued by Trenton Systems and/or the appropriate 3rd party vendor.

Buyer agrees that if a Trenton System product proves defective, Trenton Systems is only obligated to repair, replace or refund the purchase price of this product at the discretion of Trenton Systems. 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; or if failure is caused by accident, acts of God, or other causes beyond the control of Trenton Systems. Trenton Systems 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 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' 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

A Return Material Authorization (RMA) 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 an RMA number, call us at (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 Lawrenceville, GA facility:

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

Contact Trenton for our complete service and repair policy.

TRADEMARKS

LIABILITY DISCLAIMER

In no event will Trenton Systems be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many system variables and application requirements associated with any particular installation, Trenton Systems cannot assume responsibility or liability for actual system use based on the examples and diagrams. No patent liability is assumed by Trenton Systems with respect to the use of the information, components, equipment or software described in this manual. This manual is as complete and factual as possible at the time of publication; however, the information in this manual may have been updated since that time. Trenton Systems, Inc. reserves the right to change the functions, features or specifications of their products at any time, without notice.

E-mail: Support@TrentonSystems.com

Web: www.TrentonSystems.com

Warnings

Descriptions of Warning Labels

The following graphical warning symbols may appear on the outside of the unit. The intent of this section is to explain the warning symbols.

Shock Hazard 

Electric shock hazard. Contact with internal components may cause shock or injury. Disconnect power before servicing.

Moving Fan Blade 

This equipment utilizes mechanical fans for system cooling. Exercise caution; keep hands clear. Blades can cause serious injury.

Danger / Attention 

A Danger/Attention warning indicates a potential for property damage, personal injury, or death.

Handling Precautions

WARNING: This system has internal components which 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:

- When removing or installing the motherboard and sub-components, keep these components in their static-shielded bag and/or packaging until you are ready for component installation.
- Handle the motherboard and sub-components by their edges.
- Do not touch any sub-component I/O connector pins. Do not apply pressure or attach labels to the motherboard or board-level sub-components.
- Use a grounded wrist strap at your system or ground yourself frequently by touching the metal chassis of the system before handling any sub-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 motherboard 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:

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.

Chapter 1 - System Overview

Introduction

It is important to be aware of the system considerations listed below before installing your BAM8300 motherboard. Overall system performance may be affected by incorrect usage of these features.

DDR5 memory

Trenton Systems recommends Registered ECC DDR5-4800 memory modules for use on the BAM8300. The BAM8300 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 4800 MHz.

- To maximize memory interface speed, populate each memory channel with DDR5 DIMMs having the same interface speed. The motherboard will support DIMMs with different speeds, but the memory channel interface will operate at the speed of the slowest DIMM.
- Using a balanced memory population approach ensures maximum memory interface performance. A “balanced approach” means using an even number of DIMMs on the BAM8300 motherboard whenever possible.
- For each channel on the BAM8300, DIMM0 must be installed with memory before DIMM1 may be used.
- All memory modules must be Registered.

DIMM population order:

NOTE: Channels 1, 3, 5, and 7 are single DIMM channels.

	CH 7		CH 6		CH 5		CH 4			CH 0		CH 1		CH 2		CH 3	
DDR5	Slot0	Slot1 (not used)	Slot0	Slot1	Slot0	Slot1 (not used)	Slot0	Slot1		Slot1	Slot0	Slot1 (not used)	Slot0	Slot1	Slot0	Slot1 (not used)	Slot0
1											DDR5						
							DDR5										
													DDR5				
					DDR5												
2			DDR5								DDR5						
							DDR5		CPU						DDR5		
4			DDR5				DDR5				DDR5				DDR5		
6			DDR5		DDR5		DDR5				DDR5				DDR5		DDR5
	DDR5		DDR5				DDR5				DDR5		DDR5		DDR5		
	DDR5				DDR5		DDR5						DDR5		DDR5		DDR5
	DDR5		DDR5		DDR5						DDR5		DDR5				DDR5
8	DDR5		DDR5		DDR5		DDR5				DDR5		DDR5		DDR5		DDR5
12	DDR5		DDR5	DDR5	DDR5		DDR5	DDR5		DDR5	DDR5		DDR5	DDR5	DDR5		DDR5

SATA RAID OPERATION (WINDOWS O/S SETUP)

The Intel® C741 (Emmitsburg) Platform Controller Hub (PCH) used on the motherboard features Intel® Rapid Storage Technology (Intel® RST) and requires unique drivers. Please contact Trenton for assistance.

