X11DPG-OT-CPU

USER'S MANUAL

Revision 1.0

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Manual Revision 1.0

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Preface

About This Manual

This manual is written for system integrators, IT technicians and knowledgeable end users. It provides information for the installation and use of the X11DPG-OT-CPU motherboard.

About This Motherboard

The X11DPG-OT-CPU motherboard supports dual Intel 81xx/61xx/51xx/41xx/31xx (Socket P) processors that offer 3 Ultra Path Interconnect (UPI) support with a speed of up to 10.4 GT/s. With the C622 PCH built-in, this motherboard supports up to 3TB of 3DS LRDIMM/LRDIMM/3DS RDIMM/RDIMM DDR4 ECC memory of up to 2666 MHz in 24 slots. The X11DPG-OT-CPU provides maximum performance, system cooling, and I/O expendability. This motherboard is optimized for High-Performance Computing (HPC), deep learning, or artificial intelligence platforms. Please note that this motherboard is intended to be installed and serviced by professional technicians only. For processor/memory updates, please refer to our website at http://www.supermicro.com/products/.

Manual organization

Chapter 1 describes the features, specifications and performance of the motherboard, and provides detailed information on the C622 chipset.

Chapter 2 provides hardware installation instructions. Read this chapter when installing the processor, memory modules, and other hardware components into the system.

If you encounter any problems, see **Chapter 3**, which describes troubleshooting procedures for video, memory and system setup stored in the CMOS.

Chapter 4 includes an introduction to the BIOS, and provides detailed information on running the CMOS Setup utility.

Appendix A lists software program installation instructions**.**

Appendix B lists standardized warning statements in various languages**.**

Appendix C lists UEFI BIOS Recovery instructions**.**

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Website:	www.supermicro.com.tw

Table of Contents

Chapter 1

Introduction

Congratulations on purchasing your computer motherboard from an industry leader. Supermicro motherboards are designed to provide you with the highest standards in quality and performance.

1.1 Checklist

This motherboard was designed to be used in an SMCI-proprietary chassis only as a part of an integrated, complete system solution. It is not intended to be sold as an independent, stand-alone product; therefore, no shipping package will be included in the shipment.

Important Links

For your system to work properly, please follow the links below to download all necessary drivers/utilities and the user's manual for your server.

- Supermicro product manuals: http://www.supermicro.com/support/manuals/

- Product drivers and utilities: ftp://ftp.supermicro.com

- Product safety info: http://www.supermicro.com/about/policies/safety_information.cfm

- If you have any questions, please contact our support team at: support@supermicro.com

This manual may be periodically updated without notice. Please check the Supermicro website for possible updates to the manual revision level.

Figure 1-1. X11DPG-OT-CPU Motherboard Image
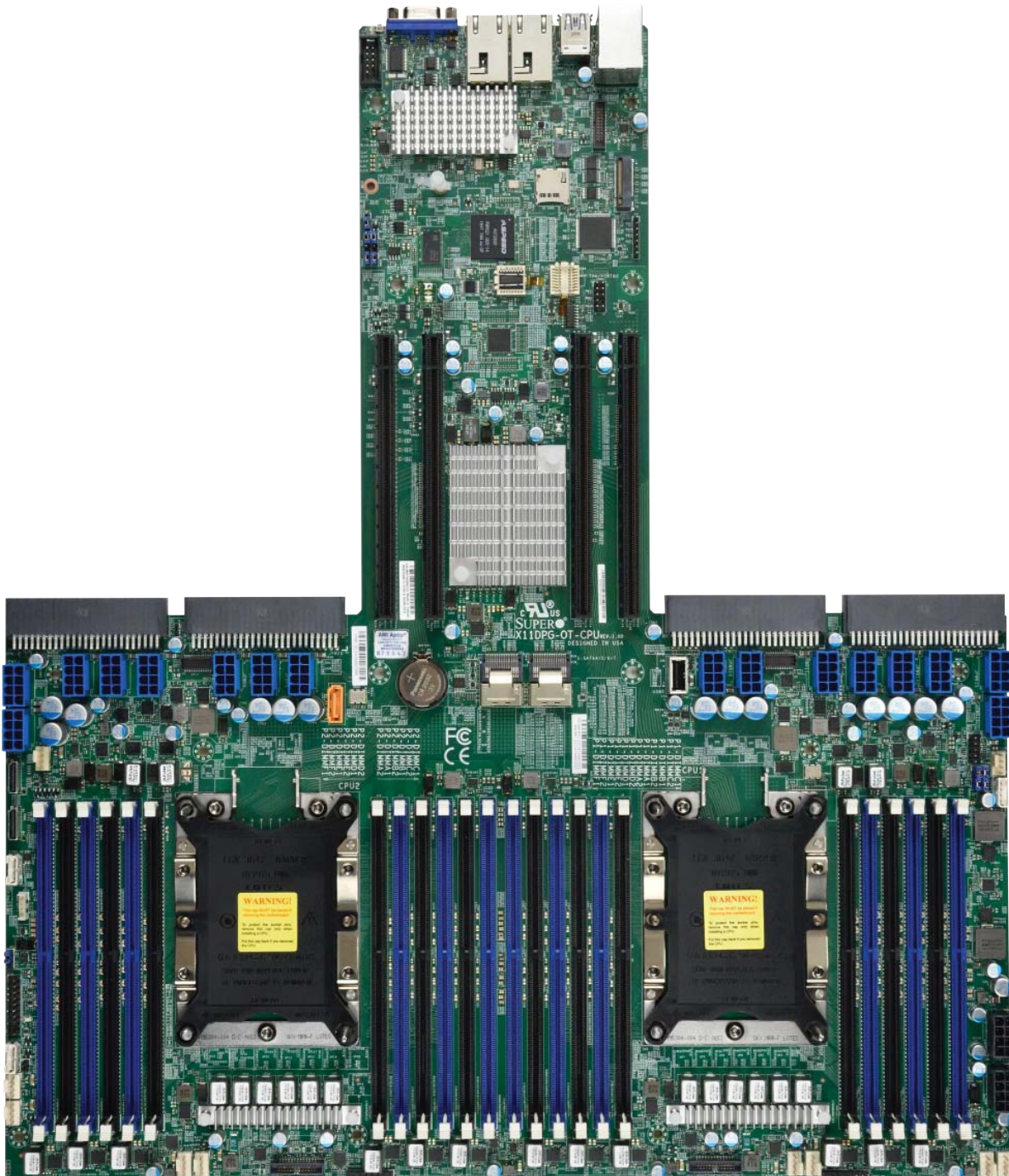
✎ **Note:** All graphics shown in this manual were based upon the latest PCB revision available at the time of publication of the manual. The motherboard you received may or may not look exactly the same as the graphics shown in this manual.

Figure 1-2. X11DPG-OT-CPU Motherboard Layout
(not drawn to scale)
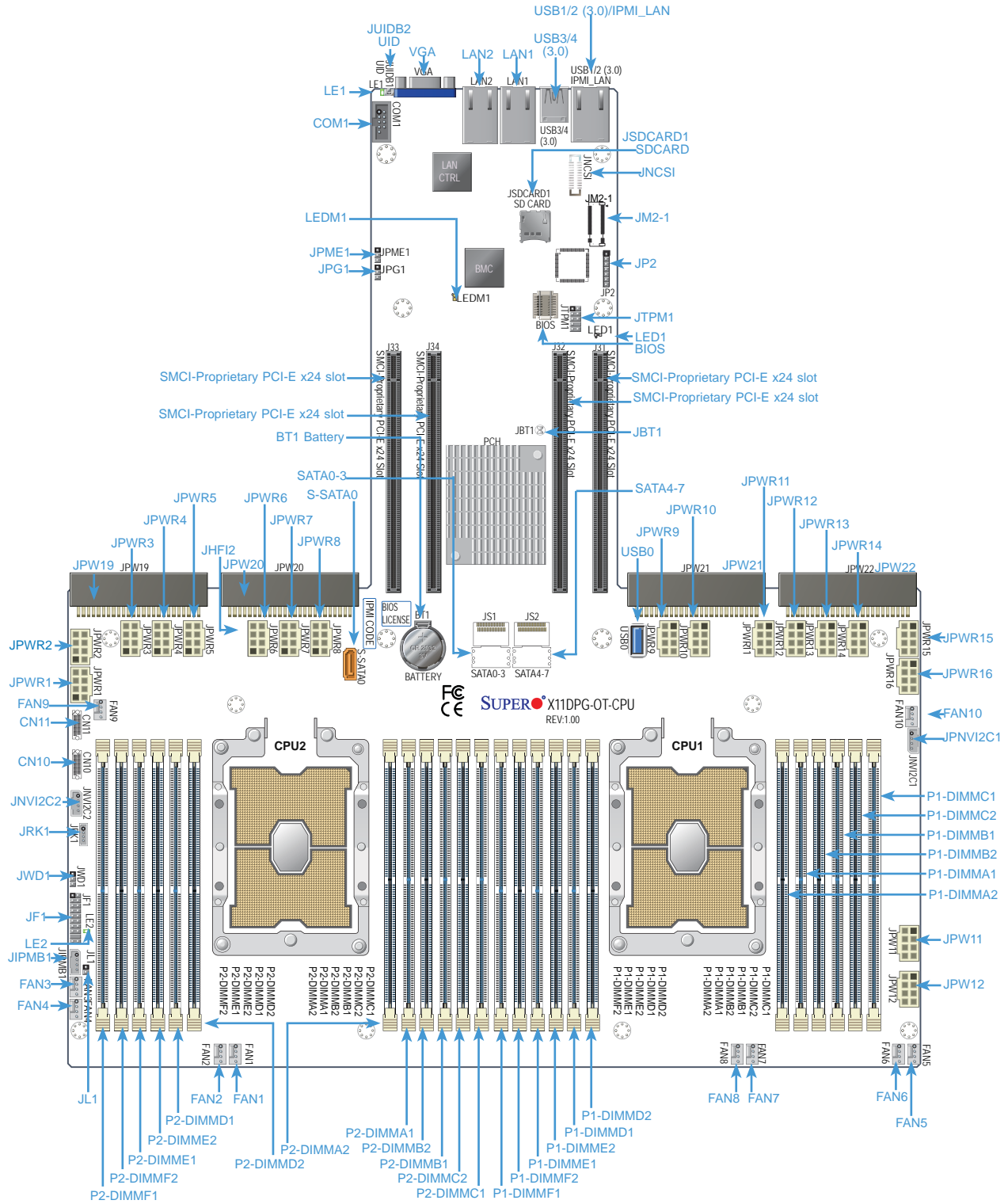
Note: Components not documented are for internal testing only.

Quick Reference
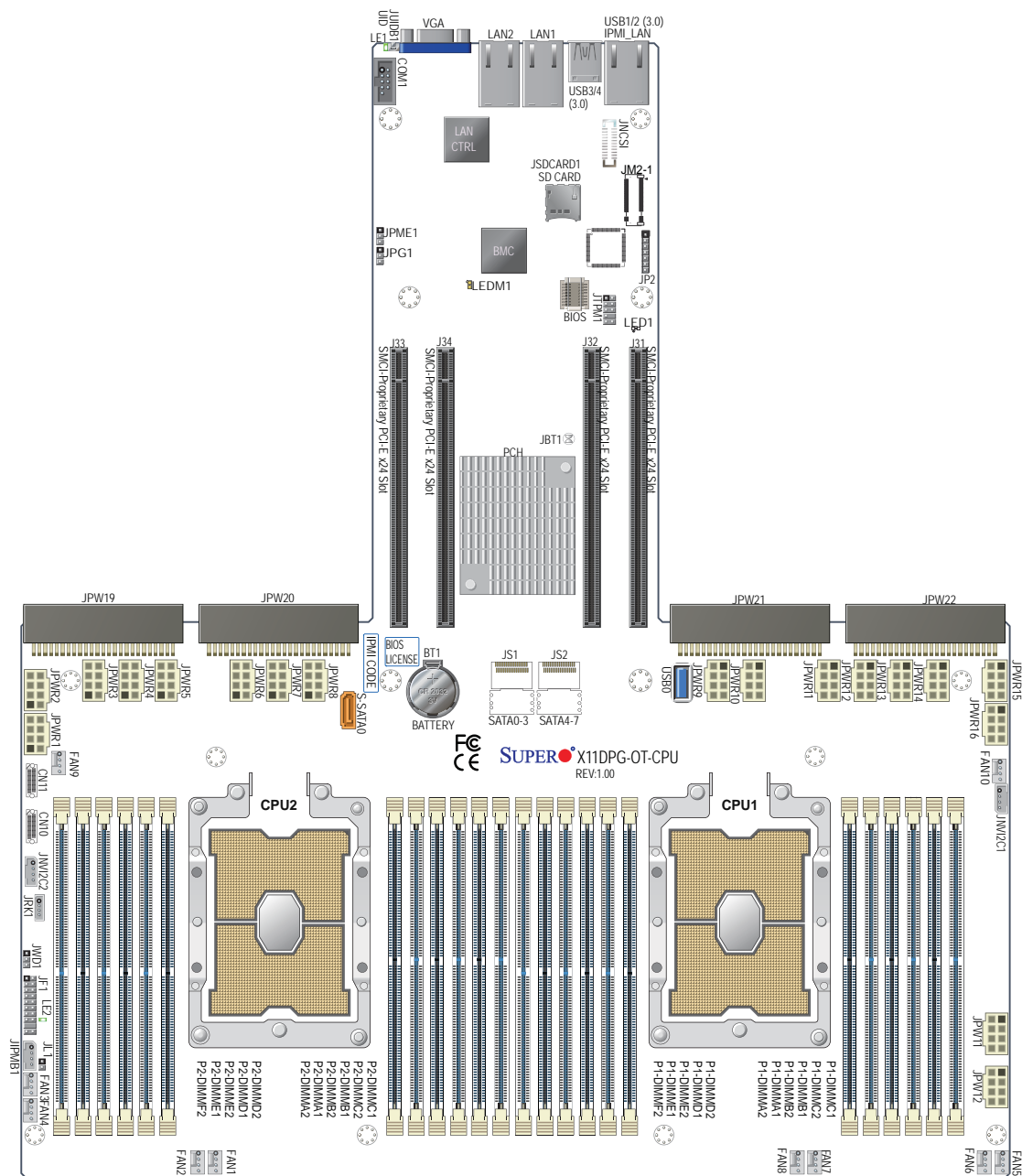
Notes:

• See Chapter 2 for detailed information on jumpers, I/O ports, and JF1 front panel connections.

• "▪" indicates the location of Pin 1. Jumpers/components/LED indicators not indicated are used for internal testing only.

• Use only the correct type of onboard CMOS battery as specified by the manufacturer. Do not install the onboard battery upside down to avoid possible explosion.

• To avoid causing interference with other components, please be sure to use an add-on card that is fully compliant with the PCI-standard on a PCI slot.

Quick Reference Table

Jumper	Description	Default Setting
JBT1	CMOS Clear	Open (Normal) (See Chpt. 2)
JPG1	VGA Enable	Pins 1-2 (Enable)
JPME1	Manufacturing Mode Select	Pins 1-2 (Normal)
JWD1	Watch Dog Timer Enable	Pins 1-2 (Reset to System)

Connector	Description
BT1	Onboard CMOS battery
CN10/CN11	x4 Oculink connectors connected to CPU2 for NVMe drive use
COM1	COM/serial port for front access
FAN1-10	System cooling fan headers (FAN1-FAN8) & active CPU heatsink fan headers (FAN9/FAN10)
IPMI_LAN	Dedicated IPMI LAN port
LAN1/LAN2	10GbE LAN Ethernet ports 1/2 on the I/O back panel
JF1	Front panel control header
JIPMB1	4-pin System Management Bus (SMBus) I^{2}C header (for an IPMI-supported card)
JL1	Chassis Intrusion header
JM2-1	PCI-E M.2 slot
JNCS1	Add-on card header used for the add-on card that supports NCSI (Network Communication Services Interface)
JNVI^{2}C1/ JNVI^{2}C2	NVMe SMBus (I^{2}C) headers used for PCI-E hot-plug SMBus clock & data connections (an SMCI-proprietary NVMe add-on card and cable are required for each NVMe SMBus header. This feature is available for a Supermicro complete system only.)
JPW19/20, JPW 21/22	SMCI-proprietary power supply units 19/20, 21/22 for system use
JPWR1-8, JPWR9-16	8-pin power supply connectors 1-8, 9-16
JRK1	Intel RAID Key header for NVMe Solid State Device (SSD) use
JSDCARD1	BMC_SD card header
JTPM1	Trusted Platform Module/Port 80 connector
JUIDB1	UID (Unit Identifier) switch
(I-)SATA 0-3(JS1), 4-7 (JS2)	SATA 3.0 headers with support of 8 SATA connections (JS1: SATA 0-3, JS2: SATA 4-7)
S-SATA0	S-SATA3.0 port with power-pin built-in w/support of SuperDOM (Device-On Module)
USB0	Type A internal USB 2.0 header (USB Port 0)
USB1/2, 3/4	Backplane Universal Serial Bus (USB) 3.0 ports 1/2, 3/4
VGA	VGA Port

LED	Description	Status
LE1	UID (Unit Identifier) LED	Solid Blue: Unit identified
LE2	Power LED	On: Onboard power on
LED1	M.2 Power LED	On: M.2 power on
LEDM1	BMC Heartbeat LED	Blinking Green: BMC normal

Note: To avoid causing interference with other components, please be sure to use an add-on card that is fully compliant with the PCI-standard on a PCI slot.

Motherboard Features

Motherboard Features

CPU

- This motherboard supports dual 81xx/61xx/51xx/41xx/31xx (Socket P) processors which offer Intel® Ultra Path Interconnect (UPI) of up to 10.4 GT/s

  Note: Both CPUs need to be installed for full access to the PCI-E slots, DIMM slots, and onboard controllers. Refer to the block diagram to determine which slots or devices may be affected.

Memory

- Integrated memory controller supports up to 3TB of 3DS Load Reduced DIMM (3DS LRDIMM)/Load Reduced DIMM (LRDIMM)/3DS Registered DIMM (3DS RDIMM)/Registered DIMM (RDIMM) DDR4 (288-pin) ECC 2666/2400/2133 MHz modules in 24 slots

DIMM Size

- Up to 128GB at 1.2V

  Note 1: Memory speed support depends on the processors used in the system.

  Note 2: For the latest CPU/memory updates, please refer to our website at http://www.supermicro.com/products/motherboard.

Chipset

- Intel C622 PCH

Expansion Slots

- Four (4) SMCI-proprietary PCI-Express x24 slots (J31/J32, J33/J34)

BaseBoard Management Controller (BMC)

- ASpeed AST 2500 Baseboard Controller (BMC) supports IPMI 2.0
- One (1) IPMI dedicated LAN located on the rear IO backpanel

Graphics

- Graphics controller via AST 2500 BMC

I/O Devices

- Ethernet LAN Ports	- Two (2) 10GbE Ethernet LAN ports 1/2 on the I/O back panel
- IPMI Dedicated LAN	- One (1) 1 Gigabit IPMI LAN supported by the AST 2500 BMC the I/O back panel
- Serial (COM) Port	- One (1) Fast UART 16550 port on the I/O back panel
- SATA 3.0	- Eight (8) (I-)SATA 3.0 connections supported by two SATA headers (JS1: SATA 0-3, JS2: SATA 4-7) - One (1) S-SATA 3.0 port with power-pin built-in (S-SATA0) (**Note**: S-SATA0 also supports Supermicro SuperDOM.)
- RAID (PCH)	- RAID 0, 1, 5, 10

Motherboard Features
Peripheral Devices
• Four (4) USB 3.0 ports on the rear I/O panel (USB 1/2, USB 3/4) • One (1) Type A USB 2.0 connector (USB 0)
BIOS
• 64 MB SPI AMI BIOS® SM Flash UEFI BIOS • ACPI 3.0/4.0, USB keyboard, Plug-and-Play (PnP), SPI dual/quad speed support, riser-card auto detection support, and SMBIOS 2.7 or later
Power Management
• Main switch override mechanism • Power-on mode for AC power recovery • Intel® Intelligent Power Node Manager 3.0 (available when the Supermicro Power Manager [SPM] is installed and a special power supply is used.) • Management Engine (ME)
System Health Monitoring
• Onboard voltage monitoring for +3.3V, 3.3V standby, +5V, +5V standby, +12V, CPU core, memory, chipset, BMC, PCH, and battery voltages • CPU System LED and control • CPU Thermal Trip support • Status monitor for speed control • Status monitor for on/off control • CPU Thermal Design Power (TDP) support of up to 205W (See Note 1 on next page.)
Fan Control
• Fan status monitoring via IPMI connections • Dual cooling zone • Low-noise fan speed control • Pulse Width Modulation (PWM) fan control
System Management
• Trusted Platform Module (TPM) support • PECI (Platform Environment Control Interface) 2.0 support • UID (Unit Identification)/Remote UID • System resource alert via SuperDoctor® 5 • SuperDoctor® 5, Watch Dog, NMI • Chassis intrusion header and detection
LED Indicators
• CPU/Overheating • Fan Failure • M.2 Power LED • UID (Unit Identification)/Remote UID
Dimensions
• 19.50" (L) x 17.00" (W) (495.30 mm x 431.80 mm)

Note 1: The CPU maximum thermal design power (TDP) is subject to chassis and heatsink cooling restrictions. For proper thermal management, please check the chassis and heatsink specifications for proper CPU TDP sizing.

Note 2: For IPMI configuration instructions, please refer to the Embedded IPMI Configuration User's Guide available at http://www.supermicro.com/support/manuals/.

Note 3: It is strongly recommended that you change BMC log-in information upon initial system power-on. The manufacture default username is ADMIN and the password is ADMIN. For proper BMC configuration, please refer to   http://www.supermicro.com/products/info/files/IPMI/Best_Practices_BMC_Security.pdf

Figure 1-3.
System Block Diagram
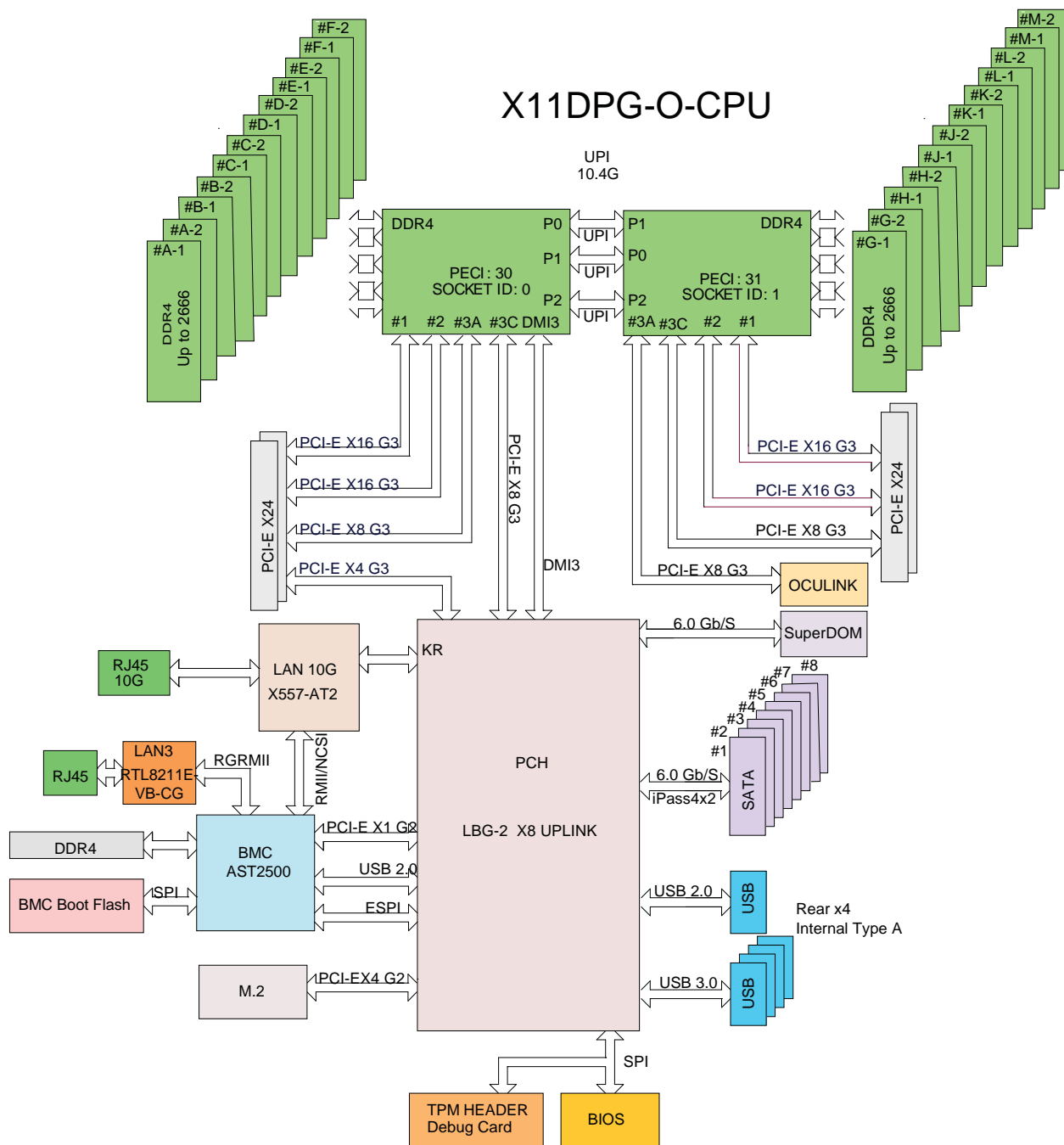
✎ **Note:** This is a general block diagram and may not exactly represent the features on your motherboard. See the previous pages for the actual specifications of your motherboard.

1.2 Processor and Chipset Overview

Built upon the features of the 81xx/61xx/51xx/41xx/31xx (Socket P) processors and the C622 chipset, the X11DPG-OT-CPU provides superb system performance, efficient power management, and a rich feature set based on cutting edge technology to address the needs of next-generation computer users. With support of Intel® UltraPath Interconnect (UPI) of up to 10.4 GT/s, and Intel® AVX-512 new instructions, this motherboard offers an innovative solution with maximum system performance to meet the ongoing demands of High Performance Computing (HPC) platforms. This motherboard is optimized for deep learning, and artificial intelligence platforms.

The Intel Xeon 81xx/61xx/51xx/41xx/31xx processor and the C622 chipset support the following features:

• Intel® AVX-512 support with memory bandwidth increase to 6 channels (x1.5 from the previous generation)

• High availability interconnect between multiple nodes

• Rich set of available IOs, full flexibility in usage model, and software stack

• Dedicated subsystems for customer innovation

• Increased platform security with Intel® Boot Guard for hardware-based boot integrity protection; prevention of buffer overflow class security threads

• Integrated solution for real-time compression, streaming write & read performance increases from gen-to-gen

• Hot plug and enclosure management with Intel Volume Management Device (Intel VMD)

• Single standard server development (Accelerate NFV transition) consolidating application, control, and data plane workloads, reducing total platform investment needs

1.3 Special Features

This section describes the health monitoring features of the X11DPG-OT-CPU motherboard. The motherboard has an onboard ASpeed AST2500 Baseboard Management Controller (BMC) that supports system health monitoring.

Recovery from AC Power Loss

The Basic I/O System (BIOS) provides a setting that determines how the system will respond when AC power is lost and then restored to the system. You can choose for the system to remain powered off (in which case you must press the power switch to turn it back on), or for it to automatically return to the power-on state. See the Advanced BIOS Setup section for this setting. The default setting is Last State.

1.4 System Health Monitoring

This section describes the health monitoring features of the X11DPG-OT-CPU motherboard. The motherboard has an onboard Baseboard Management Controller (BMC) chip that supports system health monitoring. Once a voltage becomes unstable, a warning is given or an error message is sent to the screen. The user can adjust the voltage thresholds to define the sensitivity of the voltage monitor.

Onboard Voltage Monitoring

The onboard voltage monitor will continuously scan crucial voltage levels. Once a voltage becomes unstable, it will give a warning or send an error message to the screen. The user can adjust the voltage thresholds to define the sensitivity of the voltage monitor. Real time readings of these voltage levels are all displayed in IPMI 2.0.

Fan Status Monitor with Firmware Control

The system health monitor embedded in the BMC chip can check the RPM status of the cooling fans. The CPU and chassis fans are controlled via IPMI 2.0.

Environmental Temperature Control

System Health sensors in the BMC monitor the temperatures and voltage settings of onboard processors and the system in real time via the IPMI interface. Whenever the temperature of the CPU or the system exceeds a user-defined threshold, system/CPU cooling fans will be turned on to prevent the CPU or the system from overheating.

> **Note:** To avoid possible system overheating, please be sure to provide adequate airflow to your system.

System Resource Alert

This feature is available when used with SuperDoctor 5®. SuperDoctor 5 is used to notify the user of certain system events. For example, you can configure SuperDoctor 5 to provide you with warnings when the system temperature, CPU temperatures, voltages and fan speeds go beyond a predefined range.

1.5 ACPI Features

ACPI stands for Advanced Configuration and Power Interface. The ACPI specification defines a flexible and abstract hardware interface that provides a standard way to integrate power management features throughout a computer system including its hardware, operating system and application software. This enables the system to automatically turn on and off peripherals such as network cards, hard disk drives and printers.

In addition to enabling operating system-directed power management, ACPI also provides a generic system event mechanism for Plug and Play and an operating system-independent interface for configuration control. ACPI leverages the Plug and Play BIOS data structures, while providing a processor architecture-independent implementation that is compatible with Windows 2012/R2 and Windows 2016 operating systems.

1.6 Power Supply

As with all computer products, a stable power source is necessary for proper and reliable operation. It is even more important for processors that have high CPU clock rates and in areas where noisy power transmission is present.

1.7 Super I/O

The Super I/O Aspeed AST 2500 provides a high-speed, 16550 compatible serial communication port (UART), which supports serial infrared communication. The UART includes send/receive FIFO, a programmable baud rate generator, complete modem control capability, and a processor interrupt system. The UART provides legacy speed with baud rate of up to 115.2 Kbps as well as an advanced speed with baud rates of 250 K, 500 K, or 1 Mb/s, supporting higher speed modems.

The Super I/O provides functions that comply with ACPI (Advanced Configuration and Power Interface), which includes support of legacy and ACPI power management through a SMI or SCI function pin. It also features auto power management to reduce power consumption.

1.8 Advanced Power Management

The following new advanced power management features are supported by the motherboard.

Intel® Intelligent Power Node Manager (IPNM)

Intel Intelligent Power Node Manager (IPNM) provides your system with real-time thermal control and power management for maximum energy efficiency. Although IPNM Specification Version 2.0/3.0 is supported by the BMC (Baseboard Management Controller), your system must also have IPNM-compatible Management Engine (ME) firmware installed to use this feature.

Note: Support for IPNM 2.0/3.0 support is dependent on the power supply used in the system.

Management Engine (ME)

The Management Engine, which is an ARC controller embedded in the IOH (I/O Hub), provides Server Platform Services (SPS) to your system. The services provided by SPS are different from those provided by the ME on client platforms.

Chapter 2

Installation

2.1 Static-Sensitive Devices

Electrostatic Discharge (ESD) can damage electronic components. To avoid damaging your motherboard or onboard components, it is important to handle it very carefully. The following measures are generally sufficient to protect your equipment from ESD.

Precautions

- Use a grounded wrist strap designed to prevent static discharge.

- Touch a grounded metal object before removing the motherboard from the antistatic bag.

- Handle the motherboard by its edges only; do not touch its components, peripheral chips, memory modules or gold contacts.

- When handling chips or modules, avoid touching their pins.

- Put the motherboard and peripherals back into their antistatic bags when not in use.

- For grounding purposes, make sure that your chassis provides excellent conductivity between the power supply, the case, the mounting fasteners and the motherboard.

- Use only the correct type of CMOS onboard battery as specified by the manufacturer. Do not install the CMOS battery upside down, which may result in a possible explosion.

Unpacking

The motherboard is shipped in antistatic packaging to avoid static damage. When unpacking the motherboard, make sure that the person handling it is static protected.

2.2 Motherboard Installation

All motherboards have standard mounting holes to fit different types of chassis. Make sure that the locations of all the mounting holes for both the motherboard and the chassis match. Although a chassis may have both plastic and metal mounting fasteners, metal ones are highly recommended because they ground the motherboard to the chassis. Make sure that the metal standoffs click in or are screwed in tightly.

Phillips Screwdriver (1)

Phillips Screws (14)

Standoffs (14) Only if Needed

Tools Needed
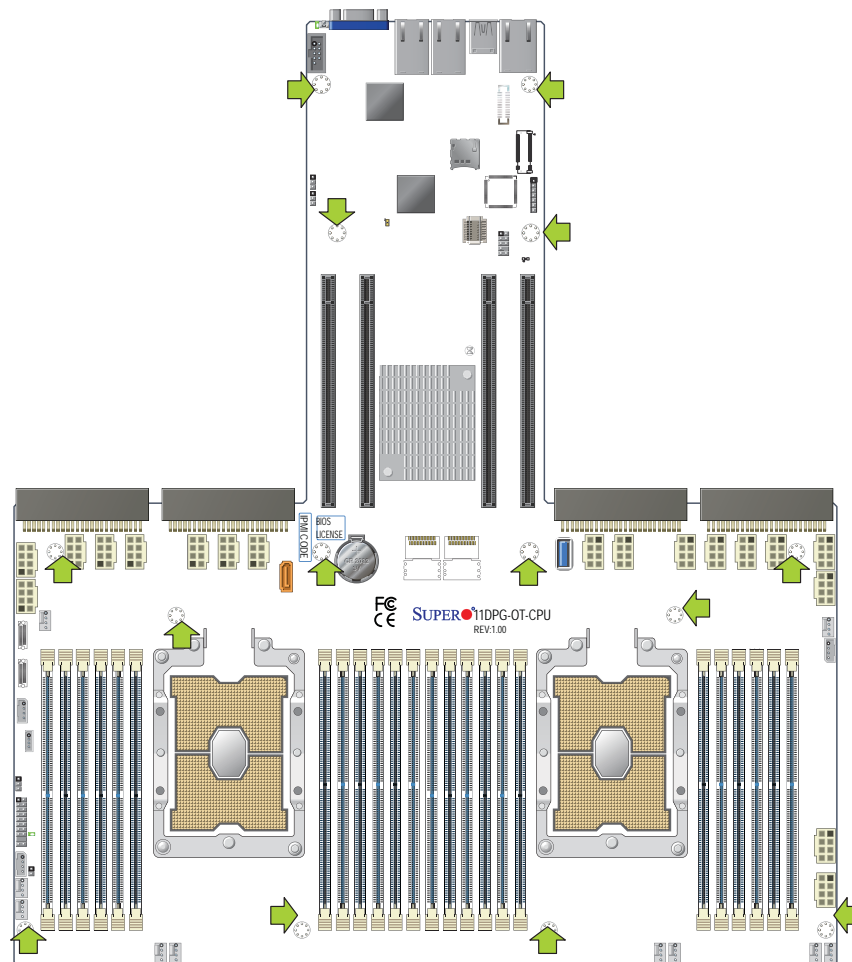
Location of Mounting Holes

Notes: 1) To avoid damaging the motherboard and its components, please do not use a force greater than 8 lb/inch on each mounting screw during motherboard installation. 2) Some components are very close to the mounting holes. Please take precautionary measures to avoid damaging these components when installing the motherboard to the chassis.

Installing the Motherboard

1. Locate the mounting holes on the motherboard. Please refer to the previous page for locations of the mounting holes.

2. Locate the matching mounting holes on the chassis. Align the mounting holes on the motherboard against the mounting holes on the chassis.
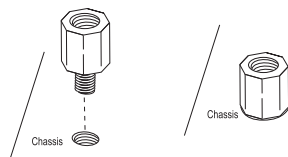
3. Install standoffs in the chassis as needed.
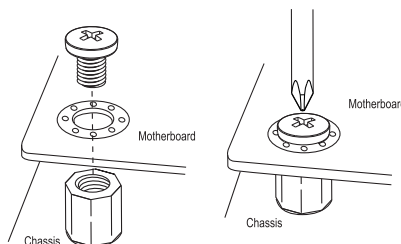
4. Install the motherboard into the chassis carefully to avoid damaging other motherboard components.

5. Using the Phillips screwdriver, insert a Phillips head #6 screw into a mounting hole on the motherboard and its matching mounting hole on the chassis.

6. Repeat Step 5 to insert #6 screws into all mounting holes.

7. Make sure that the motherboard is securely placed in the chassis.

   Note: Images displayed are for illustration only. Your chassis or components might look different from those shown in this manual.

2.3 Processor and Heatsink Installation

Warning: When handling the processor package, avoid placing direct pressure on the label area of the CPU or CPU socket. Also, improper CPU installation or socket misalignment can cause serious damage to the CPU or the motherboard which may result in RMA repairs. Please read and follow all instructions thoroughly before installing your CPU and heatsink.

> **Notes:**

- Always connect the power cord last, and always remove it before adding, removing, or changing any hardware components. Please note that the processor and heatsink should be assembled together first to form the Processor Heatsink Module (PHM), and then install the entire PHM into the CPU socket.

- When you receive a motherboard without a processor pre-installed, make sure that the plastic CPU socket cap is in place, and that none of the socket pins are bent; otherwise, contact your retailer immediately.

- Refer to the Supermicro website for updates on CPU support.

- Please follow the instructions given in the ESD Warning section on the first page of this chapter before handling, installing, or removing system components.

The Intel 81xx/61xx/51xx/41xx/31xx Series Processors

> **Note:** The 81xx/61xx/51xx/41xx/31xx processors come in two models-the F model processors and the Non-F model processors. This motherboard supports Non-F model processors only.
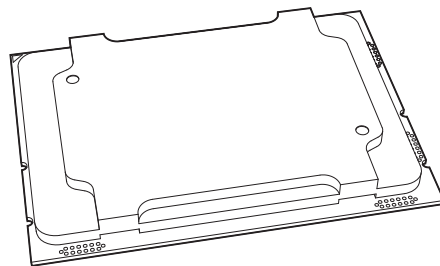
Intel Processor (Non-F Model)

> **Note:** All graphics, drawings, and pictures shown in this manual are for illustration only. The components that came with your machine may or may not look exactly the same as those shown in this manual.

Overview of the Processor Socket Assembly

The processor socket assembly contains 1) the Intel 81xx/61xx/51xx/41xx/31xx processor, 2) the narrow processor clip, 3) the dust cover, and 4) the CPU socket.

1. The 81xx/61xx/51xx/41xx/31xx Processor
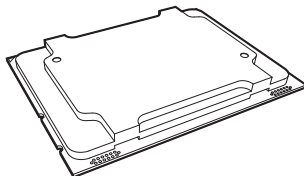
(The 81xx/61xx/51xx/41xx/31xx Processor)

2. Narrow processor clip (the plastic processor package carrier used for the CPU)
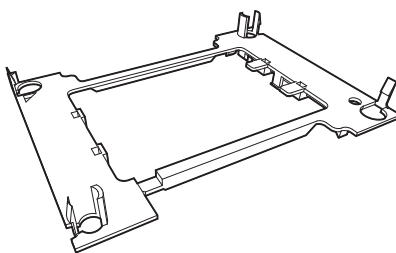
3. Dust Cover
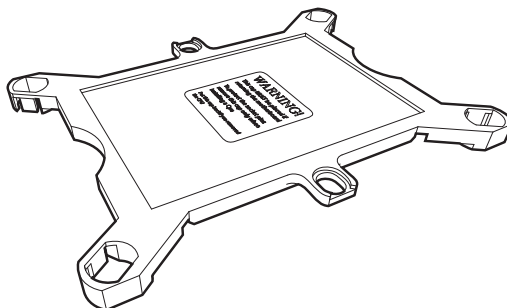
4. CPU Socket
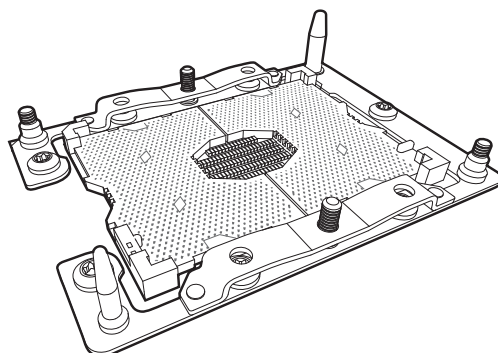
Note: Be sure to cover the CPU socket with the dust cover when the CPU is not installed.

Overview of the Processor Heatsink Module (PHM)

The Processor Heatsink Module (PHM) contains 1) a heatsink, 2) a narrow processor clip, and 3) the 81xx/61xx/51xx/41xx/31xx processor.

1. Heatsink
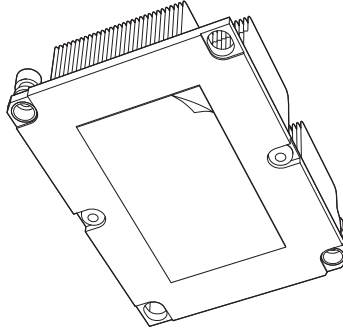
2. Narrow processor clip
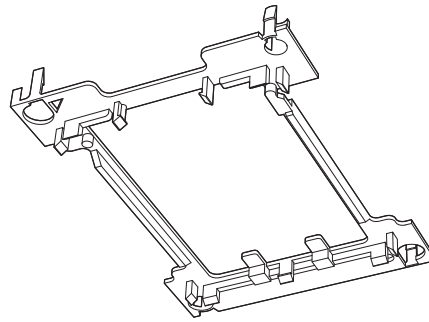
3. Intel Processor
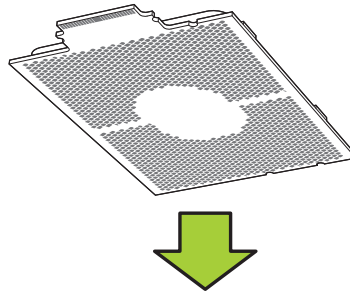
4. Processor Heatsink Module (PHM)
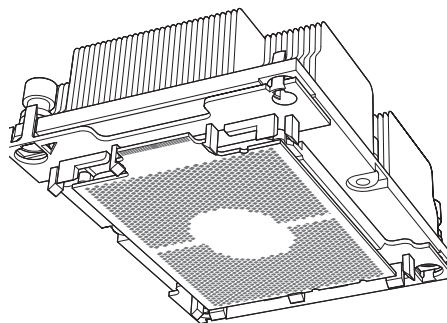
Processor Heatsink Module (PHM)

Note: If one CPU is used, be sure to install it on CPU Socket#1.

Attaching the Processor to the Narrow Processor Clip to Create the Processor Package Assembly

To properly install the CPU into the narrow processor clip, please follow the steps below.

1. Locate pin 1 (notch A), which is the triangle located on the top of the narrow processor clip. Also locate notch B and notch C on the processor clip.

2. Locate pin 1 (notch A), which is the triangle on the substrate of the CPU. Also, locate notch B and notch C on the CPU as shown below.

3. Align pin 1 (the triangle on the substrate) of the CPU with pin 1 (the triangle) of the narrow processor clip. Once they are aligned, carefully insert the CPU into the processor clip by sliding notch B of the CPU into notch B of the processor clip, and sliding notch C of the CPU into notch C of the processor clip.

4. Examine all corners of the CPU to ensure that it is properly seated on the processor clip. Once the CPU is securely attached to the processor clip, the processor package assembly is created.

Note: Please exercise extreme caution when handling the CPU. Do not touch the CPU LGA-lands to avoid damaging the LGA-lands or the CPU. Be sure to wear ESD gloves when handling components.
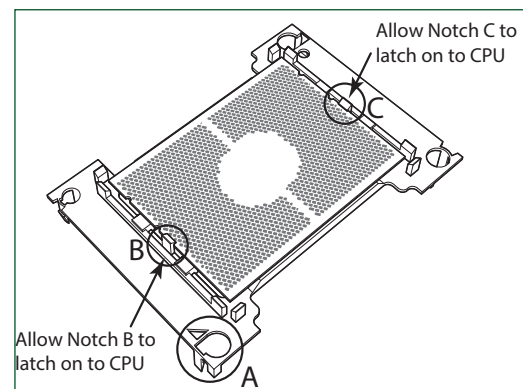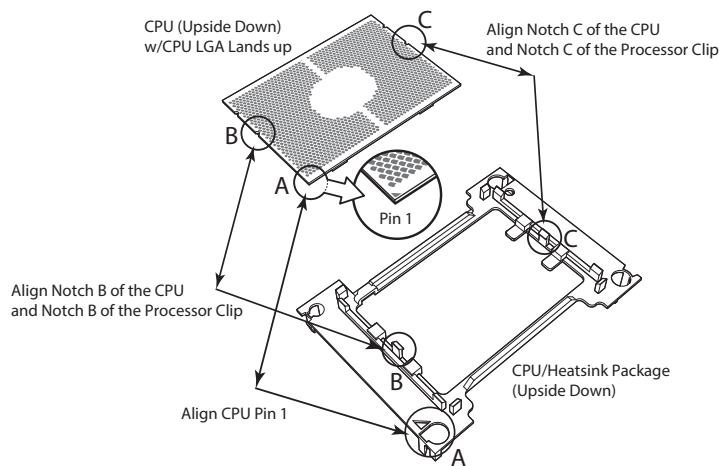
Processor Package Carrier (w/CPU mounted on the Processor Clip)

Attaching the Processor Package Assembly to the Heatsink to Form the Processor Heatsink Module (PHM)

After you have made a processor package assembly by following the instructions on the previous page, please follow the steps below to mount the processor package assembly onto the heatsink to create the Processor Heatsink Module (PHM).

1. Locate "1" on the heatsink label and the triangular corner next to it on the heatsink. With your index finger pressing against the screw at this triangular corner, carefully hold and turn the heatsink upside down with the thermal-grease side facing up. Remove the protective thermal film if present, and apply the proper amount of the thermal grease as needed. (Skip this step if you have a new heatsink because the necessary thermal grease is pre-applied in the factory.)

2. Holding the processor package assembly at the center edge, turn it upside down. With the thermal-grease side facing up, locate the hollow triangle located at the corner of the processor carrier assembly ("a" in the graphic). Note a larger hole and plastic mounting clicks located next to the hollow triangle. Also locate another set of mounting clicks and a larger hole at the diagonal corner of the same (reverse) side of the processor carrier assembly ("b" in the graphic).

3. With the back of heatsink and the reverse side of the processor package assembly facing up, align the triangular corner on the heatsink ("A" in the graphic) against the mounting clips next to the hollow triangle ("a") on the processor package assembly.

4. Also align the triangular corner ("B") at the diagonal side of the heatsink with the corresponding clips on the processor package assembly ("b").

5. Once the mounting clips on the processor package assembly are properly aligned with the corresponding holes on the back of heatsink, securely attach the heatsink to the processor package assembly by snapping the mounting clips at the proper places on the heatsink to create the processor heatsink module (PHM).

Non-Fabric CPU and Processor Clip (Upside Down)

Triangle on the CPU

Triangle on the Processor Clip

Heatsink (Upside Down)

On Locations of (C, D), the notches snap onto the heat sink's mounting holes

On Locations (A, B), the notches snap onto the heatsink's sides

Make sure Mounting Notches snap into place
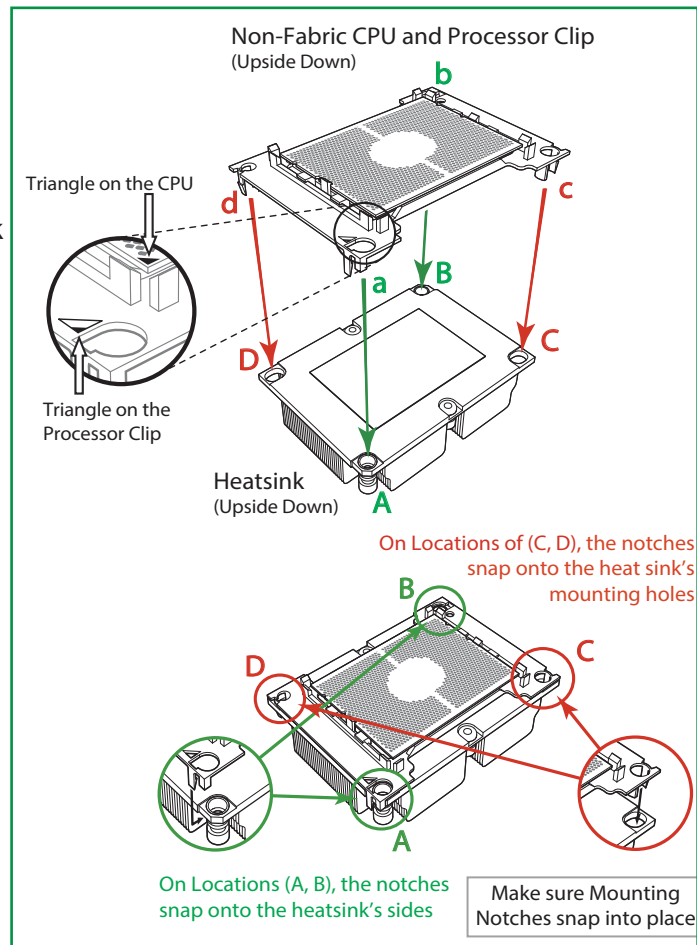
Preparing the CPU Socket for Installation

This motherboard comes with the CPU socket pre-assembled in the factory. The CPU socket contains 1) a dust cover, 2) a socket bracket, 3) the CPU socket, and 4) a back plate. These components are pre-installed on the motherboard before shipping.
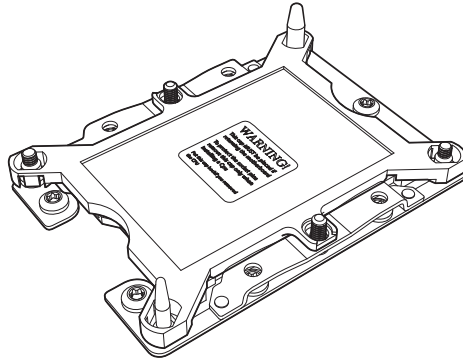
CPU Socket w/Dust Cover On

Removing the Dust Cover from the CPU Socket

Remove the dust cover from the CPU socket, exposing the CPU socket and socket pins as shown on the illustration below.

Note: Do not touch the socket pins to avoid damaging them, causing the CPU to malfunction.

Dusk Cover

Remove the dust cover from the CPU socket. Do not touch the socket pins!