BIOS

The BAM8300 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 BAM8300 motherboard with a variety of contemporary operating systems including Linux (Red Hat RHEL 8.2+, Ubuntu 20.04+ and SUSE), Windows® 11, Windows® Server.

Chapter 2 - Technical Specifications

MODEL NUMBER

BAM8300

PROCESSORS

- Intel® Xeon® 4th/5th Generation Scalable Performance Processors
- CPU TDP support up to 350W (non-HBM)
- LGA4677 Socket

MEMORY

- **Slots:** 24x DDR5 RDIMM sockets
- **Capacity:** Up to 1.5TB
- **Type:** 4800 ECC DDR5 RDIMM
- **DIMM Sizes:** 128GB, 64GB, 32 GB, 16GB, 8GB
- **Error Detection:** Corrects single-bit errors and detects double-bit errors using ECC memory

ON-BOARD DEVICES

- **Chipset:** Intel® C741 (Emmitburg)
- **IPMI:** Support for Intelligent Platform Management Interface v2
  - IPMI 2.0 with virtual media over LAN and KVM-over-LAN support
  - ASPEED AST2600 BMC
- **SATA:** 6x SATA3 (6 Gbps)
- **USB:**
  - 1x QUAD USB3
  - 1x On-board USB3 header (2 ports)
- **Network Controllers:**
  - 1x Intel® i350 Dual Gigabit Ethernet
  - Supports 10BASE-T, 100BASE-TX, and 1000BASE-T
  - 2x RJ-45 output
- **Graphics:** ASPEED AST2500 BMC

INPUT / OUTPUT

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

SYSTEM BIOS

BIOS Type: 512Mb SPI NOR Flash with Insyde 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

AST2600 Baseband Management Controller: rKVM, System Monitoring, Out of Band Management, On-board TPM 2.0

PROCESSORS

- Intel® Xeon® Scalable Processors (4th Generation)
- Processor plugs into an LGA4677 socket

SERIAL INTERCONNECT INTERFACE

PCI Express® 5.0, 4.0, 3.0, 2.0, and 1.1 compatible.

SERIAL INTERCONNECT SPEEDS

- PCI Express 5.0 - 32.0 GHz per lane
- 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 BAM8300 comes with nine 16-lane PCIe slots and two 8-lane PCIe slots. The following table displays the configuration of slots within the system. All slots are PCIe 5.0 compatible:

Board Silkscreen Label	CPU	CPU Port	Topology	Lane Width
PCIE1	Socket 1	Port 4	Retimer	x16
PCIE2		Port 0	Direct	x16
PCIE3		Port 1	Direct	x16
PCIE4		Port 2	Direct	x16
PCIE5		Port 3	Direct	x16
PCIE6	Socket 0	Port 4	Retimer	x16
PCIE7		Port 0	Direct	x16
PCIE8		Port 1	Direct	x16
PCIE9		Port 2	Direct	x16
PCIE10		Port 3A	Direct	x8
PCIE11		Port 3E	Direct	x8

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.

PLATFORM CONTROLLER HUB (PCH)

- Intel® C741 Platform Controller Hub (Emmitsburg)

MEMORY INTERFACE

The System BIOS automatically detects memory type, size, and speed. The BAM8300 features eight memory channels of registered DDR5 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 DDR5-4800 standard memory RDIMMs. The peak memory interface transfer rate per channel is 4800MT/s.

INTERRUPTS

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

BIOS (FLASH)

The BAM8300 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. Should you have a custom BIOS request please contact us for assistance.

ETHERNET INTERFACES

The BAM8300 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 BAM8300 motherboard. All of the SATA interfaces are driven with a built-in SATA controller from the Intel® C741 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 BAM8300 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.

POWER

The BAM8300 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.

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: Operational 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. (Default)
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: Operational Jumpers 2

NOTE: Jumper JU10 is a dual-row, 14-pin jumper. Each position controls the operation of a specific function.