Socket Pins
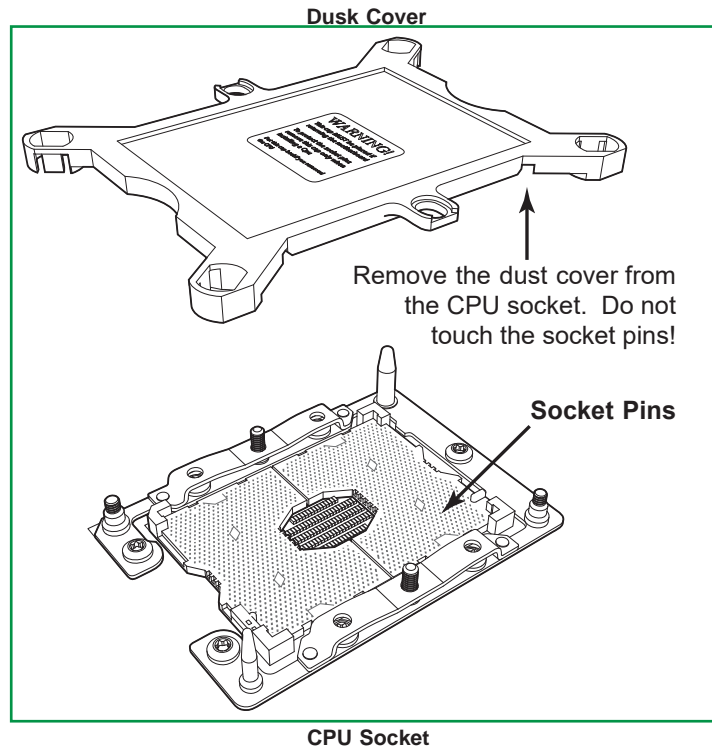
CPU Socket

Installing the Processor Heatsink Module (PHM)

1. Once you have assembled the processor heatsink module (PHM) by following the instructions, you are ready to install the processor heatsink module (PHM) into the CPU socket on the motherboard. To install the PHM into the CPU socket, follow the instructions below.

2. Locate the triangle (pin 1) on the CPU socket, and locate the triangle (pin 1) at the corner of the PHM that is closest to "1." (If you have difficulty locating pin 1 of the PHM, turn the PHM upside down. With the LGA-lands side facing up, you will note the hollow triangle located next to a screw at the corner. Turn the PHM right side up, and you will see a triangle marked on the processor clip at the same corner of hollow triangle.)

3. Carefully align pin 1 (the triangle) on the the PHM against pin 1 (the triangle) on the CPU socket.

4. Once they are properly aligned, insert the two diagonal oval holes on the heatsink into the guiding posts.

5. Using a T30 Torx-bit screwdriver, install four screws into the mounting holes on the socket to securely attach the PHM onto the motherboard starting with the screw marked "1" (in the sequence of 1, 2, 3, and 4).

   Note: Do not use excessive force when tightening the screws to avoid damaging the LGA-lands and the processor.

Mounting the Processor Heatsink Module into the CPU socket (on the motherboard)

Tighten the screws in the sequence of 1, 2, 3, 4 (top 3 quarter view)
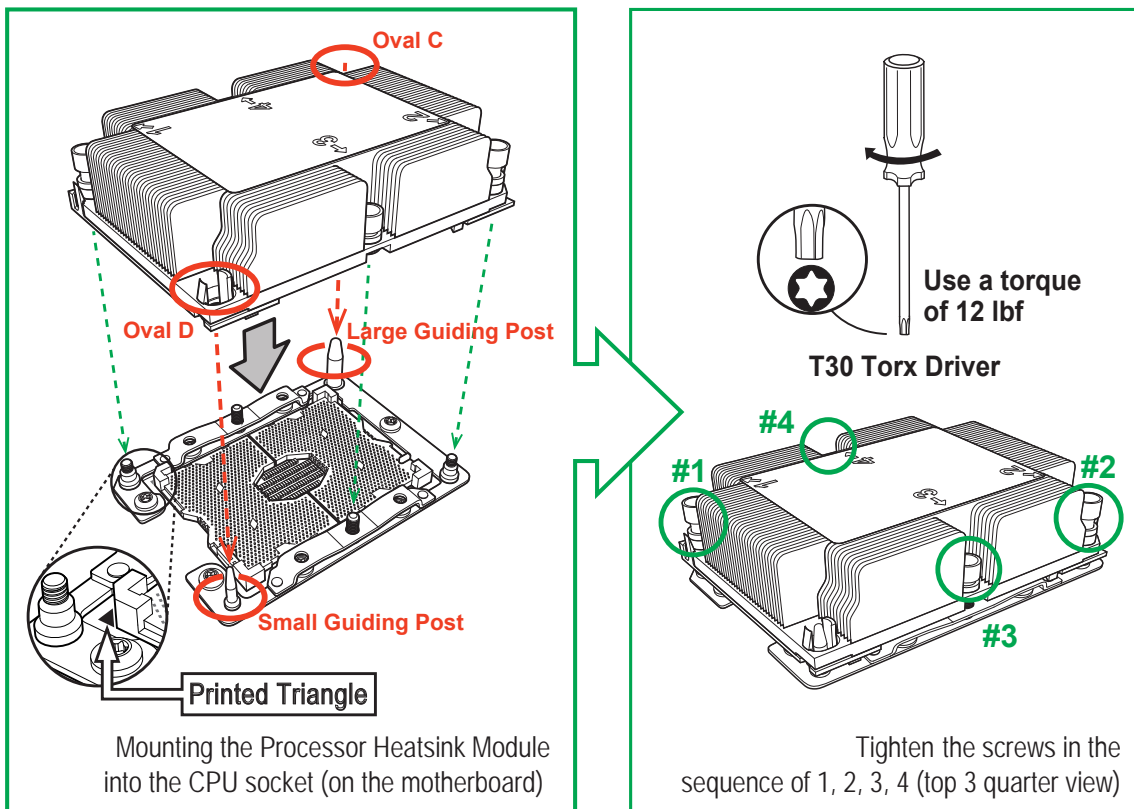
Removing the Processor Heatsink Module (PHM) from the Motherboard

Before removing the processor heatsink module (PHM), unplug power cord from the power outlet.

1. Using a T30 Torx-bit screwdriver, turn the screws on the PHM counterclockwise to loosen them from the socket, starting with screw marked #4 (in the sequence of 4, 3, 2, 1).

2. After all four screws are removed, wiggle the PHM gently and pull it up to remove it from the socket.

   Note: To properly remove the processor heatsink module, be sure to loosen and remove the screws on the PHM in the sequence of 4, 3, 2, 1 as shown below.

Removing the screws in the sequence of 4, 3, 2, 1

#4
#1
#2
#3

Printed Triangle on Motherboard

CPU Socket

After removing the screws, lift the Processor Heatsink Module off the CPU socket.
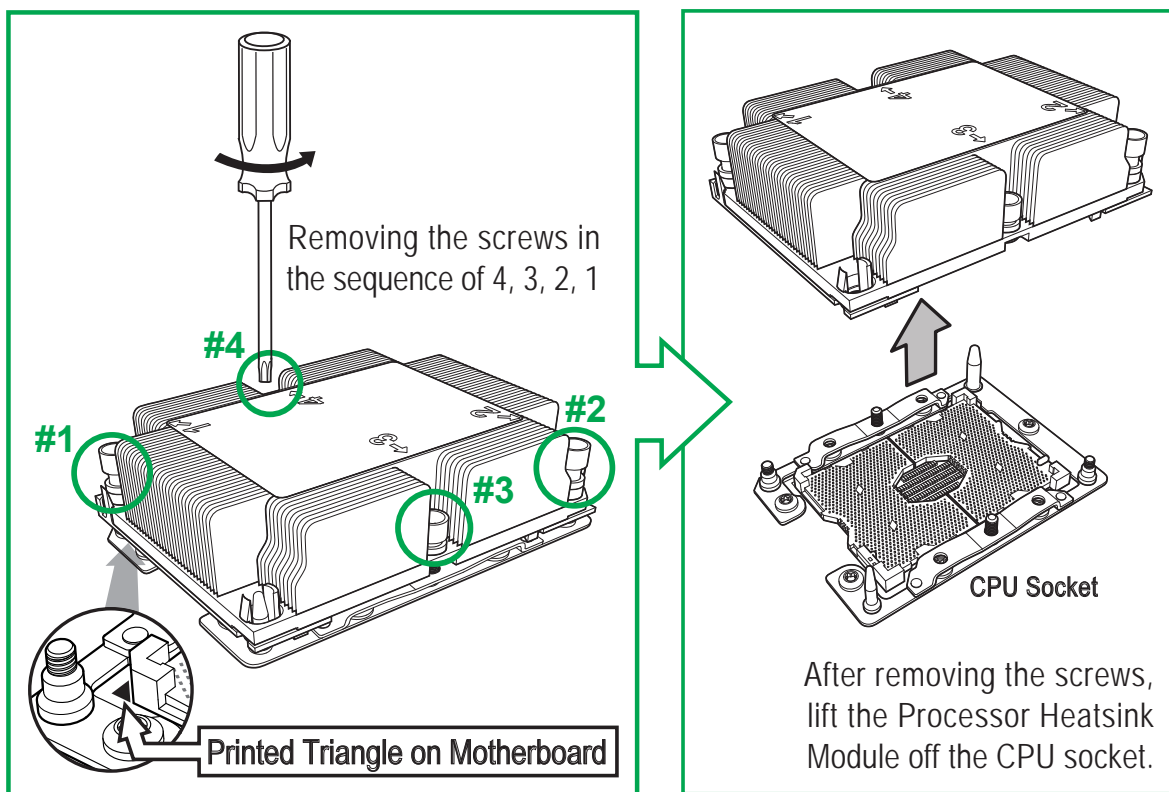
2.4 Memory Support and Installation

Warning! Exercise extreme care when installing or removing DIMM modules to prevent any possible damage. Check the Supermicro website for recommended memory modules.

Memory Support

The X11DPG-OT-CPU supports up to 3TB 3DS Load Reduced DIMM (3DS LRDIMM) Load Reduced DIMM (LRDIMM), 3DS Registered DIMM (3DS RDIMM) Registered DIMM (RDIMM), DDR4 (288-pin) ECC 2666/2400/2133 MHz memory modules in 24 slots. Populating these DIMM modules with a pair of memory modules of the same type and size will result in interleaved memory, which will improve memory performance.

Notes: 1. Please follow the DIMM population tables listed in this chapter to install the DIMM modules on your motherboard. 2. Using an unbalanced memory topology by installing two DIMMs in one channel while installing one DIMM in another channel will result in reduced memory performance. 3. Memory speed is dependent on the type of processors used in your system.

DDR4 Memory Support (for 2-Slot Per-Channel Configuration)					
Type	Ranks Per DIMM and Data Width	DIMM Capacity (GB)		Speed (MT/s); Voltage (V); Slots per Channel (SPC) and DIMMs per Channel (DPC)	
				2 Slots per Channel	
				1DPC (1-DIMM per Channel)	2DPC (2-DIMM per Channel)
		4 Gb	8 Gb	1.2 V	1.2 V
RDIMM	SRx4	8 GB	16 GB	2666	2666
RDIMM	SRx8	4 GB	8 GB	2666	2666
RDIMM	DRx8	8 GB	16 GB	2666	2666
RDIMM	DRx4	16 GB	32 GB	2666	2666
RDIMM 3DS	QRX4	N/A	2H-64GB	2666	2666
RDIMM 3DS	8RX4	N/A	4H-128GB	2666	2666
LRDIMM	QRx4	32 GB	64 GB	2666	2666
LRDIMM 3DS	QRX4	N/A	2H-64GB	2666	2666
	8Rx4	N/A	4H-128 GB	2666	2666

DDR4 Memory Support (for 1-Slot Per-Channel Configuration)				
Type	Ranks Per DIMM and Data Width	DIMM Capacity (GB)		Speed (MT/s); Voltage (V); Slots per Channel (SPC) and DIMMs per Channel (DPC)
				1 Slot per Channel
				1DPC (1-DIMM per Channel)
		4 Gb	8 Gb	1.2 V
RDIMM	SRx4	8 GB	16 GB	2666
RDIMM	SRx8	4 GB	8 GB	2666
RDIMM	DRx8	8 GB	16 GB	2666
RDIMM	DRx4	16 GB	32 GB	2666
RDIMM 3DS	QRX4	N/A	2H-64GB	2666
RDIMM 3DS	8RX4	N/A	4H-128GB	2666
LRDIMM	QRx4	32 GB	64 GB	2666
LRDIMM 3DS	QRX4	N/A	2H-64GB	2666
	8Rx4	N/A	4H-128 GB	2666

DIMM Population Requirements

For optimal memory performance, follow the tables below when populating memory modules.

Key Parameters for DIMM Configurations	
Parameters	**Possible Values**
Number of Channels	1, 2, 3, 4, 5, or 6
Number of DIMMs per Channel	1DPC (1 DIMM Per Channel) or 2DPC (2 DIMMs Per Channel)
DIMM Type	RDIMM (w/ECC), LRDIMM, 3DS-LRDIMM
DIMM Construction	• non-3DS RDIMM Raw Cards: A/B (2RX4), C (1RX4), D (1RX8), E (2RX8) • 3DS RDIMM Raw Cards: A/B (4RX4) • non-3DS LRDIMM Raw Cards: D/E (4RX4) • 3DS LRDIMM Raw Cards: A/B (8RX4)

General Population Requirements
DIMM Mixing Rules
• All DIMMs must be all DDR4 DIMMs. • X4 and X8 DIMMs can be mixed in the same channel. • Mixing of LRDIMMs and RDIMMs is not allowed in the same channel, across different channels, and across different sockets. • Mixing of non-3DS and 3DS LRDIMM is not allowed in the same channel, across different channels, and across different sockets.

Mixing of DIMM Types within a Channel			
DIMM Types	**RDIMM**	**LRDIMM**	**3DS LRDIMM**
RDIMM	Allowed	Not Allowed	Not Allowed
LRDIMM	Not Allowed	Allowed	Not Allowed
3DS LRDIMM	Not Allowed	Not Allowed	Allowed

DIMM Population Table

Note: Unbalanced memory configuration decreases memory performance and is not recommended for Supermicro motherboards.

Memory Population Tables for X11DP Motherboards w/24 DIMM Slots	
When 1 CPU is used:	**Memory Population Sequence**
1 CPU & 1 DIMM	CPU1: P1-DIMMA1
1 CPU & 2 DIMMs	CPU1: P1-DIMMA1/P1-DIMMD1
1 CPU & 3 DIMMs	CPU1: P1-DIMMC1/P1-DIMMB1/P1-DIMMA1
1 CPU & 4 DIMMs	CPU1: P1-DIMMB1/P1-DIMMA1/P1-DIMMD1/P1-DIMME1
1 CPU & 5 DIMMs **(Unbalanced: not recommended)**	CPU1: P1-DIMMC1/P1-DIMMB1/P1-DIMMA1/P1-DIMMD1/P1-DIMME1
1 CPU & 6 DIMM	CPU1: P1-DIMMC1/P1-DIMMB1/P1-DIMMA1/P1-DIMMD1/P1-DIMME1/P1-DIMMF1
1 CPU & 7 DIMMs **(Unbalanced: not recommended)**	CPU1: P1-DIMMC1/P1-DIMMB1/P1-DIMMA1/P1-DIMMA2/P1-DIMMD1/P1-DIMME1/P1-DIMMF1
1 CPU & 8 DIMMs	CPU1: P1-DIMMC1/P1-DIMMB1/P1-DIMMA1/P1-DIMMA2/P1-DIMMD2/P1-DIMMD1/P1-DIMME1/P1-DIMMF1
1 CPU & 9 DIMMs **(Unbalanced: not recommended)**	CPU1: P1-DIMMC1/P1-DIMMC2/P1-DIMMB1/P1-DIMMB2/P1-DIMMA1/P1-DIMMA2/P1-DIMMD1/P1-DIMME1/P1-DIMMF1
1 CPU & 10 DIMMs **(Unbalanced: not recommended)**	CPU1: P1-DIMMC1/P1-DIMMB1/P1-DIMMB2/P1-DIMMA1/P1-DIMMA2/P1-DIMMD2/P1-DIMMD1/P1-DIMME2/P1-DIMME1/P1-DIMMF1
1 CPU & 11 DIMMs **(Unbalanced: not recommended)**	CPU1: P1-DIMMC1/P1-DIMMC2/P1-DIMMB1/P1-DIMMB2/P1-DIMMA1/P1-DIMMA2/P1-DIMMD2/P1-DIMMD1/P1-DIMME2/P1-DIMME1/P1-DIMMF1
1 CPU & 12 DIMMs	CPU1: P1-DIMMC1/P1-DIMMC2/P1-DIMMB1/P1-DIMMB2/P1-DIMMA1/P1-DIMMA2/P1-DIMMD2/P1-DIMMD1/P1-DIMME2/P1-DIMME1/P1-DIMMF2/P1-DIMMF1
When 2 CPUs are used:	**Memory Population Sequence**
2 CPUs & 2 DIMMs	CPU1: P1-DIMMA1 CPU2: P2-DIMMA1
2 CPUs & 4 DIMMs	CPU1: P1-DIMMA1/P1-DIMMD1 CPU2: P2-DIMMA1/P2-DIMMD1
2 CPUs & 6 DIMMs	CPU1: P1-DIMMC1/P1-DIMMB1/P1-DIMMA1 CPU2: P2-DIMMC1/P2-DIMMB1/P2-DIMMA1
2 CPUs & 8 DIMMs	CPU1: P1-DIMMB1/P1-DIMMA1/P1-DIMMD1/P1-DIMME1 CPU2: P2-DIMMB1/P2-DIMMA1/P2-DIMMD1/P2-DIMME1
2 CPUs & 10 DIMMs	CPU1: P1-DIMMC1/P1-DIMMB1/P1-DIMMA1/P1-DIMMD1/P1-DIMME1/P1-DIMMF1 CPU2: P2-DIMMB1/P2-DIMMA1/P2-DIMMD1/P2-DIMME1
2 CPUs & 12 DIMMs	CPU1: P1-DIMMC1/P1-DIMMB1/P1-DIMMA1/P1-DIMMD1/P1-DIMME1/P1-DIMMF1 CPU2: P2-DIMMC1/P2-DIMMB1/P2-DIMMA1/P2-DIMMD1/P2-DIMME1/P2-DIMMF1
2 CPUs & 14 DIMMs	CPU1: P1-DIMMB1/P1-DIMMB2/P1-DIMMA1/P1-DIMMA2/P1-DIMMD2/P1-DIMMD1/P1-DIMME1/P1-DIMMF1 CPU2: P2-DIMMC1/P2-DIMMB1/P2-DIMMA1/P2-DIMMD1/P2-DIMME1/P2-DIMMF1
2 CPUs & 16 DIMMs	CPU1: P1-DIMMB1/P1-DIMMB2/P1-DIMMA1/P1-DIMMA2/P1-DIMMD2/P1-DIMMD1/P1-DIMME1/P1-DIMMF1 CPU2: P2-DIMMB1/P2-DIMMB2/P2-DIMMA1/P2-DIMMA2/P2-DIMMD2/P2-DIMMD1/P2-DIMME1/P2-DIMMF1
2 CPUs & 18 DIMMs	CPU1: P1-DIMMC1/P1-DIMMC2/P1-DIMMB1/P1-DIMMB2/P1-DIMMA1/P1-DIMMA2/P1-DIMMD2/P1-DIMMD1/P1-DIMME2/P1-DIMME1/P1-DIMMF2/P1-DIMMF1 CPU2: P2-DIMMC1/P2-DIMMB1/P2-DIMMA1/P2-DIMMD1/P2-DIMME1/P2-DIMMF1
2 CPUs & 20 DIMMs	CPU1: P1-DIMMC1/P1-DIMMC2/P1-DIMMB1/P1-DIMMB2/P1-DIMMA1/P1-DIMMA2/P1-DIMMD2/P1-DIMMD1/P1-DIMME2/P1-DIMME1/P1-DIMMF2/P1-DIMMF1 CPU2: P2-DIMMB1/P2-DIMMB2/P2-DIMMA1/P2-DIMMA2/P2-DIMMD2/P2-DIMMD1/P2-DIMME1/P2-DIMMF1
2 CPUs & 22 DIMMs **(Unbalanced: not recommended)**	CPU1: P1-DIMMC1/P1-DIMMC2/P1-DIMMB1/P1-DIMMB2/P1-DIMMA1/P1-DIMMA2/P1-DIMMD2/P1-DIMMD1/P1-DIMME2/P1-DIMME1/P1-DIMMF1 CPU2: P2-DIMMC1/P2-DIMMC2/P2-DIMMB1/P2-DIMMB2/P2-DIMMA1/P2-DIMMA2/P2-DIMMD2/P2-DIMMD1/P2-DIMME2/P2-DIMME1/P2-DIMMF1
2 CPUs & 24 DIMMs	CPU1: P1-DIMMC1/P1-DIMMC2/P1-DIMMB1/P1-DIMMB2/P1-DIMMA1/P1-DIMMA2/P1-DIMMD2/P1-DIMMD1/P1-DIMME2/P1-DIMME1/P1-DIMMF2/P1-DIMMF1 CPU2: P2-DIMMC1/P2-DIMMC2/P2-DIMMB1/P2-DIMMB2/P2-DIMMA1/P2-DIMMA2/P2-DIMMD2/P2-DIMMD1/P2-DIMME2/P2-DIMME1/P2-DIMMF2/P2-DIMMF1

DIMM Installation

1. Follow the instructions given in the memory population tables provided in the previous section to install memory modules on your motherboard. For the system to work properly, please use memory modules of the same type and speed on the motherboard. (See the note below.)

2. Push the release tabs outwards on both ends of the DIMM slot to unlock it.

3. Align the key of the DIMM module with the receptive point on the memory slot.

4. Align the notches on both ends of the module against the receptive points on the ends of the slot.

5. Use two thumbs together to press the notches on both ends of the module straight down into the slot until the module snaps into place.

6. Press the release tabs to the lock positions to secure the DIMM module into the slot.
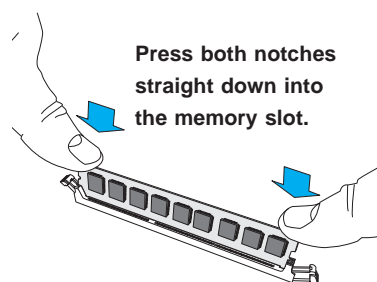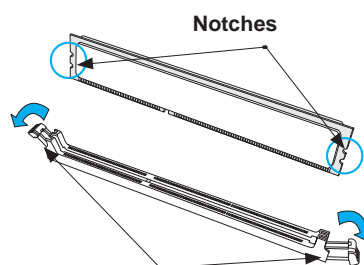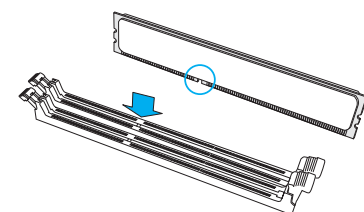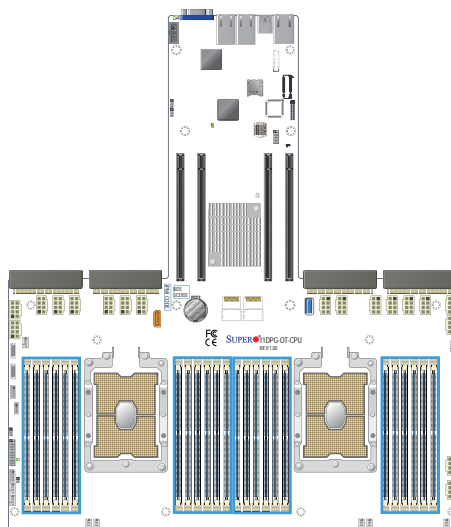
DIMM Removal

Reverse the steps above to remove the DIMM modules from the motherboard.

Notches

Release Tabs

Press both notches straight down into the memory slot.

Note: All graphics including the layout drawing above are for reference only. Your system components may look or may not look the same as graphics shown in this guide.

2.5 Rear I/O Ports

See the layout below for the locations and descriptions of the various I/O ports on the rear of the motherboard.
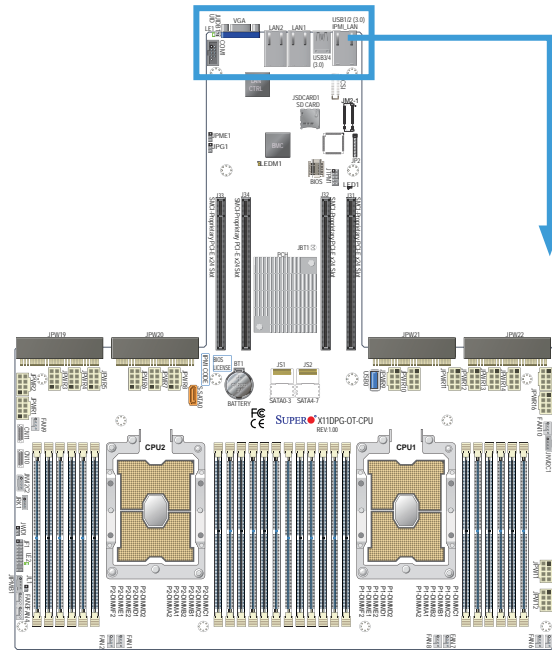
I/O Port Locations and Definitions
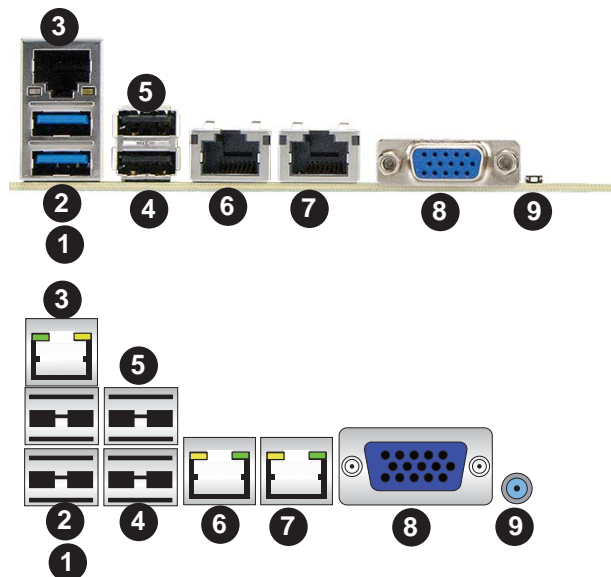
I/O Back Panel Port Descriptions			
Pin#	**Definition**	**Pin#**	**Definition**
1	USB 1 (3.0)	6	LAN Port 1
2	USB 2 (3.0)	7	LAN Port 2
3	IPMI_LAN	8	VGA
4	USB 3 (3.0)	9	UID Switch
5	USB 4 (3.0)		(UID LED: on the motherboard)

Universal Serial Bus (USB) Ports

Four USB 3.0 port (USB1/2, 3/4) are located on the I/O back panel. A Type A internal USB 2.0 header on the motherboard provides front access. Connect appropriate cables here to use USB support. (USB cables are not included).

Back Panel USB (3.0) Pin Definitions			
Pin#	Definitio	Pin#	Definition
A1	VBUS	B1	VBUS
A2	D-	B2	D-
A3	D+	B3	D+
A4	GND	B4	GND
A5	Stda_SSRX-	B5	Stda_SSRX-
A6	Stda_SSRX+	B6	Stda_SSRX+
A7	GND	B7	GND
A8	Stda_SSTX-	B8	Stda_SSTX-
A9	Stda_SSTX+	B9	Stda_SSTX+

USB (2.0) Pin Definitions	
Pin#	Definition
1	Vcc
2	Data-
3	Data+
4	Ground
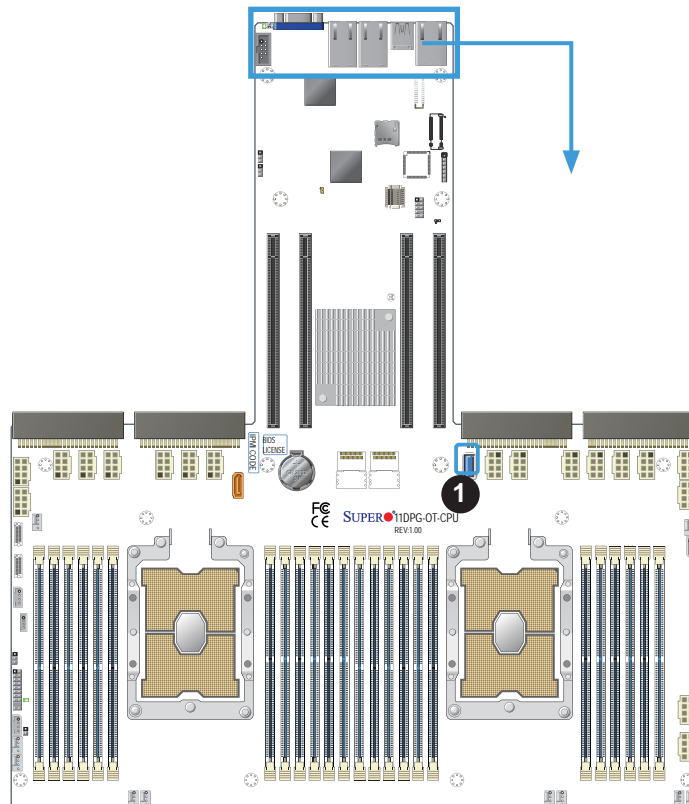
1. Type A USB 2.0 for front Access

2. Backpanel USB 1 (USB 3.0)

3. Backpanel USB 2 (USB 3.0)

4. Backpanel USB 3 (USB 3.0)

5. Backpanel USB 4 (USB 3.0)
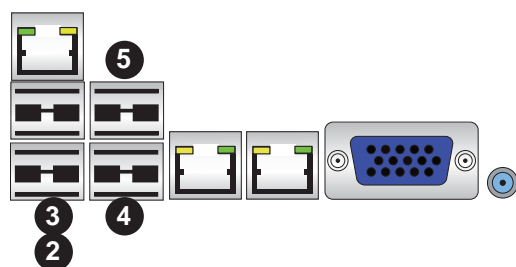
Ethernet Ports

Two Ethernet ports (LAN1, LAN2) that support 10 GbE Ethernet LAN connections are located on the I/O backplane. Additionally, an IPMI-dedicated LAN, located above USB 1/2 ports on the I/O backplane, provides 1 GbE IPMI LAN support via the AST 2500 BMC. All these LAN ports accept RJ45 type cables. Please refer to the LED Indicator Section for LAN LED information.

1. LAN Port 1 (10GbE LAN)
2. LAN Port 2 (10GbE LAN)
3. IPMI_LAN (1 GbE LAN)
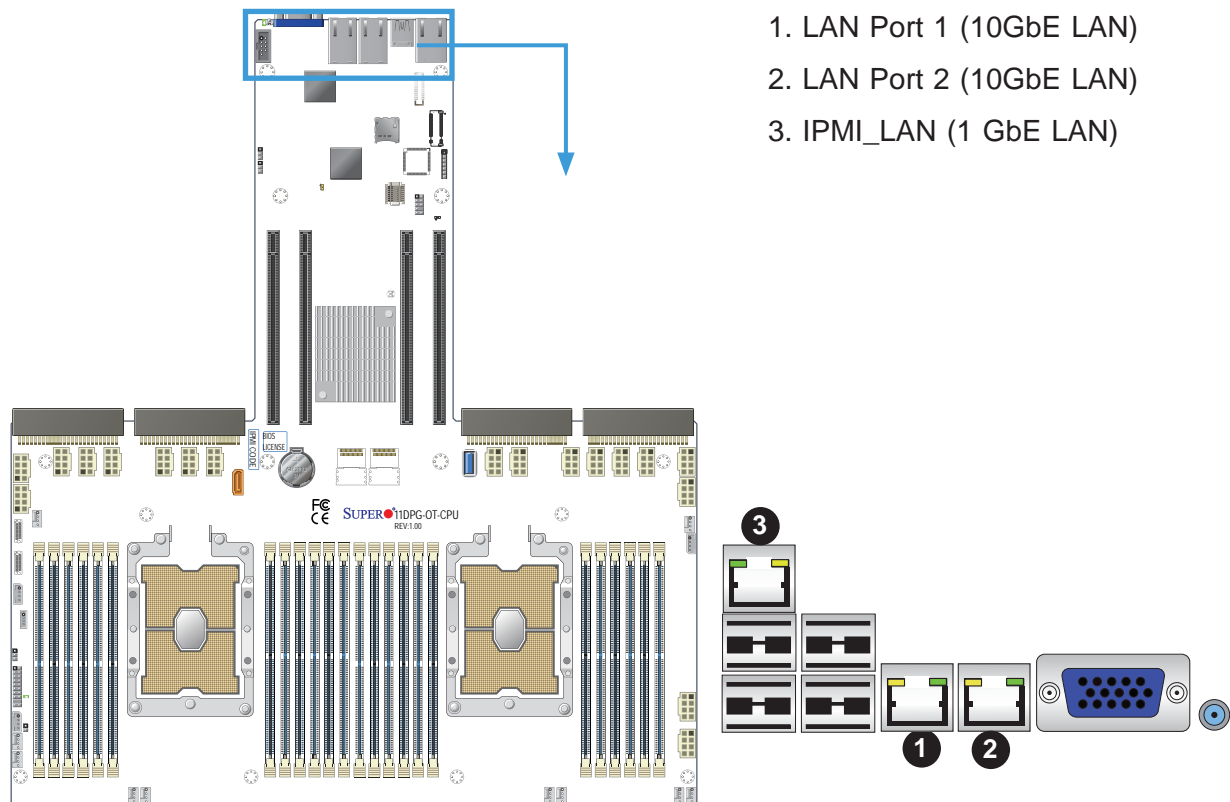
VGA Port

The onboard VGA port is located next to LAN Port 2 on the I/O back panel. Use this connection for VGA display.

Unit Identifier Switch/UID LED Indicator

A Unit Identifier (UID) switch and a rear UID LED (LE1) are located on the I/O back panel. A front UID switch is located on pins 7 & 8 of the front panel control (JF1). When you press the front or the rear UID switch, both front and rear UID LEDs will be turned on. Press the UID switch again to turn off the LED indicators. The UID indicators provide easy identification of a system that may be in need of service. (**Note:** UID can also be triggered via IPMI on the motherboard. For more information, please refer to the IPMI User's Guide posted on our website at http://www.supermicro.com.)

UID Switch Pin Definitions	
Pin#	**Definition**
1	Ground
2	Ground
3	Button In
4	Button In

UID LED Pin Definitions	
Color	**Status**
Blue: On	Unit Identified
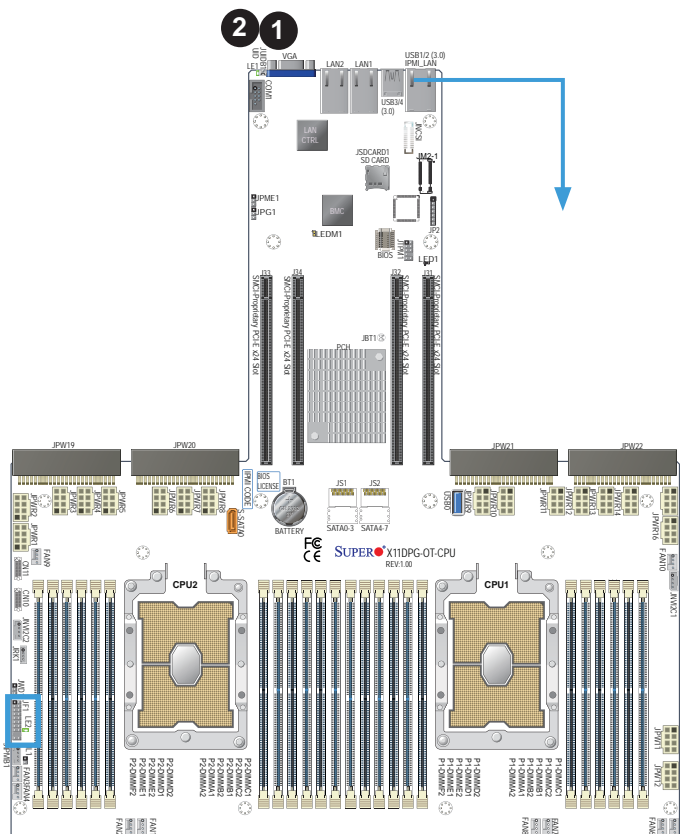
1. UID Switch

2. Rear UID LED (LE1)

3. Front UID LED

	1	2	
PWR Power Button	○	○	Ground
Reset Reset Button	○	○	Ground
3.3V	○	○	Power Fail LED
UID LED	○	○	OH/Fan Fail LED
3.3V Stby	○	○	NIC2 Active LED
3.3V Stby	○	○	NIC1 Active LED
3.3V Stby	○	○	HDD LED
3.3V	○	○	PWR LED
X	○	○	X
NMI	○	○	Ground
	19	20	
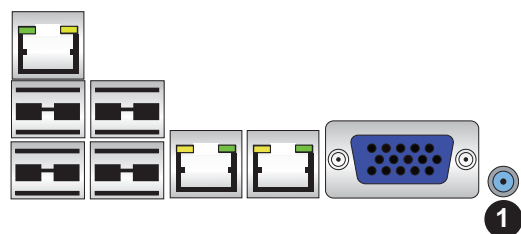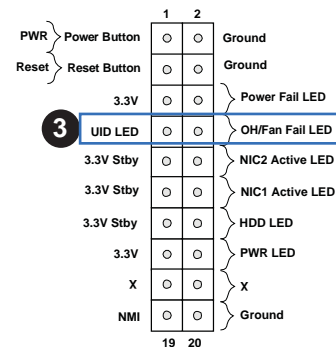
2.6 Front Control Panel

JF1 contains header pins for various buttons and indicators that are normally located on a control panel at the front of the chassis. These connectors are designed specifically for use with Supermicro chassis. See the figure below for the descriptions of the front control panel buttons and LED indicators.
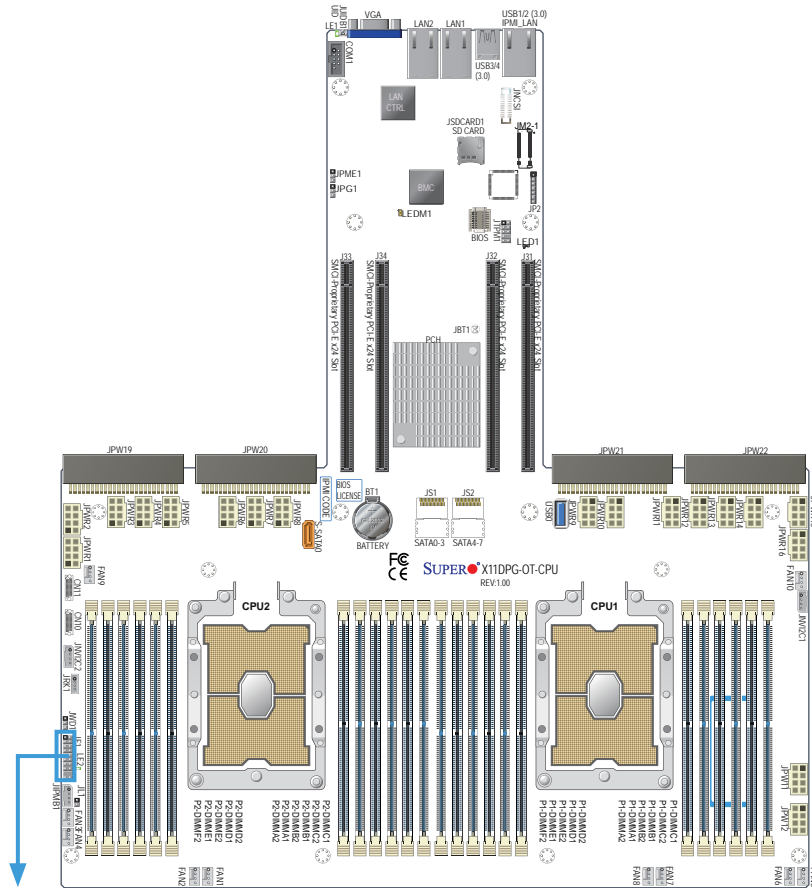
Figure 2-3. JF1 Header Pins

	1	2	
PWR > **Power Button**	○	○	**Ground**
Reset > **Reset Button**	○	○	**Ground**
3.3V	○	○	**Power Fail LED**
UID LED	○	○	**OH/Fan Fail LED**
3.3V Stby	○	○	**NIC2 Active LED**
3.3V Stby	○	○	**NIC1 Active LED**
3.3V Stby	○	○	**HDD LED**
3.3V	○	○	**PWR LED**
X	○	○	**X**
NMI	○	○	**Ground**
	19	**20**	

Power Button

The Power Button connection is located on pins 1 and 2 of JF1. Momentarily contacting both pins will power on/off the system. This button can also be configured to function as a suspend button (with a setting in the BIOS - see Chapter 4). To turn off the power when the system is in suspend mode, press the button for 4 seconds or longer. Refer to the table below for pin definitions.

Power Button Pin Definitions (JF1)	
Pins	Definition
1	Signal
2	Ground

Reset Button

The Reset Button connection is located on pins 3 and 4 of JF1. Attach it to a hardware reset switch on the computer case to reset the system. Refer to the table below for pin definitions.

Reset Button Pin Definitions (JF1)	
Pins	Definition
3	Reset
4	Ground
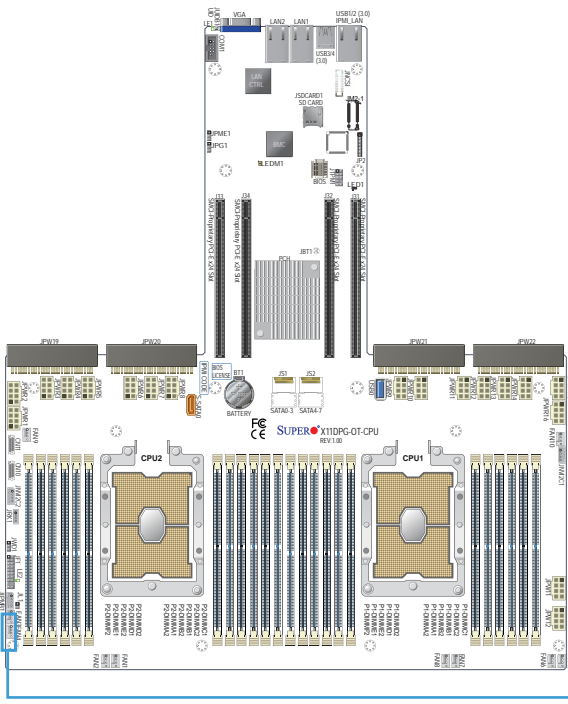
1. PWR Button

2. Reset Button

	1	2	
PWR — Power Button	○	○	Ground
Reset — Reset Button	○	○	Ground
3.3V	○	○	Power Fail LED
UID LED	○	○	OH/Fan Fail LED
3.3V Stby	○	○	NIC2 Active LED
3.3V Stby	○	○	NIC1 Active LED
3.3V Stby	○	○	HDD LED
3.3V	○	○	PWR LED
X	○	○	X
NMI	○	○	Ground
	19	20	
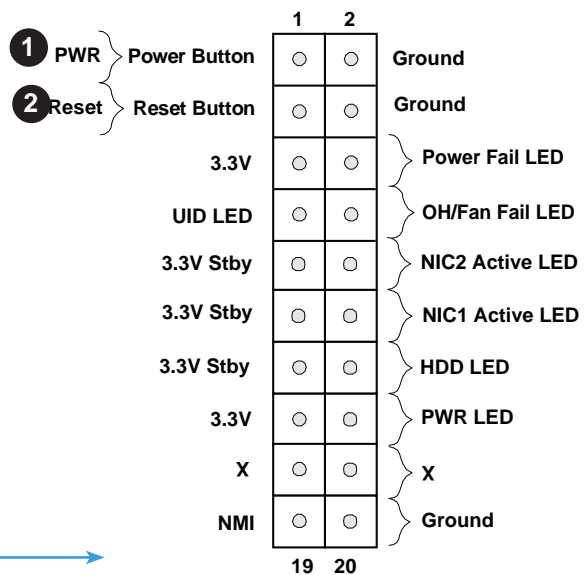
Power Fail LED

The Power Fail LED connection is located on pins 5 and 6 of JF1. Refer to the table below for pin definitions.

Power Fail LED Pin Definitions (JF1)	
Pin#	Definition
5	3.3V
6	PWR Supply Fail

Overheat/Fan Fail/UID LED

Connect an LED cable to pins 7 and 8 of the Front Control Panel to use the Overheat/Fan Fail LED/UID LED connections. The LED on pin 8 provides warnings of overheat or fan failure. Refer to the tables below for Overheat/Fan Fail LED and pin definitions.

OH/Fan Fail LED Pin Definitions (JF1)	
Pin#	Definition
7	Blue LED
8	OH/Fan Fail LED

OH/Fan Fail Indicator Status	
State	Definition
Off	Normal
On	Overheat
Flashing	Fan Fail
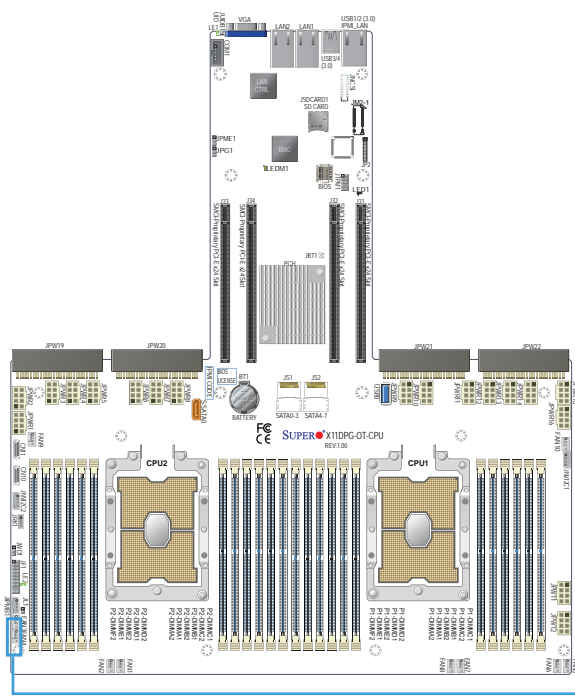
1. Power Fail LED
2. UID/OH/Fan Fail LED

		1	2	
PWR	Power Button	○	○	Ground
Reset	Reset Button	○	○	Ground
	3.3V	○	○	Power Fail LED ❶
	UID LED	○	○	OH/Fan Fail LED ❷
	3.3V Stby	○	○	NIC2 Active LED
	3.3V Stby	○	○	NIC1 Active LED
	3.3V Stby	○	○	HDD LED
	3.3V	○	○	PWR LED
	X	○	○	X
	NMI	○	○	Ground
		19	20	
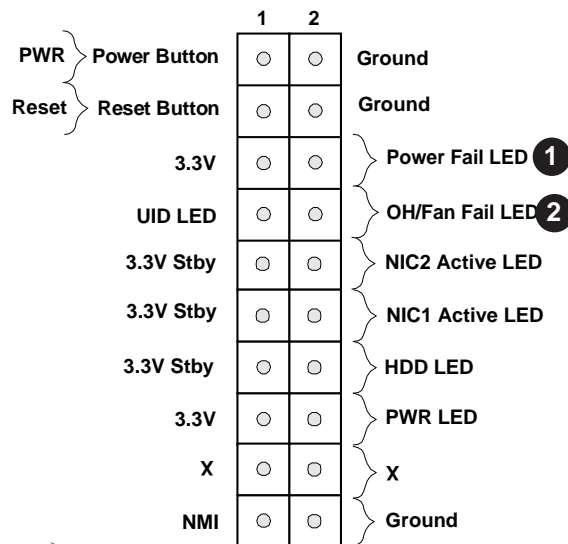
NIC1/NIC2 (LAN1/LAN2)

The NIC (Network Interface Controller) LED connection for LAN port 1 is located on pins 11 and 12 of JF1, and LAN port 2 is on pins 9 and 10. Attach the NIC LED cables here to display network activity. Refer to the table below for pin definitions.

LAN1/LAN2 LED Pin Definitions (JF1)	
Pin#	Definition
9	NIC 2 Activity LED
11	NIC 1 Activity LED

HDD LED

The HDD LED connection is located on pins 13 and 14 of JF1. Attach a cable to pin 14 to show hard drive activity status. Refer to the table below for pin definitions.

HDD LED Pin Definitions (JF1)	
Pins	Definition
13	3.3V Stdby
14	HDD Active

1. NIC2 LED

2. NIC1 LED

3. HDD LED

	1	2	
PWR > Power Button	○	○	Ground
Reset > Reset Button	○	○	Ground
3.3V	○	○	Power Fail LED
UID LED	○	○	OH/Fan Fail LED
3.3V Stdby	○	○	NIC2 Active LED ❶
3.3V Stdby	○	○	NIC1 Active LED ❷
3.3V Stdby	○	○	HDD LED ❸
3.3V	○	○	PWR LED
X	○	○	X
NMI	○	○	Ground
	19	20	
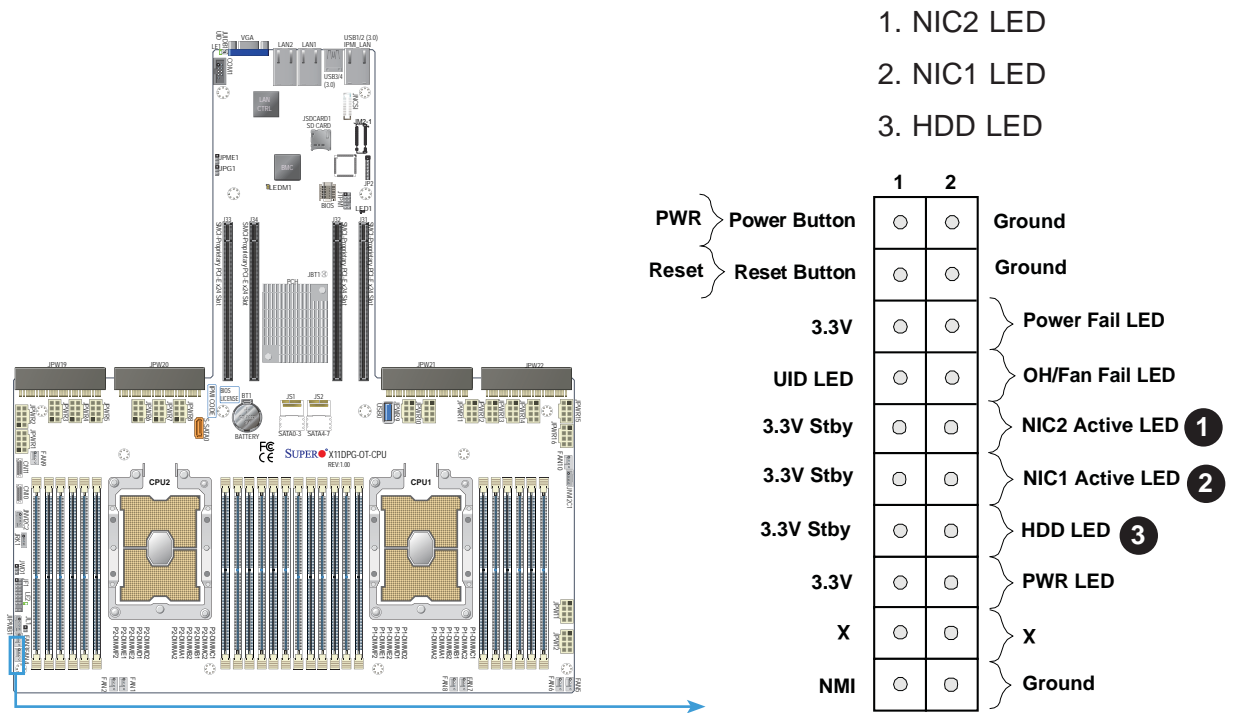
Power LED

The Power LED connection is located on pins 15 and 16 of JF1. Refer to the table below for pin definitions.