PINS	PURPOSE
1:2	PFR POSTCODE SEL#
3:4	BMC NMA PCH EN
5:6	ADR EXT TRIGGER#
7:8	PFR FORCE RECOVERY#
9:10	PFR TM1 HOLD#
11:12	FORCE BMC UPDATE#
13:14	Not used

Jumper JU2: Disable BMC Jumper

NOTE: Jumper JU2 is a 2-pin jumper.

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

Jumper P14: Front Panel Interface

NOTE: Jumper P14 is a dual-row, 18-pin jumper. Each position controls the operation of a specific function.

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)

CONNECTORS

P21 - 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+
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
DB15

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	-	

DB9

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 - P41, P46, P71 - P74: Chassis Fan Power Connector, 4 pin single row

Pin	Signal	Pin	Signal
1	PWM	4	GND
2	Fan Tach	5	GND
3	+12V	6	Present_Detect

STATUS LEDs

POST Code LEDs 0 – 7

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 BAM8300 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	The <Esc> key allows you to discard changes and exit the setup utility. This action can be aborted by selecting *No* when prompted. The <Esc> key is also used to move one level up in the menu structure.
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.

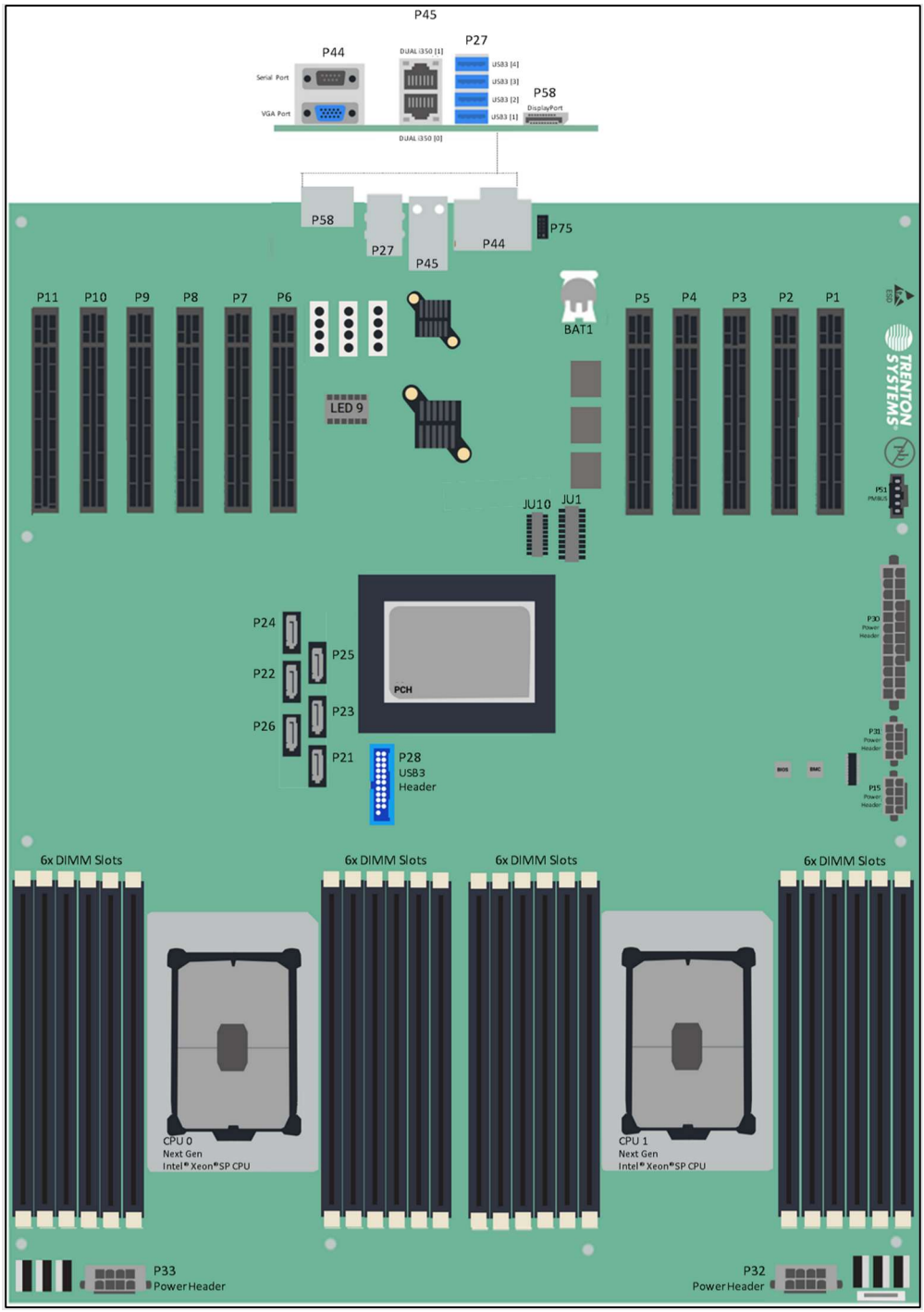
- **Administer Secure Boot**
  - This option may only be accessed before booting to any device. If the BIOS menu has been entered by exiting UEFI shell, the user must reset the system and enter BIOS directly to access this menu.
- **Setup Utility**
  - Selecting this option will bring the user to the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