Power LED Pin Definitions (JF1)	
Pins	**Definition**
15	3.3V
16	PWR LED

NMI Button

The non-maskable interrupt (NMI) button header is located on pins 19 and 20 of JF1. Refer to the table below for pin definitions.

NMI Button Pin Definitions (JF1)	
Pins	**Definition**
19	Control
20	Ground

1. PWR LED

2. NMI

	1	2	
PWR > Power Button	○	○	Ground
Reset > Reset Button	○	○	Ground
3.3V	○	○	Power Fail LED
UID LED	○	○	OH/Fan Fail LED
3.3V Stby	○	○	NIC2 Active LED
3.3V Stby	○	○	NIC1 Active LED
3.3V Stby	○	○	HDD LED
3.3V	○	○	PWR LED **1**
X	○	○	X
2 NMI	○	○	Ground
	19	20	
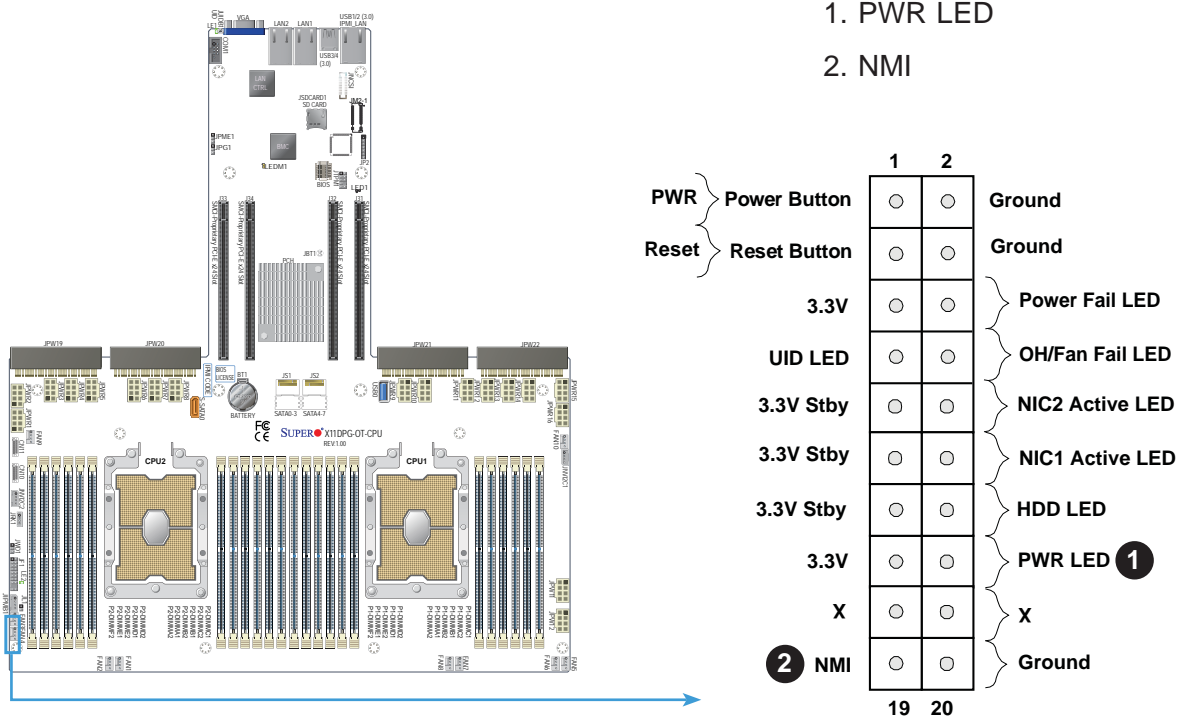
2.7 Connectors and Headers

SMCI-Proprietary Power Connectors

SMCI-Propietary Power Connectors

Four SMCI proprietary power supplies are located at JPW19/JPW20 and JPW21/JPW22 on the motherboard. This connectors are reserved for an SMCI proprietary server use only.
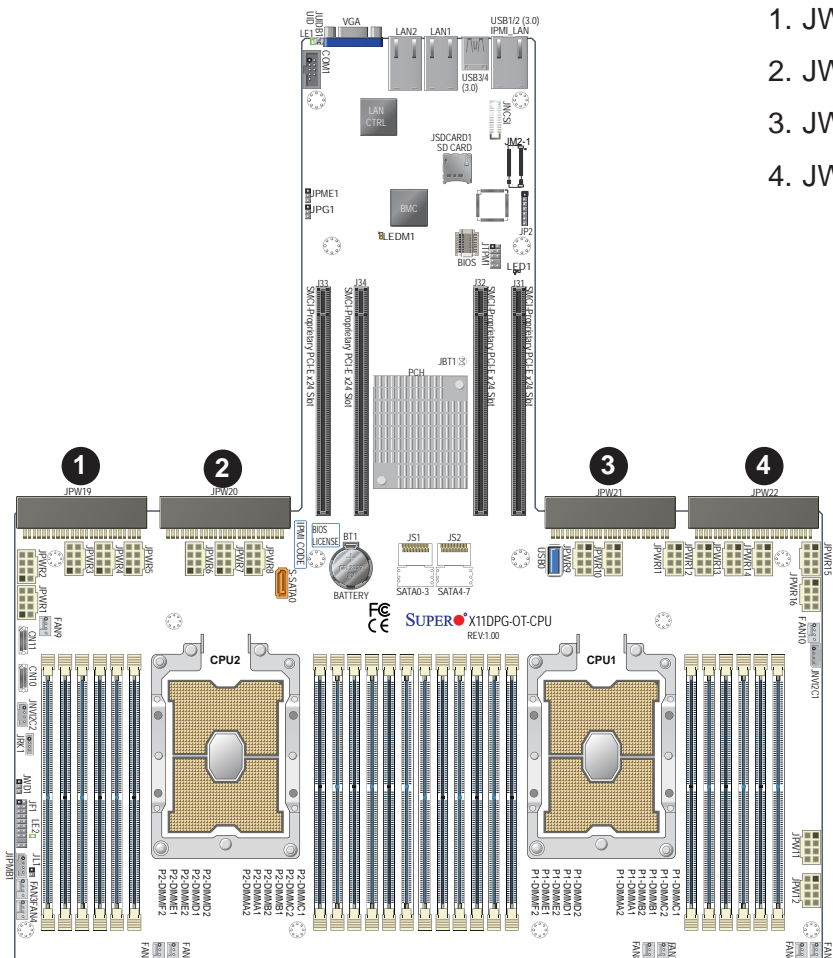
1. JWP19 (SMCI PWRConnecor 19)

2. JWP20 (SMCI PWRConnecor 20)

3. JWP21 (SMCI PWRConnecor 21)

4. JWP22 (SMCI PWRConnecor 22)

12V 8-pin System Power Connectors

Sixteen 8-pin 12V power connectors are located at (JPWR1-JPWR8, JPWR9-JPWR16) on the motherboard to provide power to system components. Refer to the table below for pin definitions.

12V 8-pin Power Pin Definitions	
Pin#	**Definition**
1 - 4	Ground
5 - 8	+12V

12V 8-pin CPU Power Connectors

Two 8-pin 12V power connectors (JPW11/JPW12) are located on the motherboard to provide power to the processors. Refer to the table below for pin definitions.

Pin#	Definition
1 - 4	Ground
5 - 8	+12V
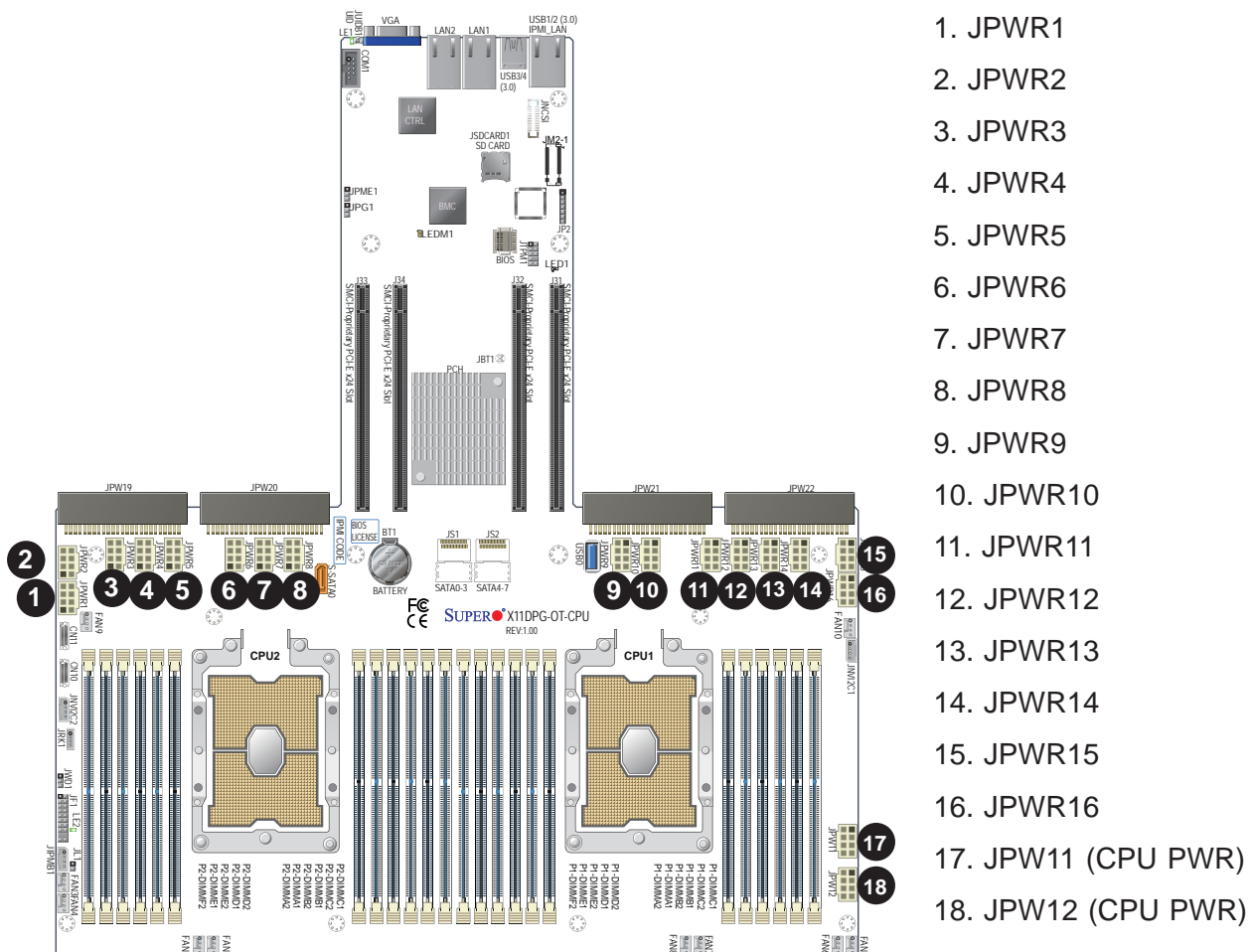
1. JPWR1
2. JPWR2
3. JPWR3
4. JPWR4
5. JPWR5
6. JPWR6
7. JPWR7
8. JPWR8
9. JPWR9
10. JPWR10
11. JPWR11
12. JPWR12
13. JPWR13
14. JPWR14
15. JPWR15
16. JPWR16
17. JPW11 (CPU PWR)
18. JPW12 (CPU PWR)

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Headers

Onboard Fan Headers

There are ten onboard fan headers (FAN1-FAN10) is located on the motherboard. FAN1-FAN8 are used for system cooling, and FAN9/FAN10 are used as Active CPU heatsink fans. All onboard fans are 4-pin fan headers, which are backward compatible with traditional 3-pin fans. However, only 4-pin fans can support fan speed control (via Hardware Monitoring in the BMC). <u>Please use all 3-pin fans or all 4-pin fans on the same motherboard</u>.

Fan Header Pin Definitions	
Pin#	Definition
1	Ground (Black)
2	+12V (Red)
3	Tachometer
4	PWM Control

1. FAN1
2. FAN2
3. FAN3
4. FAN4
5. FAN5
6. FAN6
7. FAN7
8. FAN8
9. FAN9
10. FAN10
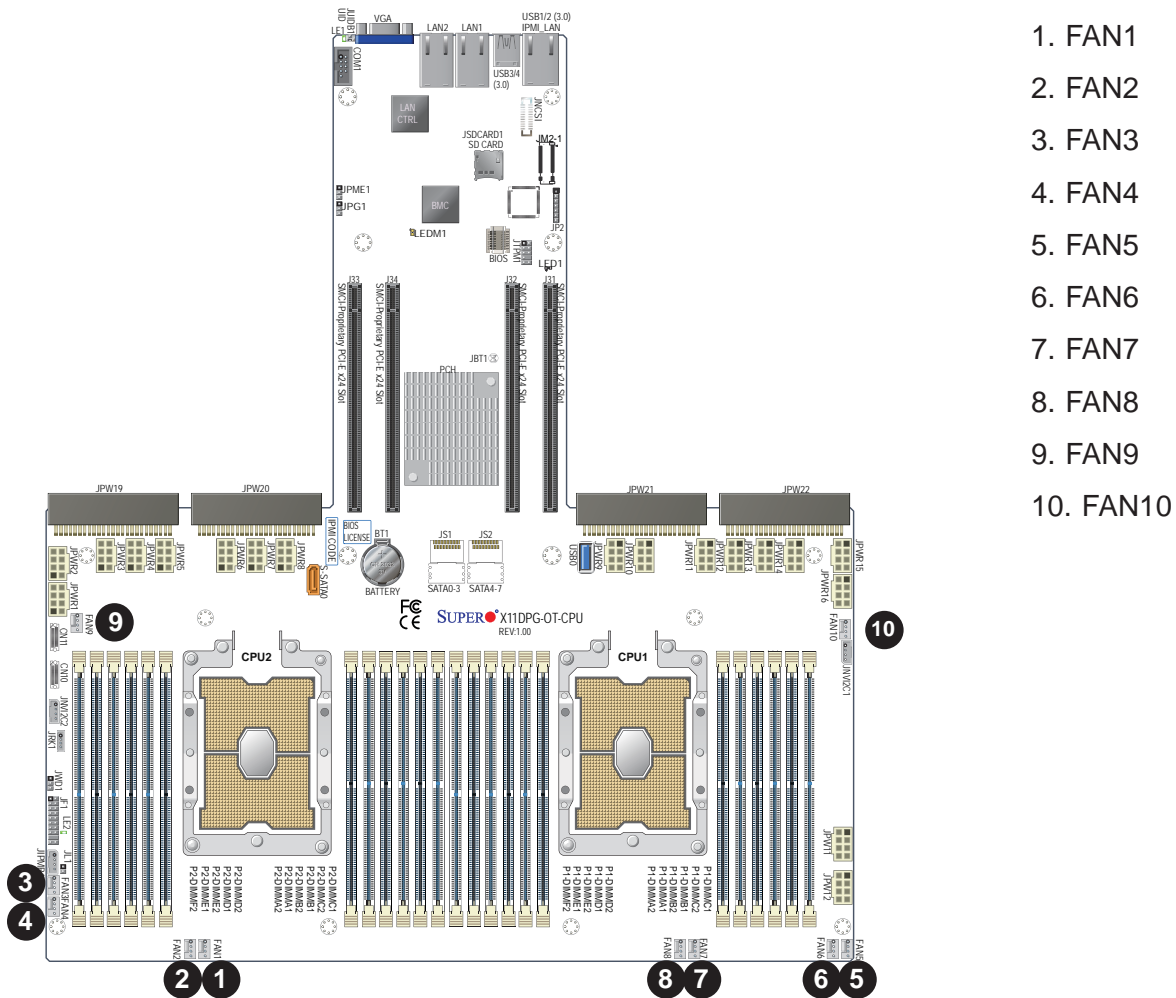
TPM Header

The JTPM1 header is used to connect Trusted Platform Module (TPM)/Port 80, which is available from Supermicro (optional). The TPM/Port 80 connector is a security device that supports encryption and authentication in hard drives. It allows the motherboard to deny access if the TPM associated with the hard drive is not installed in the system. See the table below for pin definitions.

Trusted Platform Module/Port 80 Header Pin Definitions			
Pin#	Definition	Pin#	Definition
1	P3V3	2	SPI_TPM_CS_N
3	PCI_RESET_N	4	SPI_PCH_MISO
5	SPI_PCH_CLK	6	Ground
7	SPI_PCH_MOSI	8	x
9	P3V3_STBY	10	IRQ_TPM_SPI_N

1. TPM/Port 80 Header
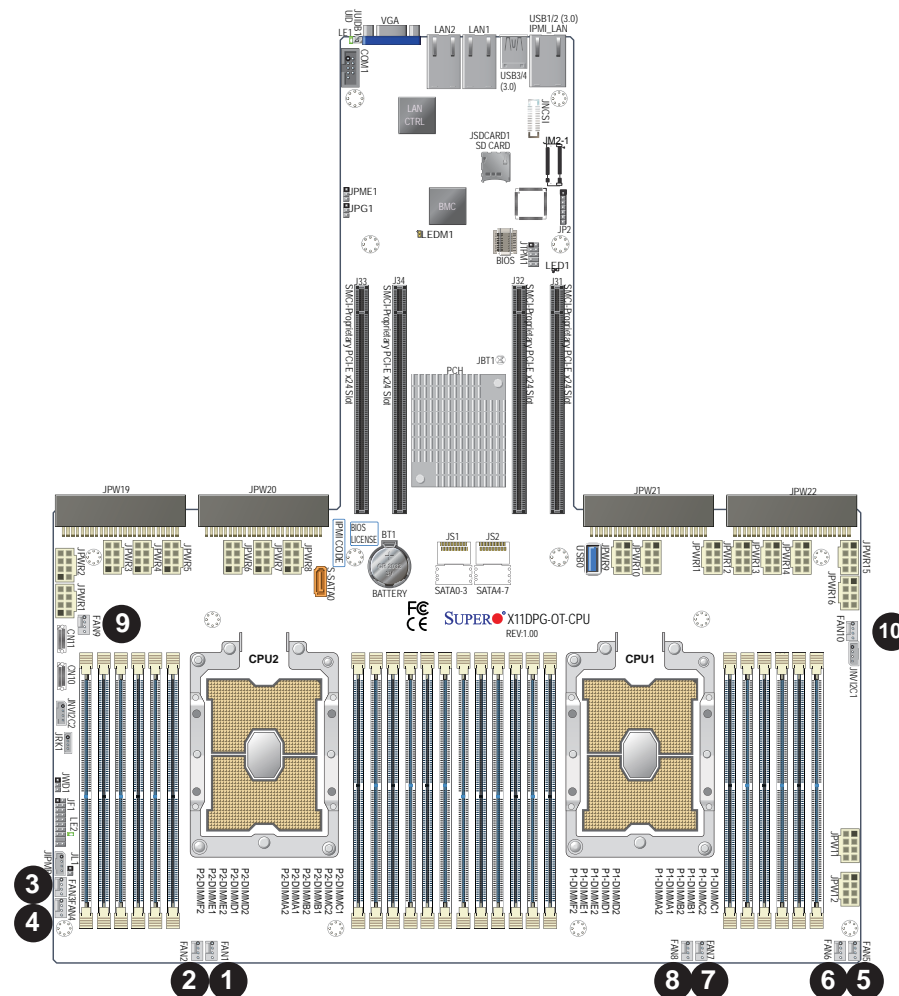
RAID Key Header

A RAID Key header is located at JRK1 on the motherboard. RAID key is used to support NVMe solid state devices (SSD). Please refer to the layout below for JRK1 location.

RAID Key Header Pin Definitions	
Pin#	Definition
1	Ground
2	P3V3_STBY
3	Ground
4	RAID_KEY

Chassis Intrusion

A Chassis Intrusion header is located at JL1 on the motherboard. Attach the appropriate cable from the chassis to inform you of a chassis intrusion when the chassis is opened. Refer to the table below for pin definitions.

Chassis Intrusion Pin Definitions	
Pin#	Definition
1	Intrusion Input
2	Ground
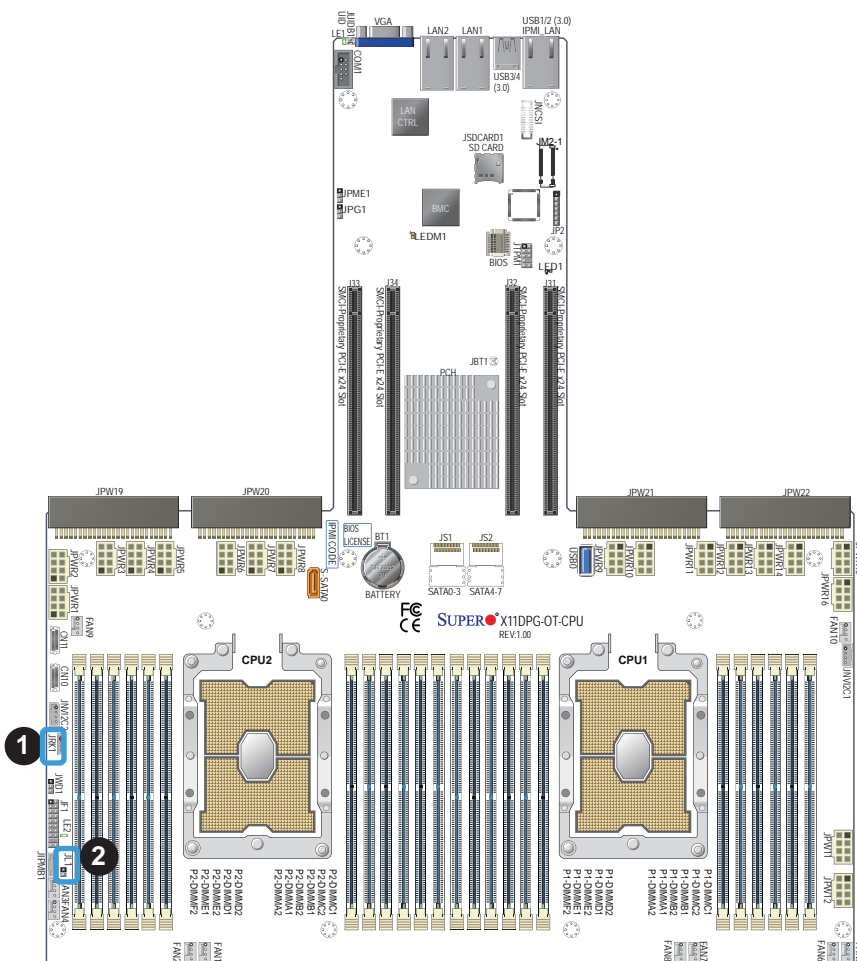
1. RAID Key
2. Chassis Intrusion

Serial Port

A serial port header is located at COM1 on the motherboard. This header provides serial communication support for your system. See the table below for pin definitions.

Serial Port Pin Definitions			
Pin#	**Definition**	**Pin#**	**Definition**
1	DCD	6	DSR
2	RXD	7	RTS
3	TXD	8	CTS
4	DTR	9	RI
5	Ground	10	N/A

1. Serial Port
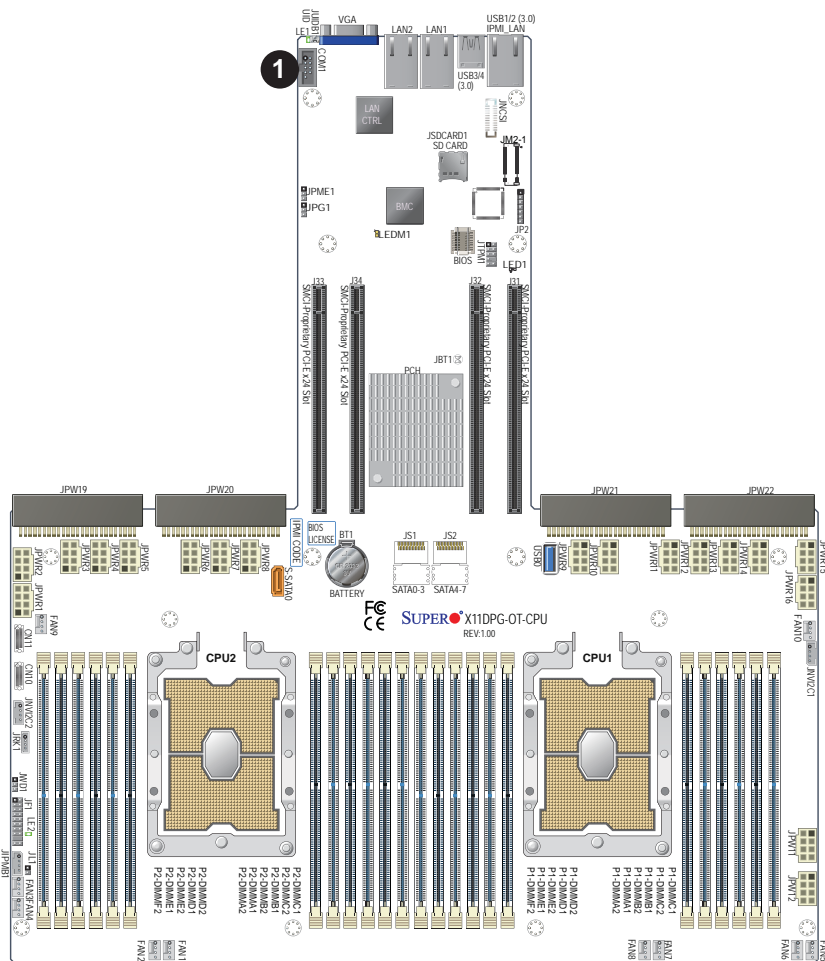
System Management Bus (SMBus) Header

A SMBus (I²C) header for IPMI 2.0 is located at JIPMB1. Connect the appropriate cable here to use the IPMB I²C connection on your system. Refer to the table below for pin definitions.

External I²C Header Pin Definitions	
Pin#	**Definition**
1	Data
2	Ground
3	Clock
4	No Connection

1. SMBus (JIPMB1)
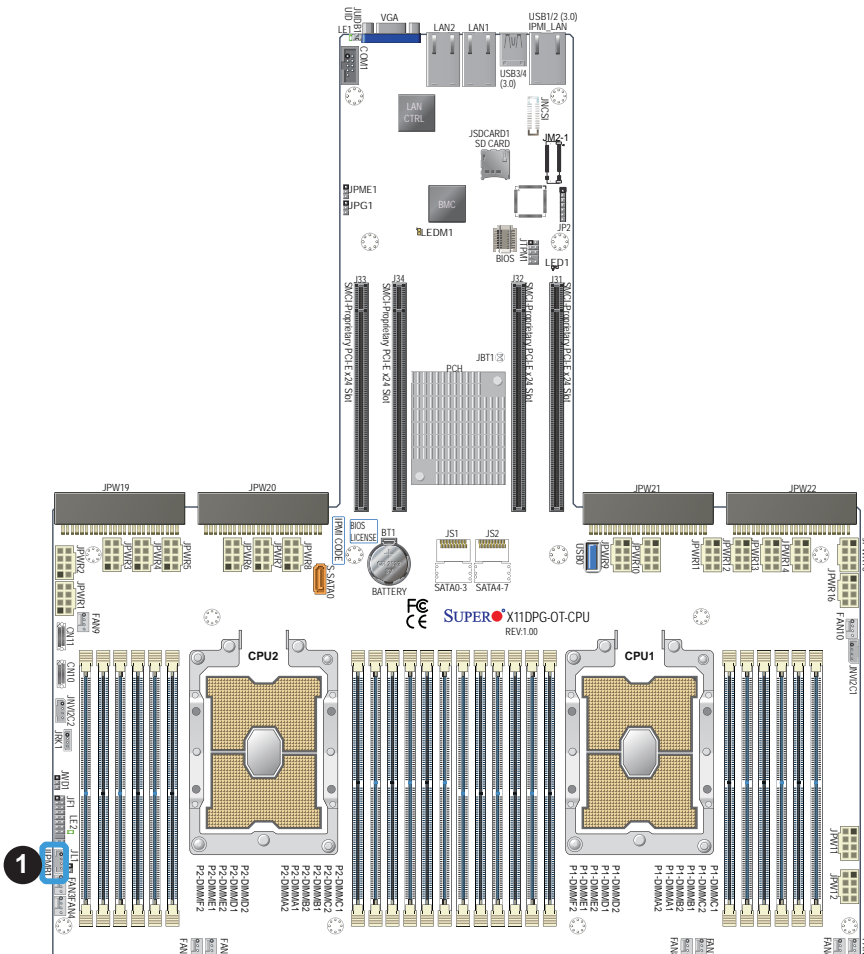
NVMe SMBus Headers

NVMe SMBus (I²C) headers (JNVI²C1/JNVI²C2), used for PCI-E SMBus clock and data connections, provide hot-plug support via dedicated SMBus interface. This feature is only available for a Supermicro complete system with an SMCI-proprietary NVMe add-on card and cable installed for each NVMe SMBus header supported. See the table below for pin definitions.

NVMe SMBus Header Pin Definitions	
Pin#	Definition
1	Data
2	Ground
3	Clock
4	VCCIO

PCI-E M.2 Slot

This motherboard has one PCI-E M.2 slot. M.2 was formerly Next Generation Form Factor (NGFF) and serves to replace mini PCI-E. M.2 allows for a variety of card sizes, increased functionality, and spatial efficiency. The M.2 socket on the motherboard supports PCI-E 3.0 X4 (32 Gb/s) SSD cards in the 2260, 2280 and 22110 form factors.
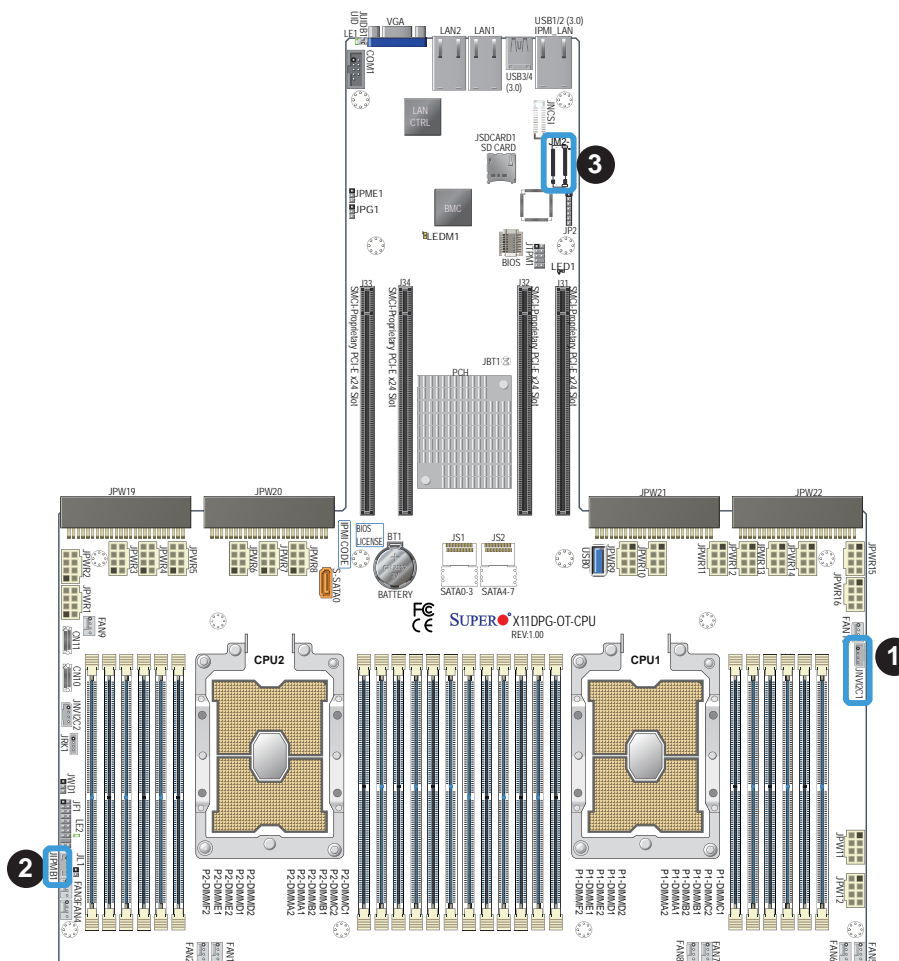
1. JNVI²C1
2. JNVI²C2
3. PCI-E M.2 Slot

S-SATA 3.0 and (I-)SATA 3.0 Connections

This motherboard has one S-SATA 3.0 port (S-SATA0) and two (I-)SATA 3.0 headers (JS1/ JS2) onboard. The two SATA 3.0 headers provide eight SATA connections (SATA 0-3, 4-7). In addition to SATA 3.0 support, S-SATA0 can also be used with Supermicro SuperDOM, which is a yellow SATA DOM connector with a power pin built in. SuperDOM does not require a power cable and is backward-compatible with regular a standard SATA HDD or a third-party SATA DOM that requires external power cables for power supply. All these SATA ports provide serial-link signal connections, which are faster than the connections of Parallel ATA.
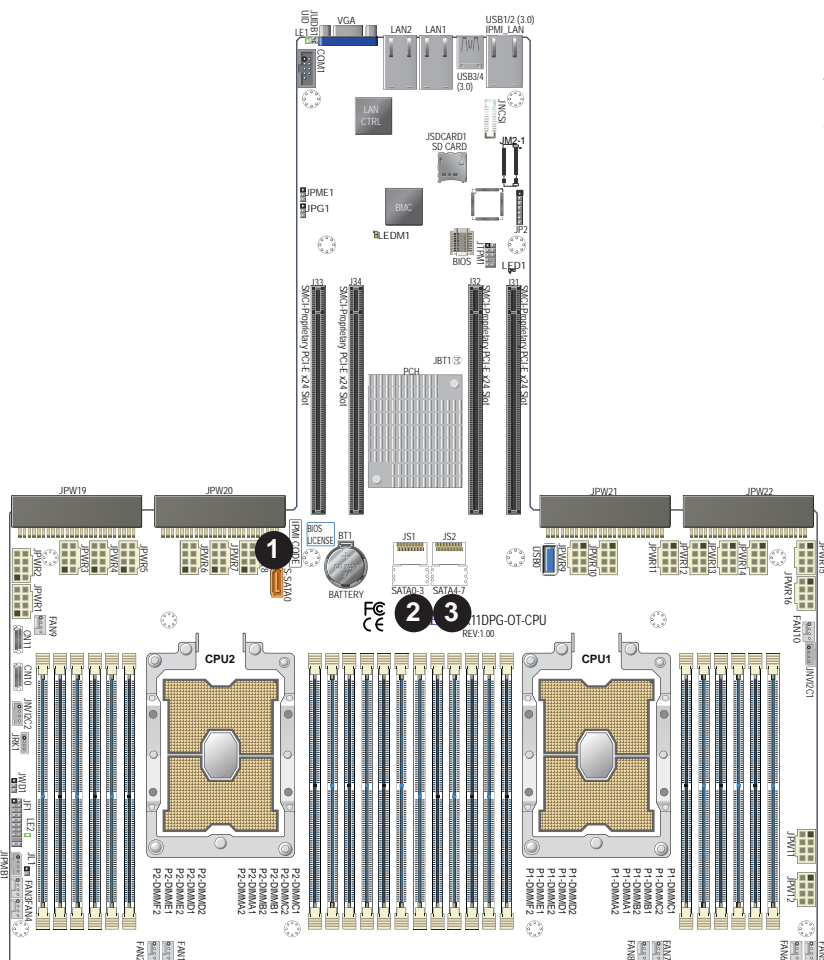
1. S-SATA0 (SuperDOM)

2. (I-)SATA0-3 (JS1)

3. (I-)SATA4-7 (JS2)

2.8 Jumper Settings

How Jumpers Work

To modify the operation of the motherboard, jumpers can be used to choose between optional settings. Jumpers create shorts between two pins to change the function of the connector. Pin 1 is identified with a square solder pad on the printed circuit board. See the diagram at right for an example of jumping pins 1 and 2. Refer to the motherboard layout page for jumper locations.

Note: On two-pin jumpers, "Closed" means the jumper is on and "Open" means the jumper is off the pins.
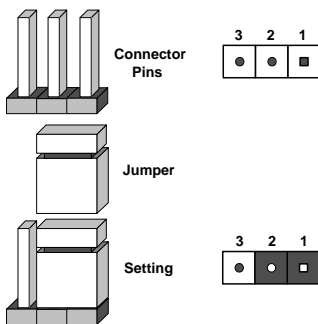
VGA Port Enable/Disable

Jumper JPG1 is used to enable or disable the VGA port on the I/O back panel. Close pin 1 and pin 2 for VGA support. The default setting is Enabled.

VGA Port Enable/Disable Jumper Settings	
Jumper Setting	**Definition**
Pins 1-2	Enabled
Pins 2-3	Disabled

1. VGA Enable/Disable
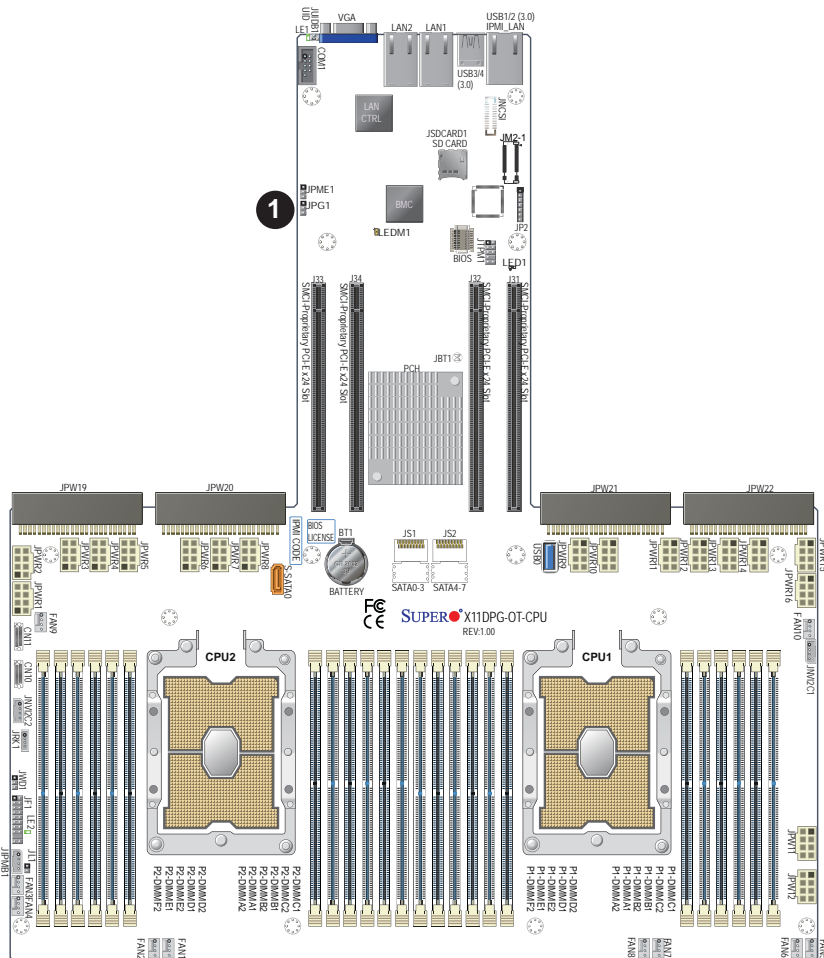
CMOS Clear

JBT1 is used to clear CMOS, which will also clear any passwords. Instead of pins, this jumper consists of contact pads to prevent accidentally clearing the contents of CMOS.

To Clear CMOS

1. First power down the system and unplug the power cord(s).

2. Remove the cover of the chassis to access the motherboard.

3. Remove the onboard battery from the motherboard.

4. Short the CMOS pads with a metal object such as a small screwdriver for at least four seconds.

5. Remove the screwdriver (or shorting device).

6. Replace the cover, reconnect the power cord(s), and power on the system.

> **Note:** Clearing CMOS will also clear all passwords.

Do not use the PW_ON connector to clear CMOS.

JBT1 contact pads

1. Clear CMOS
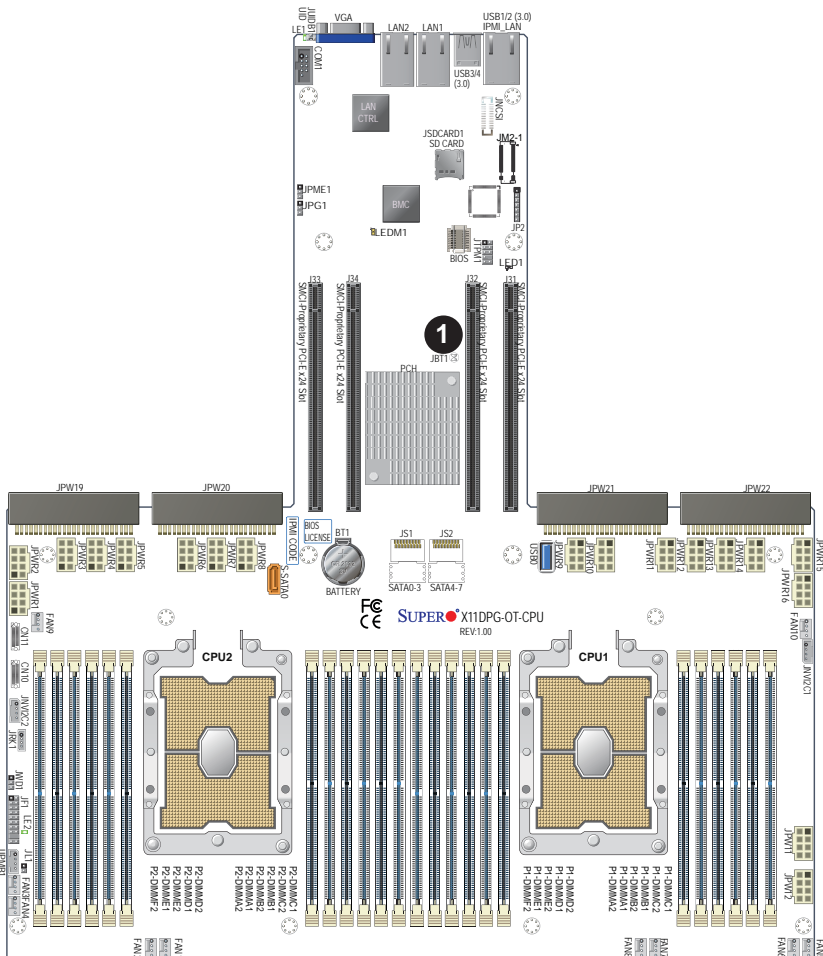
Manufacturing Mode Select

Close pins 1-2 of JPME1 to bypass SPI flash security and force the system to use the Manufacturing Mode, which will allow you to flash the system firmware from a host server to modify system settings. See the table below for jumper settings.

Manufacturing Mode Select Jumper Settings	
Jumper Setting	Definition
Pins 1-2	Normal (Default)
Pins 2-3	Manufacturing Mode

1. ME Select
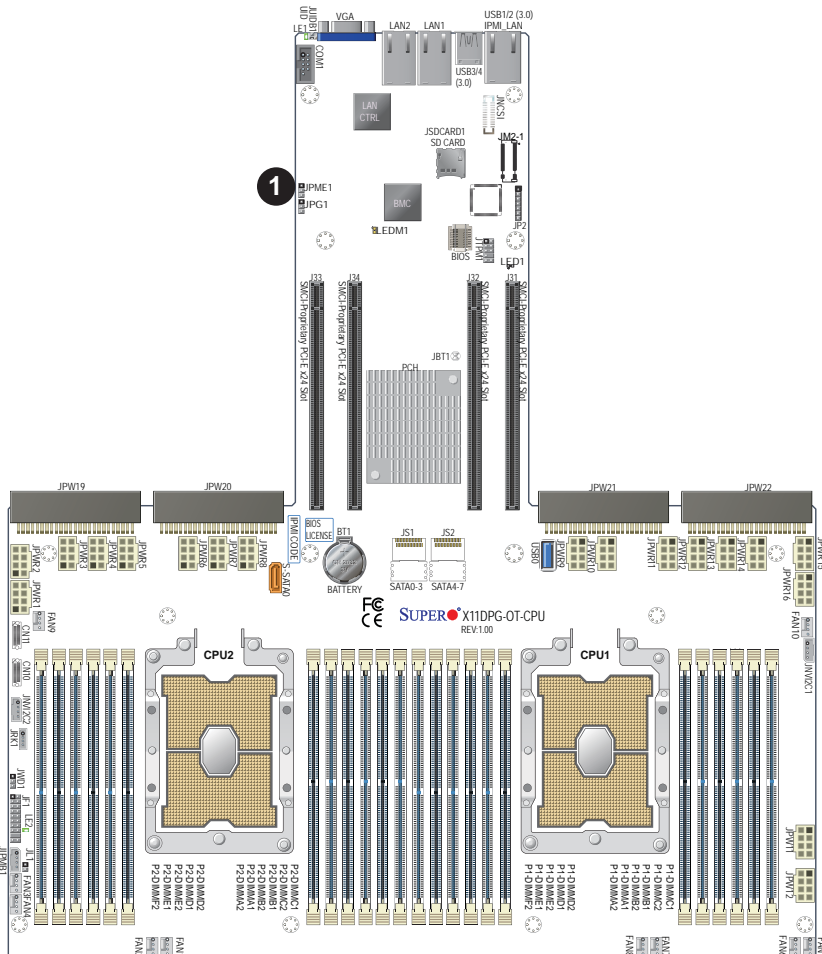
Watch Dog

JWD1 controls the Watch Dog function. Watch Dog is a monitor that can reboot the system when a software application hangs. Jumping pins 1-2 will cause Watch Dog to reset the system if an application hangs. Jumping pins 2-3 will generate a non-maskable interrupt signal for the application that hangs. Watch Dog must also be enabled in BIOS. The default setting is Reset.

Note: When Watch Dog is enabled, the user needs to write their own application software to disable it.

Jumper Setting	Definition
Pins 1-2	Reset
Pins 2-3	NMI
Open	Disabled

1. Watch Dog Enable
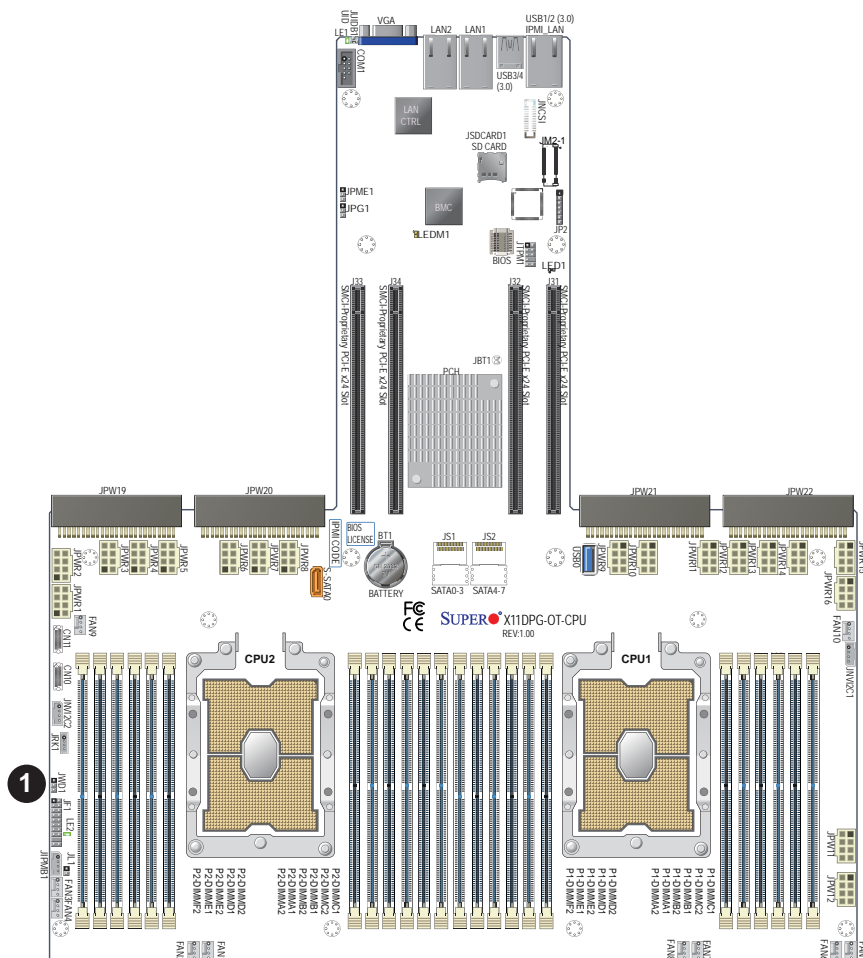
2.9 LED Indicators

LAN LEDs

The LAN ports are located on the IO backplane on the motherboard. Each Ethernet LAN port has two LEDs. The green LED indicates activity. Link LED, located on the left side of the LAN port, may be green, amber or off indicating the speed of the connection. See the tables at right for more information.

LAN 1/2

Link LED ▭ ▭ ▭ ▭ Activity LED

GLAN Activity Indicator (Right) LED Settings		
Color	State	Definition
Green	Flashing	Active

LAN Link Indicator (Left) LED Settings	
LED Color	Definition
Off	No Connection, 10 or 100 Mbps
Green	10 Gbps
Amber	1 Gbps

IPMI-Dedicated LAN LEDs

In addition to LAN 1/LAN 2, an IPMI LAN is located on the I/O backplane of the motherboard. The yellow LED indicates activity. Link LED, located on the left side of the LAN port indicates the speed of the connection. See the table below for more information.