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.

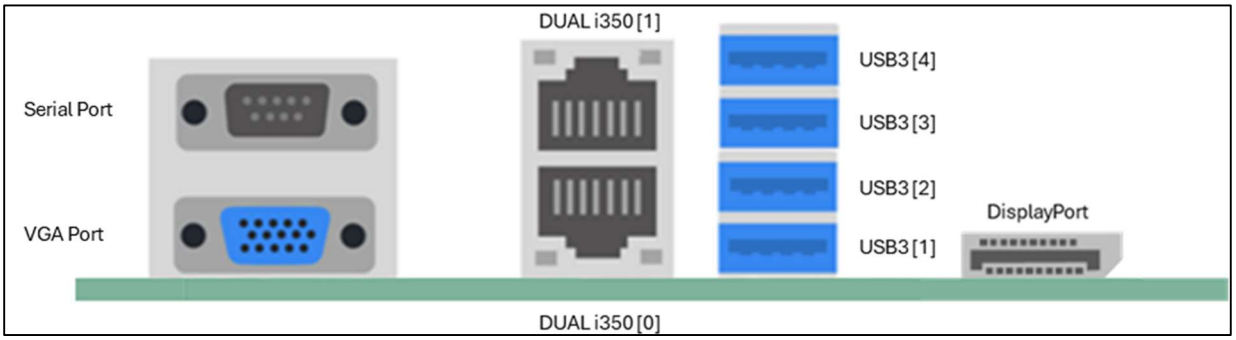
To enter the BIOS setup menu, power the system on and begin striking the <Esc> key.