IPMI LAN

Link LED ▭ ▭ Activity LED

IPMI LAN Link LED (Left) & Activity LED (Right)		
Color	State	Definition
Link (Left)	Green: Solid	100 Mbps
	Amber: Solid	1 Gbps
Activity (Right)	Yellow: Blinking	Active
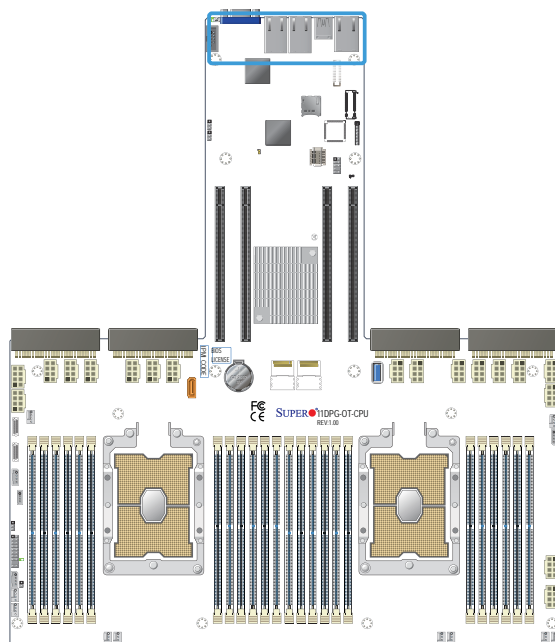
1. LAN LEDs

2. IPMI LAN LEDs
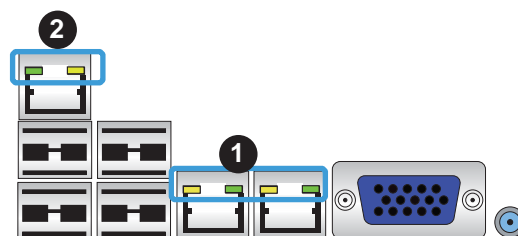
BMC Heartbeat LED

The BMC heartbeat LED is located at LED1. When this LED is blinking green, BMC functions normally. See the table below for the LED status.

BMC Heartbeat LED Indicator	
LED Color	**Definition**
Green: Blinking	BMC Normal

Onboard Power LED

The Onboard Power LED is located at LE2 on the motherboard. When this LED is on, the system is on. Be sure to turn off the system and unplug the power cord before removing or installing components. Refer to the table below for more information.

Onboard Power LED Indicator	
LED Color	**Definition**
Off	System Off (power cable not connected)
Green	System On
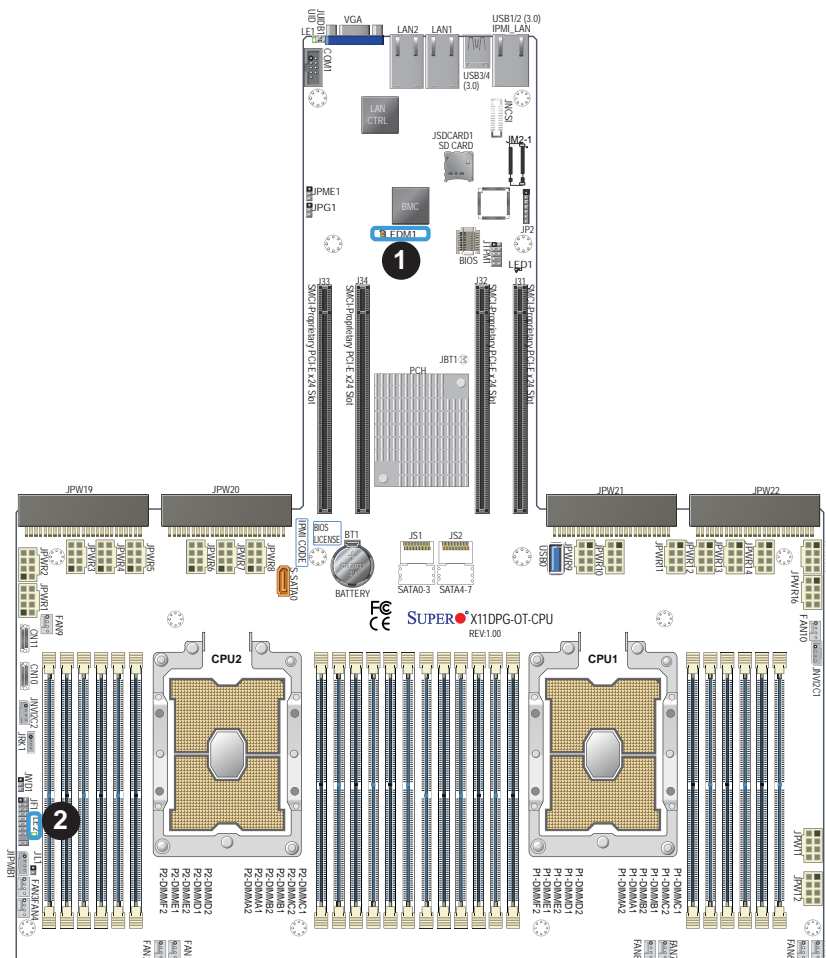
1. BMC Heartbeat LED
2. Onboard Power LED

M.2 Power LED

The Power LED indicator for the PCI-E M.2 slot is located at LED1 on the motherboard. When this LED is on, the M.2 power is on. Refer to the table below for more information.

M.2 Power LED Indicator (LED1)	
LED Color	**Definition**
Off	M.2 Power Off
On	M.2 Power On

1. M.2 Power LED
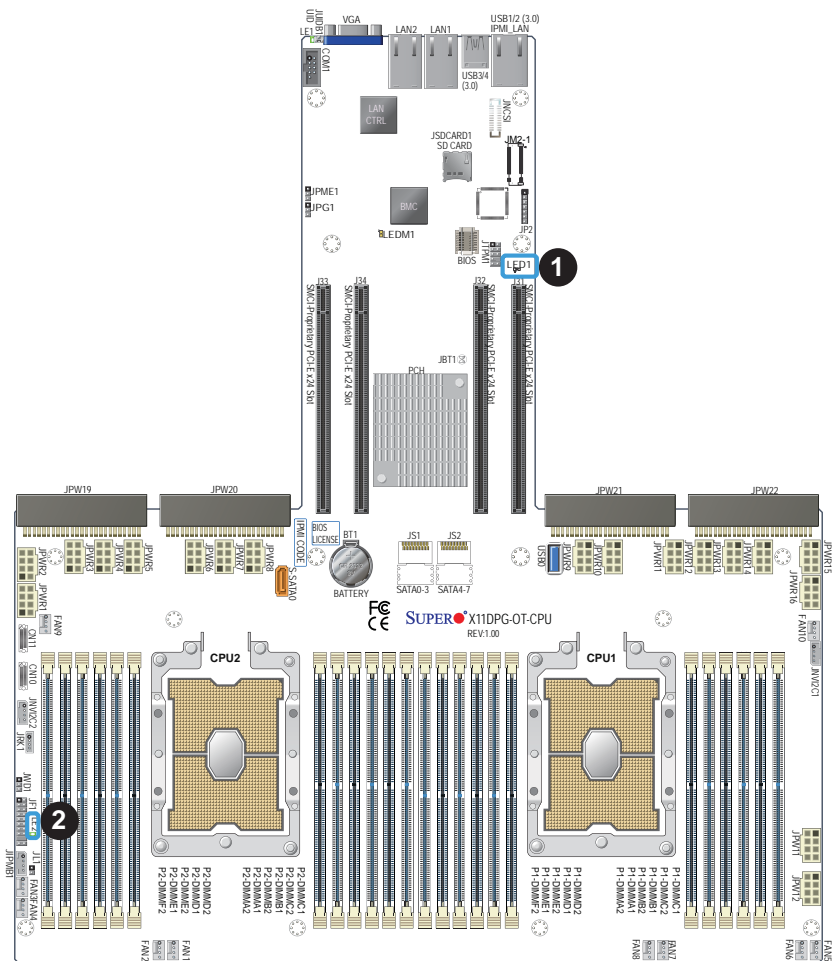
Chapter 3

Troubleshooting

3.1 Troubleshooting Procedures

Use the following procedures to troubleshoot your system. If you have followed all of the procedures below and still need assistance, refer to the 'Technical Support Procedures' and/ or 'Returning Merchandise for Service' section(s) in this chapter. Always disconnect the AC power cord before adding, changing or installing any non hot-swap hardware components.

Before Power On

1. Check that the power LED on the motherboard is on.

2. Make sure that the power connector is connected to your power supply.

3. Make sure that no short circuits exist between the motherboard and chassis.

4. Disconnect all cables from the motherboard, including those for the keyboard and mouse.

5. Remove all add-on cards.

6. Install a CPU, a heatsink*, and connect the internal speaker (if available) and the power LED to the motherboard. Check all jumper settings as well. (*Make sure that the heatsink is fully seated.)

7. Use the correct type of onboard CMOS battery as recommended by the manufacturer. To avoid possible explosion, do not install the CMOS battery upside down.

No Power

1. Make sure that no short circuits exist between the motherboard and the chassis.

2. Verify that all jumpers are set to their default positions.

3. Check that the 115V/230V switch on the power supply is properly set.

4. Turn the power switch on and off to test the system.

5. The battery on your motherboard may be old. Check to verify that it still supplies ~3VDC. If it does not, replace it with a new one.

System Boot Failure (Available when an Internal Speaker is Installed)

If the system does not display POST (Power-On-Self-Test) or does not respond after the power is turned on, check the following:

1. Check for any error beep from the motherboard speaker.

- If there is no error beep, try to turn on the system without DIMM modules installed. If there is still no error beep, replace the motherboard.
- If there are error beeps, clear the CMOS settings by unplugging the power cord and contacting both pads on the CMOS Clear Jumper (JBT1). Refer to chapter 2.

2. Remove all components from the motherboard, especially the DIMM modules. Make sure that system power is on and that memory error beeps are activated.

3. Turn on the system with only one DIMM module installed. If the system boots, check for bad DIMM modules or slots by following the Memory Errors Troubleshooting procedure in this Chapter.

Memory Errors

1. Make sure that the DIMM modules are properly and fully installed.

2. Confirm that you are using the correct memory. Also, it is recommended that you use the same memory type and speed for all DIMMs in the system. See Section 2.4 for memory details.

3. Check for bad DIMM modules or slots by swapping modules between slots and noting the results.

4. Check the power supply voltage 115V/230V switch.

Losing the System's Setup Configuration

1. Make sure that you are using a high quality power supply. A poor quality power supply may cause the system to lose the CMOS setup information. Refer to Section 1.6 for more information on power supply.

2. The battery on your motherboard may be old. Check to verify that it still supplies ~3VDC. If it does not, replace it with a new one.

3. If the above steps do not fix the setup configuration problem, contact your vendor for repairs.

When the System Becomes Unstable

A. If the system becomes unstable during or after OS installation, check the following:

1. CPU/BIOS support: Make sure that your CPU is supported and that you have the latest BIOS installed in your system.

2. Memory support: Make sure that the memory modules are supported by testing the modules using memtest86 or a similar utility.

   Note: Refer to the product page on our website at http:\\www.supermicro.com for memory and CPU support and updates.

3. HDD support: Make sure that all hard disk drives (HDDs) work properly. Replace the bad HDDs with good ones.

4. System cooling: Check the system cooling to make sure that all heatsink fans and CPU/system fans, etc., work properly. Check the hardware monitoring settings in the IPMI to make sure that the CPU and system temperatures are within the normal range. Also check the front panel Overheat LED and make sure that it is not on.

5. Adequate power supply: Make sure that the power supply provides adequate power to the system. Make sure that all power connectors are connected. Please refer to our website for more information on the minimum power requirements.

6. Proper software support: Make sure that the correct drivers are used.

B. If the system becomes unstable before or during OS installation, check the following:

1. Source of installation: Make sure that the devices used for installation are working properly, including boot devices such as CD.

2. Cable connection: Check to make sure that all cables are connected and working properly.

3. Using the minimum configuration for troubleshooting: Remove all unnecessary components (starting with add-on cards first), and use the minimum configuration (but with a CPU and a memory module installed) to identify the trouble areas. Refer to the steps listed in Section A above for proper troubleshooting procedures.

4. Identifying bad components by isolating them: If necessary, remove a component in question from the chassis, and test it in isolation to make sure that it works properly. Replace a bad component with a good one.

5. Check and change one component at a time instead of changing several items at the same time. This will help isolate and identify the problem.

6. To find out if a component is good, swap this component with a new one to see if the system will work properly. If so, then the old component is bad. You can also install the component in question in another system. If the new system works, the component is good and the old system has problems.

3.2 Technical Support Procedures

Before contacting Technical Support, please take the following steps. Also, note that as a motherboard manufacturer, we do not sell directly to end users, so it is best to first check with your distributor or reseller for troubleshooting services. They should know of any possible problem(s) with the specific system configuration that was sold to you.

1. Please review the 'Troubleshooting Procedures' and 'Frequently Asked Questions' (FAQs) sections in this chapter or see the FAQs on our website before contacting Technical Support.

2. BIOS upgrades can be downloaded from our website. **Note:** Not all BIOS can be flashed. Availability of BIOS upgrading is dependent on the boot block modification codes.

3. If you still cannot resolve the problem, include the following information when contacting us for technical support:

- Motherboard model and PCB revision number

- BIOS release date/version (this can be seen on the initial display when your system first boots up)

- System configuration

An example of a Technical Support form is posted on our website.

Distributors: For immediate assistance, please have your account number ready when contacting our technical support department by e-mail.

3.3 Frequently Asked Questions

Question: What type of memory does my motherboard support?

Answer: The X11DPG-OT-CPU motherboard supports up to 3TB of 3DS LRDIMM/ LRDIMM/3DS RDIMM/RDIMM DDR4 ECC 2666/2400/2133 MHz memory modules in 24 slots. See Section 2.4 for details on installing memory.

Question: How do I update my BIOS?

Answer: It is recommended that you **do not** upgrade your BIOS if you are not experiencing any problems with your system. Updated BIOS files are located on our website at http://www.supermicro.com. Please check our BIOS warning message and the information on how to

update your BIOS on our website. Select your motherboard model and download the BIOS file to your computer. Also, check the current BIOS revision to make sure that it is newer than your BIOS before downloading. You can choose from the zip file and the .exe file. If you choose the zip BIOS file, please unzip the BIOS file onto a bootable USB device. Run the batch file using the format FLASH.BAT filename.rom from your bootable USB device to flash the BIOS. Then, your system will automatically reboot.

Question: Why can't I turn off the power using the momentary power on/off switch?

Answer: The instant power off function is controlled in BIOS by the Power Button Mode setting. When the On/Off feature is enabled, the motherboard will have instant off capability as long as the BIOS has control of the system. When the Standby or Suspend feature is enabled or when the BIOS is not in control such as during memory count (the first screen that appears when the system is turned on), the momentary on/off switch must be held for more than four seconds to shut down the system. This feature is required to implement the ACPI features on the motherboard.

3.4 Battery Removal and Installation

Battery Removal

To remove the onboard battery, follow the steps below:

1. Power off your system and unplug your power cable.

2. Locate the onboard battery as shown below.

3. Using a tool such as a pen or a small screwdriver, push the battery lock outwards to unlock it. Once unlocked, the battery will pop out from the holder.

4. Remove the battery.

Proper Battery Disposal

Please handle used batteries carefully. Do not damage the battery in any way; a damaged battery may release hazardous materials into the environment. Do not discard a used battery in the garbage or a public landfill. Please comply with the regulations set up by your local hazardous waste management agency to dispose of your used battery properly.

Battery Installation

1. To install an onboard battery, follow the steps 1 & 2 above and continue below:

2. Identify the battery's polarity. The positive (+) side should be facing up.

3. Insert the battery into the battery holder and push it down until you hear a click to ensure that the battery is securely locked.

Note: When replacing a battery, be sure to only replace it with the same type.

LITHIUM BATTERY

BATTERY HOLDER

OR

LITHIUM BATTERY

BATTERY HOLDER
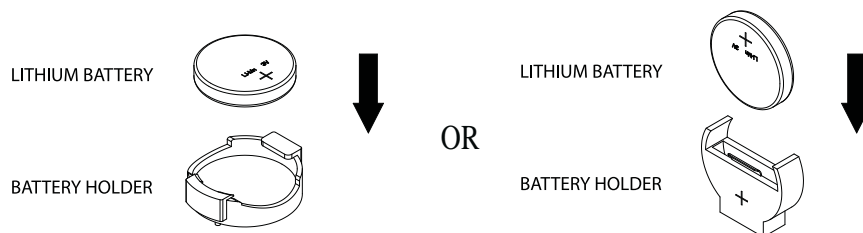
3.5 Returning Merchandise for Service

A receipt or copy of your invoice marked with the date of purchase is required before any warranty service will be rendered. You can obtain service by calling your vendor for a Returned Merchandise Authorization (RMA) number. When returning to the manufacturer, the RMA number should be prominently displayed on the outside of the shipping carton and mailed prepaid or hand-carried. Shipping and handling charges will be applied for all orders that must be mailed when service is complete.

For faster service, RMA authorizations may be requested online (http://www.supermicro.com/support/rma/).

This warranty only covers normal consumer use and does not cover damages incurred in shipping or from failure due to the alteration, misuse, abuse or improper maintenance of products.

During the warranty period, contact your distributor first for any product problems.

Chapter 4

BIOS

4.1 Introduction

This chapter describes the AMIBIOS™ setup utility for the X11DPG-OT-CPU motherboard. The BIOS is stored on a chip and can be easily upgraded using a flash program.

Note: Due to periodic changes to the BIOS, some settings may have been added or deleted and might not yet be recorded in this manual. Please refer to the Manual Download area of our website for any changes to BIOS that may not be reflected in this manual.

Starting the Setup Utility

To enter the BIOS setup utility, press the <Delete> key while the system is booting up. (In most cases, the <Delete> key is used to invoke the BIOS setup screen. There are a few cases when other keys are used, such as <F1>, <F2>, etc.) Each main BIOS menu option is described in this manual.

The Main BIOS screen has two main frames. The left frame displays all the options that can be configured. "Grayed-out" options cannot be configured. The right frame displays the key legend. Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it. (Note that BIOS has default text messages built in. We retain the option to include, omit, or change any of these text messages.) Settings printed in **Bold** are the default values.

A "▶" indicates a submenu. Highlighting such an item and pressing the <Enter> key will open the list of settings within that submenu.

The BIOS setup utility uses a key-based navigation system called hot keys. Most of these hot keys (<F1>, <F10>, <Enter>, <ESC>, <Arrow> keys, etc.) can be used at any time during the setup navigation process.

4.2 Main Setup

When you first enter the AMI BIOS setup utility, you will enter the Main setup screen. You can always return to the Main setup screen by selecting the Main tab on the top of the screen. The Main BIOS setup screen is shown below.

```
              Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
        Main  Advanced  Event Logs  IPMI  Security  Boot  Save & Exit

                                                          Set the Date. Use Tab to
                                                          switch between Date elements.
        System Date                    [Wed 12/27/2017]
        System Time                    [20:41:45]

        Supermicro X11DPG-OT
        BIOS Version                   2.0a
        Build Date                     12/21/2017 09:47:56
        CPLD Version                   02.b2.03

        Memory Information
        Total Memory                   786432 MB
        Memory Speed                   2666 MT/s
                                                          →←: Select Screen
                                                          ↑↓: Select Item
                                                          Enter: Select
                                                          +/-: Change Opt.
                                                          F1: General Help
                                                          F2: Previous Values
                                                          F3: Optimized Defaults
                                                          F4: Save & Exit
                                                          ESC: Exit


              Version 2.19.1268. Copyright (C) 2017 American Megatrends, Inc.
```

System Date/System Time

Use this feature to change the system date and time. Highlight *System Date* or *System Time* using the arrow keys on the keyboard. Press the <Tab> key or the arrow keys to move between fields. The date must be entered in Day MM/DD/YYYY format. The time is entered in HH:MM:SS format.

> **Note:** The time is in the 24-hour format. For example, 5:30 P.M. appears as 17:30:00. The date's default value is 01/01/2014 after RTC reset.

Supermicro X11DPG-OT

BIOS Version

This item displays the version of the BIOS ROM used in the system.

Build Date

This item displays the date when the version of the BIOS ROM used in the system was built.

CPLD Version

This item displays the version of the CPLD (Complex-Programmable Logical Device) used in the system.

Memory Information

Total Memory

This item displays the total size of memory available in the system.

Memory Speed

This item displays the default speed of the memory modules installed in the system.

4.3 Advanced Setup Configurations

Use the arrow keys to select the Advanced submenu and press <Enter> to access the submenu items.
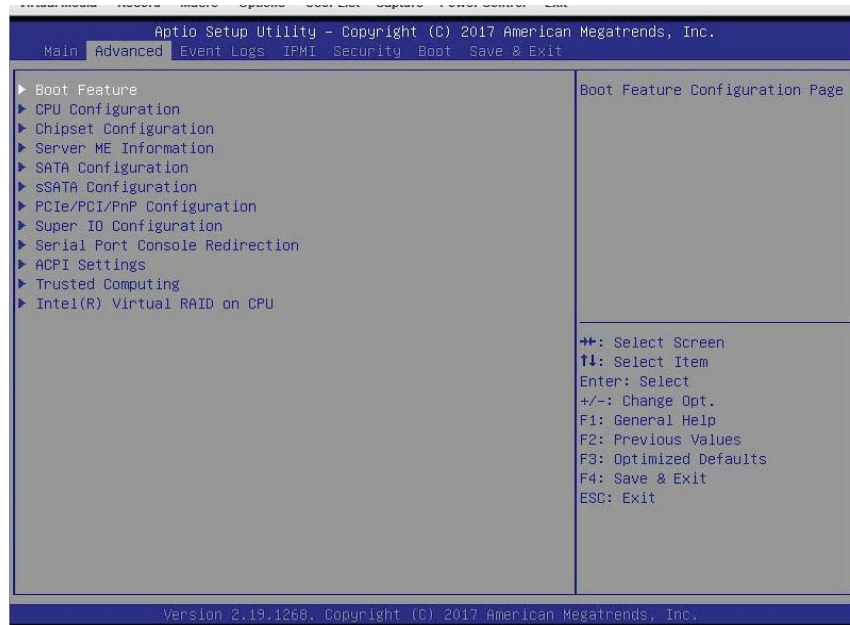
Warning: Take Caution when changing the Advanced settings. An incorrect value, an incorrect DRAM frequency, or an incorrect BIOS timing setting may cause the system to malfunction. When this occurs, restore the setting to the manufacture default setting.

▶Boot Configuration

Quiet Boot

Use this feature to select the screen between displaying POST messages or the OEM logo at bootup. Select Disabled to display the POST messages. Select Enabled to display the OEM logo instead of the normal POST messages. The options are **Enabled** and Disabled.

🖉 **Note:** POST message is always displayed regardless of the item setting.

Option ROM Messages

Use this feature to set the display mode for the Option ROM. Select Keep Current to use the current AddOn ROM display setting. Select Force BIOS to use the Option ROM display mode set by the system BIOS. The options are **Force BIOS** and Keep Current.

Bootup NumLock State

Use this feature to set the Power-on state for the Numlock key. The options are Off and **On**.

Wait For 'F1' If Error

Select Enabled to force the system to wait until the 'F1' key is pressed if an error occurs. The options are Disabled and **Enabled**.

INT19 Trap Response

Interrupt 19 is the software interrupt that handles the boot disk function. When this item is set to Immediate, the ROM BIOS of the host adaptors will "capture" Interrupt 19 at bootup immediately and allow the drives that are attached to these host adaptors to function as bootable disks. If this item is set to Postponed, the ROM BIOS of the host adaptors will not capture Interrupt 19 immediately and allow the drives attached to these adaptors to function as bootable devices at bootup. The options are **Immediate** and Postponed.

Re-try Boot

When EFI (Expansible Firmware Interface) Boot is selected, the system BIOS will automatically reboot the system from an EFI boot device after an initial boot failure. Select Legacy Boot to allow the BIOS to automatically reboot the system from a Legacy boot device after an initial boot failure. The options are **Disabled**, Legacy Boot, and EFI Boot.

Power Configuration

Watch Dog Function

Select Enabled to allow the Watch Dog timer to reboot the system when it is inactive for more than 5 minutes. The options are Enabled and **Disabled.**

Power Button Function

This feature controls how the system shuts down when the power button is pressed. Select 4 Seconds Override for the user to power off the system after pressing and holding the power button for 4 seconds or longer. Select Instant Off to instantly power off the system as soon as the user presses the power button. The options are 4 Seconds Override and **Instant Off**.

Restore on AC Power Loss

Use this feature to set the power state after a power outage. Select Power-Off for the system power to remain off after a power loss. Select Power-On for the system power to be turned on after a power loss. Select Last State to allow the system to resume its last power state before a power loss. The options are Stay-Off, Power-On, and **Last State**.

▶CPU Configuration

Warning: Setting the wrong values in the following sections may cause the system to malfunction.

▶Processor Configuration

The following CPU information will be displayed:

- Processor BSP Revision
- Processor Socket
- Processor ID
- Processor Frequency
- Processor Max Ratio
- Processor Min Ratio
- Microcode Revision
- L1 Cache RAM
- L2 Cache RAM
- L3 Cache RAM
- Processor 0 Version/Processor 1 Version

Hyper-Threading (ALL)

Select Enable to use Intel Hyper-Threading Technology to enhance CPU performance. The options are **Enable** and Disable.