Chapter 3 – Board Drawings

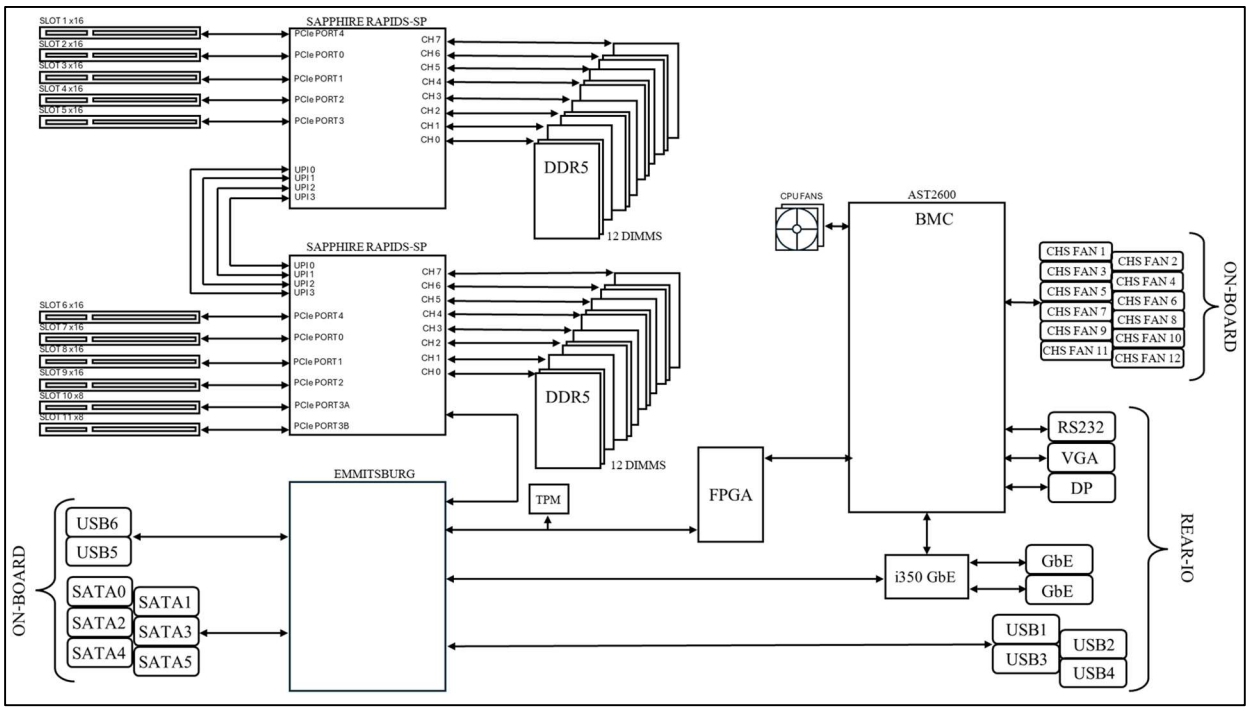
BAM8300 Layout Drawing



I/O Diagram



BAM8300 Block Diagram



Chapter 4 – Replacing System Components

BAM8300 Field Replacement Units (FRUs)

A trained electronics technician is required to install or remove the FRUs and PCI Express plug-in option card. When servicing this equipment, all screws shall be tightened utilizing a #2 Phillips screwdriver.

NOTE: When installing an option card into the BAM8300 motherboard, you must ensure that the card installation does not result in non-conformance to the safety or EMC requirements for this product.

To remove all power from the equipment, disconnect power from all three power modules.

Memory DIMMs

Following proper anti-static precautions, remove the blade card as described in the previous section in order to replace the memory DIMMs. Push down on the memory DIMM socket tab located on opposite sides of each module. This downward action releases a memory DIMM from its socket and pushes the module up. Remove the module and replace it with the FRU.

Extreme care must be taken when inserting or removing memory modules and DDR5 DIMMs. This is an effect of the significant change in design of the memory module from previous generations. For example, DDR5 DIMMs contain On-DIMM voltage regulators and require 3.3V and 12V supplies from the mother board. Best practices indicate that the most effective way to insert or remove a memory module is to ensure that system power is disconnected (AC power unplugged for example) and DDR5 DIMM module power delivery systems have completely drained before taking any action. Failure to do so may result in motherboard and/or memory module damage. It is recommended for the Power Delivery Design Engineer to calculate the worst cast power delivery decay time and use that as the standard time before an attempt is made to add or remove memory modules from a system.

Battery Replacement

The motherboard's battery is located near PCIe slot 6. Using proper anti-static precautions, slightly push the battery toward the inside of the SBC while lifting up on the battery to remove it from its socket. Install the new battery, ensuring that the (+) side of the battery faces up and away from the motherboard itself.

CAUTION: The BAM8300 motherboard uses a CR2032 battery. There is a risk of explosion if the BAM8300 motherboard battery is replaced by an incorrect type. Dispose of used batteries according to local regulations.

Chapter 5 – Troubleshooting

System boot failure

If the system doesn't complete POST or respond after power on, perform the following:

1. Clear CMOS: Remove and drain AC power. Move the shunt on pins 1:2 to 3:4 for 3 seconds. Return the shunt to pins 1:2 and apply AC power. Allow the system to land on the first boot device.
   Note: The system will power cycle 2-3 times as part of this procedure. Do not attempt to power on the machine with the shunt on pins 3:4
2. Remove all I/O and memory from the system leaving one DIMM module. If the system boots, systematically add one component at a time back to the system to isolate the cause.

Memory errors

If faulty memory is suspected, check the following:

1. Verify that the memory modules are compatible with the system (see pg. 12 for memory specifications)
2. Verify that the memory modules are all the seem speed
3. Check for a bad slot or modules by removing all but one DIMM and systematically swap along all memory slots

If further troubleshooting assistance is required, please log a Support Ticket on our website: www.trentonsystems.com