Core Disable Bitmap (Hex)

Use this feature to enable or disable CPU cores in the processor specified by the user. Enter 0 to enable all cores available in the processor. Enter bit0 to disable CPU Core 0. Enter bit1 to disable CPU Core 1. Please note that the maximum of 24 CPU cores are currently available in each CPU package. The default setting is **0**.

Execute Disable Bit (Available if supported by the OS & the CPU)

Select Enable to keep mixed power-on frequency of each CPU socket. The options are **Enable** and Disable.

Intel Virtualization Technology

Select Enable to use Intel Virtualization Technology which will allow the I/O device assignments to be directly reported to the VMM (Virtual Memory Management) through the DMAR ACPI tables. This feature offers fully-protected I/O resource-sharing across the Intel platforms, providing the user with greater reliability, security and availability in networking and data-sharing. The settings are **Enable** and Disable.

PPIN Control

Select Unlock/Enable to use the Protected-Processor Inventory Number (PPIN) in the system. The options are **Unlock/Enable** and Unlock/Disable.

Hardware Prefetcher (Available when supported by the CPU)

If this feature is set to Enable, the hardware prefetcher will prefetch streams of data and instructions from the main memory to the Level 2 (L2) cache to improve CPU performance. The options are Disable and **Enable**.

Adjacent Cache Prefetch (Available when supported by the CPU)

Select Enable for the CPU to prefetch both cache lines for 128 bytes as comprised. Select Disable for the CPU to prefetch both cache lines for 64 bytes. The options are Disable and **Enable**.

> **Note**: Please power off and reboot the system for the changes you've made to take effect. Please refer to Intel's website for detailed information.

DCU (Data Cache Unit) Streamer Prefetcher (Available when supported by the CPU)

If this feature is set to Enable, the DCU (Data Cache Unit) streamer prefetcher will prefetch data streams from the cache memory to the DCU (Data Cache Unit) to speed up data accessing and processing for CPU performance enhancement. The options are Disable and **Enable**.

DCU (Data Cache Unit) IP Prefetcher

If this feature is set to Enable, the IP prefetcher in the DCU (Data Cache Unit) will prefetch IP addresses to improve network connectivity and system performance. The options are **Enable** and Disable.

LLC Prefetch

If this feature is set to Enable, LLC (hardware cache) prefetching on all threads will be supported. The options are **Disable** and Enable.

Extended APIC (Extended Advanced Programmable Interrupt Controller)

Based on the Intel Hyper-Threading technology, each logical processor (thread) is assigned 256 APIC IDs (APIDs) in 8-bit bandwidth. When this feature is set to Enable, the APIC ID will be expanded from 8 bits to 16 bits to provide 512 APIDs to each thread to enhance CPU performance. The options are **Disable** and Enable.

AES-NI

Select Enable to use the Intel Advanced Encryption Standard (AES) New Instructions (NI) to ensure data security. The options are **Enable** and Disable.

▶Advanced Power Management Configuration

Power Technology

Select Energy Efficient to support power-saving mode. Select Custom to customize system power settings. Select Disabled to disable power-saving settings. The options are Disable, **Energy Efficient**, and Custom.

Power Performance Tuning (Available when "Power Technology" is set to Custom)

Select BIOS to allow the system BIOS to configure the Power-Performance Tuning Bias setting below. The options are BIOS Controls EPB and **OS Controls EPB**.

Energy Performance BIAS Setting (Available when "Power Performance Tuning" is set to BIOS Controls EPB)

Use this feature to set the processor power use policy to achieve the desired operation settings for your machine by prioritizing system performance or energy savings. Select Maximum Performance to maximize system performance (to its highest potential); however, this may result in maximum power consumption as energy is needed to fuel the processor frequency. The higher the performance is, the higher the power consumption will be. Select Max Power Efficient to maximize power saving; however, system performance may be substantially impacted because limited power use decreases the processor frequency. The options are Maximum Performance, Performance, **Balanced Performance**, Balanced Power, Power, and Max Power Efficient. This feature is internally used by the processor to control power settings vs performance features including Energy Efficient P-State/Demotion/ Undemotion etc. The options are Maximum Performance, Performance, **Balanced Performance**, Balanced Power, Power, and Max Power Efficient.

▶CPU P State Control

SpeedStep (PStates)

EIST (Enhanced Intel SpeedStep Technology) allows the system to automatically adjust processor voltage and core frequency in an effort to reduce power consumption and heat dissipation. Please refer to Intel's website for detailed information. The options are Disable and **Enable**.

EIST PSD Function (Available when SpeedStep is set to Enable)

Use this item to configure the processor's P-State coordination settings. During a P-State, the voltage and frequency of the processor will be reduced when it is in operation. This makes the processor more energy efficient, resulting in further energy gains. The options are **HW_ALL**, SW_ALL and SW-ANY.

Turbo Mode (Available when SpeedStep is set to Enable)

Select Enable for processor cores to run faster than the frequency specified by the manufacturer. The options are Disable and **Enable**.

▶**Hardware PM (Power Management) State Control**

Hardware P-States

If this feature is set to Disable, hardware will choose a P-state setting for the system based on an OS request. If this feature is set to Native Mode, hardware will choose a P-state setting based on OS guidance. If this feature is set to Native Mode with No Legacy Support, hardware will choose a P-state setting independently without OS guidance. The options are **Disable**, Native Mode, Out of Band Mode, and Native Mode with No Legacy Support.

▶**CPU C State Control**

Autonomous Core C-State

Select Enable to support Autonomous Core C-State control which will allow the processor core to control its C-State setting automatically and independently. The options are Enable and **Disable**.

CPU C6 Report

Select Enable to allow the BIOS to report the CPU C6 state (ACPI C3) to the operating system. During the CPU C6 state, power to all caches is turned off. The options are **Auto**, Enable, and Disable.

Enhanced Halt State (C1E)

Select Enable to enable "Enhanced Halt State" support, which will significantly reduce the CPU's power consumption by minimizing CPU's clock cycles and reduce voltage during a "Halt State." The options are Disable and **Enable**.

▶**Package C State Control**

Package C State

Use this feature to set the limit on the C-State package register. The options are C0/1 state, C2 state, C6 (non-Retention) state, C6 (Retention) state, No Limit, and **Auto**.

▶**Chipset Configuration**

▶**North Bridge**

This feature allows the user to configure the settings for the Intel North Bridge.

▶**UPI (Ultra Path Interconnect) General Configuration**

This section displays the following UPI General Configuration information:

- Number of CPU

- Number of IIO

- Current UPI Link Speed

- Current UPI Link Frequency

- UPI Global MMIO Low Base/Limit

- UPI Global MMIO High Base/Limit

- UPI PCI-E Configuration Base/Size

Degrade Precedence

Use this feature to select the degrading precedence option for Ultra Path Interconnect connections. Select Topology Precedent to degrade UPI features if system options are in conflict. Select Feature Precedent to degrade UPI topology if system options are in conflict. The options are **Topology Precedence** and Feature Precedence.

Link L0p Enable

Select Enable to enable Link L0p. The options are Disable, Enable, and **Auto**.

Link L1 Enable

Select Enable to enable Link L1 (Level 1 link). The options are Disable, Enable, and **Auto**.

IO Directory Cache (IODC)

Select Enable for the IODC (I/O Directory Cache) to generate snoops instead of generating memory lockups for remote IIO (InvIToM) and/or WCiLF (Cores). Select Auto for the IODC to generate snoops (instead of memory lockups) for WCiLF (Cores). The options are Disable, **Auto**, Enable for Remote InvItoM Hybrid Push, InvItoM AllocFlow, Enable for Remote InvItoM Hybrid AllocNonAlloc, and Enable for Remote InvItoM and Remote WViLF.

Isoc Mode

Select Enable to enable Isochronous support to meet QoS (Quality of Service) requirements. This feature is especially important for Virtualization Technology. The options are Disable, Enable, and **Auto**.

SNC (Sub NUMA Cluster)

Select Enable for Sub-NUMA (Non-uniform memory access) Cluster support. Select Auto for 1-cluster or 2-cluster support depending on the satuts of IMC (Integrated Memory Controller) Interleaving. The options are **Disable**, Enable, and Auto.

Stale AtoS (A to S)

Select Enable to remove the contents and the structures of the files that are no longer needed in the remote host server but are still in use by the local client machine from Directory A to Directory S in the NFS (Network File System) to optimize system performance. The options are **Disable**, Enable, and Auto.

LLC Dead Line Alloc

Select Enable to opportunistically fill the deadlines in LLC. The options are **Enable**, Disable, and Auto.

▶Memory Configuration

Enforce POR

Select POR to enforce POR restrictions for DDR4 memory frequency and voltage programming. The options are **POR** and Disable.

PPR Type

This feature allows the user to select the Post Package Repair type. The options are **Enable**, and Disable.

Memory Frequency

Use this feature to set the maximum memory frequency for onboard memory modules. The options are **Auto**, 1866, 2000, 2133, 2200, 2400, 2600, and 2666.

IMC Interleaving

Use this feature to configure interleaving settings for the IMC (Integrated Memory Controller), which will improve memory performance. The options are 1-way Interleaving, 2-way Interleaving, and **Auto**.

Data Scrambling for NVDIMM

Select Enable to enable data scrambling for onboard NVDIMM memory to enhance system performance and security. The options are **Auto**, Disable, and Enable.

Data Scrambling for DDR4

Select Enable to enable data scrambling for DDR4 memory to enhance system performance and security. The options are **Auto**, Disable, and Enable.

tCCD_L Relaxation

If this feature is enabled, SPD (Serial Presence Detect) will override tCCD_L ("Column to Column Delay-Long", or "Command to Command Delay-Long" on the column side.) If this feature is set to Disable, tCCD_L will be enforced based on the memory frequency. The options are Disable, Enable, and **Auto**.

RD2WR Timing Override

If this feature is set to Enable, the RD2WR timing will be overridden by the optimized value. If this feature is set to Auto, overriding will only be applied to Samsung's DIMM modules. The options are Auto, Enable, and **Disable**.

Enable ADR

Select Enable for ADR (Automatic Diagnostic Repository) support to enhance memory performance. The options are Enable and **Disable**.

▶**Memory Topology**

This item displays the information of onboard memory modules as detected by the BIOS.

- P1DIMMA1/P1DIMMA2; P1DIMMB1/P1DIMMB2; P1DIMMC1/ P1 DIMMC2, P1DIMMD1/ P1DIMMD2; P1DIMME1/P1DIMME2; P1DIMMF1/P1DIMMF2

- P2DIMMA1/P2DIMMA2; P2DIMMB1/P2DIMMB2; P1DIMMC1/ P2DIMMC2, P2DIMMD1/ P1DIMMD2; P2DIMME1/P2DIMME2; P2DIMMF1/P2DIMMF2

▶**Memory RAS (Reliability_Availability_Serviceability) Configuration**

Use this submenu to configure the following Memory RAS settings.

Mirror Mode

Use this feature to configure the mirror mode settings for all 1LM/2LM memory modules installed in the system which will create a duplicate copy of data stored in the memory to increase memory security, but it will reduce the memory capacity into half. The options are **Disable**, Mirror Mode 1LM, and Mirror Mode 2LM.

Memory Rank Sparing

Select Enable to support memory-rank sparing to optimize memory performance. The options are Enable and **Disable**.

Note: This item will not be available when memory mirror mode is enabled.

Correctable Error Threshold

Use this item to enter the threshold value for correctable memory errors. The default setting is **10**.

SDDC Plus One

Select Enable for SDDC (Single Device Data Correction) Plus One support, which will activate memory ECC mode for memory error checking and correction. It will also protect against memory failures caused by 'single-bit' errors in the same memory rank. The options are Enable and **Disable**.

ADDDC (Adaptive Double Device Data Correction) Sparing

Select Enable for Adaptive Double Device Data Correction (ADDDC) support, which will not only provide memory error checking and correction but will also prevent the system from issuing a performance penalty before a device fails. Please note that virtual lockstep

mode will only start to work for ADDDC after a faulty DRAM module is spared. The options are Enable and **Disable**.

Patrol Scrub

Patrol Scrubbing is a process that allows the CPU to correct correctable memory errors detected in a memory module and send the corrections to the requestor (the original source). When this item is set to Enable, the IO hub will read and write back one cache line every 16K cycles if there is no delay caused by internal processing. By using this method, roughly 64 GB of memory behind the IO hub will be scrubbed every day. The options are **Enable** and Disable.

Patrol Scrub Interval

Use this item to specify the number of hours (between 0 to 24) required for the system to complete a full patrol scrubbing. Enter 0 for patrol scrubbing to be performed automatically. The default setting is **24**.

Note: This item is hidden when Patrol Scrub item is set to Disable.

▶IIO Configuration

EV DFX (Device Function On-Hide) Features

When this feature is set to Enable, the EV_DFX Lock Bits that are located in a processor will always remain clear during electric tuning. The options are **Disable** and Enable.

▶CPU1 Configuration/CPU2 Configuration

IOU0 (IIO PCIe Br1)

This feature configures the PCI-E Bifuraction setting for a PCI-E port specified by the user. The options are x4x4x4x4, x4x4x8, x8x4x4, x8x8, x16, and **Auto**.

IOU1 (IIO PCIe Br2)

This feature configures the PCI-E Bifuraction setting for a PCI-E port specified by the user. The options are x4x4x4x4, x4x4x8, x8x4x4, x8x8, x16, and **Auto**.

IOU2 (IIO PCIe Br3)

This feature configures the PCI-E Bifuraction setting for a PCI-E port specified by the user. The options are x4x4x4x4, x4x4x8, x8x4x4, x8x8, x16, and **Auto**.

MCP0 (IIO PCIe Br4)

This feature configures the PCI-E Bifuraction setting for a PCI-E port specified by the user. The options are x16 and **Auto**.

MCP1 (IIO PCIe Br5)

This feature configures the PCI-E Bifuraction setting for a PCI-E port specified by the user. The options are x16 and **Auto**.

▶ Socket 0 PCI-E Br0D00F0 - Port 0/DMI (Available for CPU 1 Configuration only)

Link Speed

This feature configures the link speed of a PCI-E port specified by the user. The options are **Auto**, Gen 1 (Generation 1) (2.5 GT/s), Gen 2 (Generation 2) (5 GT/s), and Gen 3 (Generation 3) (8 GT/s)

The following information will be displayed as well:

- PCI-E Port Link Status

- PCI-E Port Link Max

- PCI-E Port Link Speed

PCI-E Port Max (Maximum) Payload Size (Available for CPU 1 Configuration only)

Select Auto for the BIOS to automatically set the maximum payload value for a PCI-E device specified by to user to enhance system performance. The options are **Auto**, 128B, and 256B.

ECRC (Error Capabilities and Control Register)

Select Enable for ECRC support to enhance system performance. The options are **Auto**, 128B, and 256B.

▶ IOAT Configuration

Disable TPH (TLP Processing Hint)

TPH is used for data-tagging with a destination ID and a few important attributes. It can send critical data to a particular cache without writing through to memory. Select No in this item for TLP Processing Hint support, which will allow a "TPL request" to provide "hints" to help optimize the processing of each transaction occurred in the target memory space. The options are Yes and **No**.

Prioritize TPH (TLP Processing Hint)

Select Yes to prioritize the TPL requests that will allow the "hints" to be sent to help facilitate and optimize the processing of certain transactions in the system memory. The options are Enable and **Disable**.

Relaxed Ordering

Select Enable to allow certain transactions to be processed and completed before other transactions that have already been enqueued. The options are **Disable** and Enable.

▶Intel® VT for Directed I/O (VT-d)

Intel® VT for Directed I/O (VT-d)

Select Enable to use Intel Virtualization Technology support for Direct I/O VT-d by reporting the I/O device assignments to the VMM (Virtual Machine Monitor) through the DMAR ACPI tables. This feature offers fully-protected I/O resource sharing across Intel platforms, providing greater reliability, security and availability in networking and data-sharing. The options are **Enable** and Disable.

Interrupt Remapping

Select Enable for Interrupt Remapping support to enhance system performance. The options are **Enable** and Disable.

PassThrough DMA

Select Enable for the Non-Iscoh VT-d engine to pass through DMA (Direct Memory Access) to enhance system performance. The options are **Enable** and Disable.

ATS

Select Enable to enable ATS (Address Translation Services) support for the Non-Iscoh VT-d engine to enhance system performance. The options are **Enable** and Disable.

Posted Interrupt

Select Enable to support VT_D Posted Interrupt which will allow external interrupts to be sent directly from a direct-assigned device to a client machine in non-root mode to improve virtualization efficiency by simplifying interrupt migration and lessening the need of physical interrupts. The options are **Enable** and Disable.

Coherency Support (Non-Isoch)

Select Enable for the Non-Iscoh VT-d engine to pass through DMA (Direct Memory Access) to enhance system performance. The options are **Enable** and Disable.

▶Intel® VMD Technology

▶Intel® VMD for Onboard NVMe

Onbard NVMe Mode

Select Legacy Mode to configure onboard NVMe connections for legacy device support. The options are **Legacy Mode** and VMD Mode.

IIO-PCIE Express Global Options

PCI-E Hot Plug

Select Enable for hot-plug support for all PCI-E devices to allow the user to change an onboard device without turning off the system power. The options are Disable, **Enable**, Auto, and Manual.

PCI-E Completion Timeout (Global)

Use this feature to configure the PCI-E Completion Time-out settings. The options are **Yes**, No, and Per-Port.

▶South Bridge

The following South Bridge information will display:

• USB Module Version

• USB Devices

Legacy USB Support

Select Enabled to support onboard legacy USB devices. Select Auto to disable legacy support if there are no legacy USB devices present. Select Disable to have all USB devices available for EFI applications only. The options are **Enabled,** Disabled and Auto.

XHCI Hand-Off

This is a work-around solution for operating systems that do not support XHCI (Extensible Host Controller Interface) hand-off. The XHCI ownership change should be claimed by the XHCI driver. The options are Enabled and **Disabled**.

Port 60/64 Emulation

Select Enabled for I/O port 60h/64h emulation support, which in turn, will provide complete legacy USB keyboard support for the operating systems that do not support legacy USB devices. The options are **Enabled** and Disabled.

Port 61h Bit-4 Emulation

Select Enabled for I/O Port 61h-Bit 4 emulation support to enhance system performance. The options are Enabled and **Disabled**.

Install Windows 7 USB Support

Select Enabled to install the Windows 7 USB utility to support legacy USB devices for Windows 7 systems. The options are Enabled and **Disabled**.

▶Server ME (Management Engine) Configuration

This feature displays the following system ME configuration settings.

- Operational Firmware Version

- Backup Firmware Version

- Recovery Firmware Version

- ME Firmware Status #1/ME Firmware Status #2

    - Current State

    - Error Code

▶SATA Configuration

When this submenu is selected, the AMI BIOS automatically detects the presence of the SATA devices that are supported by the Intel PCH chip and displays the following items:

SATA Controller

This item enables or disables the onboard SATA controller supported by the Intel PCH chip. The options are **Enable** and Disable.

Configure SATA as (Available when the item above: SATA Controller is set to enabled)

Select AHCI to configure a SATA drive specified by the user as an AHCI drive. Select RAID to configure a SATA drive specified by the user as a RAID drive. The options are **AHCI** and RAID. (**Note:** This item is hidden when the SATA Controller item is set to Disabled.)

SATA HDD Unlock

Select Enable to unlock SATA HDD password in the OS. The options are **Enable** and Disable.

Aggressive Link Power Management

When this item is set to Enabled, the SATA AHCI controller manages the power use of the SATA link. The controller will put the link in a low power mode during an extended period of I/O inactivity, and will return the link to an active state when I/O activity resumes. The options are Enable and **Disable**.

SATA RAID Option ROM/UEFI Driver (Available when the item "Configure SATA as" is set to "RAID")

Select EFI to load the EFI driver for system boot. Select Legacy to load a legacy driver for system boot. The options are Disable, EFI, and **Legacy**.

(I-)SATA Port 0 - SATA Port 7

Hot Plug

Select Enable to support Hot-plugging for the device installed on a selected SATA port which will allow the user to replace the device installed in the slot without shutting down the system. The options are Enable and **Disable**.

Spin Up Device

On an edge detect from 0 to 1, set this item to allow the SATA device installed on the SATA port specified by the user to start a COMRESET initialization. The options are Enable and **Disable**.

SATA Device Type

Use this item to specify if the device installed on the SATA port selected by the user should be connected to a Solid State drive or a Hard Disk Drive. The options are **Hard Disk Drive** and Solid State Drive.

▶sSATA Configuration

When this submenu is selected, AMI BIOS automatically detects the presence of the sSATA devices that are supported by the PCH sSATA controller and displays the following items:

sSATA Controller

This item enables or disables the onboard sSATA controller supported by the Intel PCH The options are **Enable** and Disable.

Configure sSATA as

Select AHCI to configure an sSATA drive specified by the user as an AHCI drive. Select RAID to configure an sSATA drive specified by the user as a RAID drive. The options are **AHCI** and RAID. (**Note:** This item is hidden when the sSATA Controller item is set to Disabled.)

SATA HDD Unlock

Select Enable to unlock sSATA HDD password in the OS. The options are **Enable** and Disable.

Aggressive Link Power Management

When this item is set to Enable, the sSATA AHCI controller manages the power use of the SATA link. The controller will put the link in a low power mode during an extended period of I/O inactivity, and will return the link to an active state when I/O activity resumes. The options are **Disable** and Enable.

sSATA RAID Option ROM/UEFI Driver (Available when the item "Configure SATA as" is set to "RAID")

Select EFI to load the EFI driver for system boot. Select Legacy to load a legacy driver for system boot. The options are Disable, EFI, and **Legacy**.

sSATA Port 0

Hot Plug

Select Enable to support Hot-plugging for the device installed on an sSATA port selected by the user which will allow the user to replace the device installed in the slot without shutting down the system. The options are **Disable** and Enabled.

Spin Up Device

On an edge detect from 0 to 1, set this item to allow the sSATA device installed on the sSATA port specified by the user to start a COMRESET initialization. The options are Enable and **Disable**.

sSATA Device Type

Use this item to specify if the device installed on the sSATA port specified by the user should be connected to a Solid State drive or a Hard Disk Drive. The options are **Hard Disk Drive** and Solid State Drive.

▶PCIe/PCI/PnP Configuration

The following PCI information will be displayed:

• PCI Bus Driver Version

• PCI Devices Common Settings

Above 4G Decoding (Available if the system supports 64-bit PCI decoding)

Select Enabled to decode a PCI device that supports 64-bit in the space above 4G Address. The options are **Enabled** and Disabled.

SR-IOV Support (Available if the system supports Single-Root Virtualization)

Select Enabled for Single-Root IO Virtualization support. The options are Enabled and **Disabled.**

MMIO High Base

Use this feature to select the base memory size according to memory-address mapping for the IO hub. The base memory size must be between 4032G to 4078G. The options are **56T**, 40T, 24T, 16T, 4T, and 1T.

MMIO High Granularity Size

Use this feature to select the high memory size according to memory-address mapping for the IO hub. The options are 1G, 4G, 16G, 64G, **256G**, and 1024G.

PCI PERR/SERR Support

Use this feature to enable or disable the runtime event for SERR (System Error)/ PERR (PCI/ PCI-E Parity Error). The options are Enabled and **Disabled**.

Maximum Read Request

Select Auto for the system BIOS to automatically set the maximum size for a read request for a PCI-E device to enhance system performance. The options are **Auto**, 128 Bytes, 256 Bytes, 512 Bytes, 1024 Bytes, 2048 Bytes, and 4096 Bytes.

MMCFG Base

This feature determines the lowest MMCFG (Memory-Mapped Configuration) base assigned to PCI devices. The options are 1G, 1.5G, 1.75G. **2G**, 2.25G, and 3G.

VGA Priority

This feature selects the graphics device to be used as the primary video display for system boot. The options are Auto, **Onboard** and Offboard.

Disable Unused PLX

Select Enable to turn off PCI-E support when there are no downstream PCI-E devices attached to this device. The options are **Enabled** and Disabled.

PLX Workaround for NVIDIA GPU

Select Enable to shut down PLX BAR0 and BAR1 support when a NVIDIA GPU is populated in the slots. The options are **Enabled** and Disabled.

Onboard NVME1 OPROM/Onboard NVME2 OPROM

Select EFI to allow the user to boot the computer using an EFI (Expansible Firmware Interface) device installed on the NVMe slot specified by the user. Select Legacy to allow the user to boot the computer using a legacy device installed on the NVMe slot specified by the user. The options are Disabled, Legacy and **EFI**. (Note: Riser card names may differ in each system.)

Onboard Video OPROM

Select EFI to allow the user to boot the computer using an EFI (Expansible Firmware Interface) device installed on the video slot specified by the user. Select Legacy to allow the user to boot the computer using a legacy device installed on the video slot specified by the user. The options are Disabled, **Legacy** and EFI. (Note: Riser card names may differ in each system.)

Onboard LAN1 Option ROM

Use this feature to select the type of device to be installed in LAN Port1 used for system boot. The options are **Legacy**, EFI, and Disabled.

Onboard LAN2 Option ROM

Use this feature to select the type of device to be installed in LAN Port2 used for system boot. The options are Legacy, EFI, and **Disabled**.

▶Network Stack Configuration

Network Stack

Select Enabled to enable PXE (Preboot Execution Environment) or UEFI (Unified Extensible Firmware Interface) for network stack support. The options are **Enabled** and Disabled.

*If "Network Stack" is set to Enabled, the following items will display:

Ipv4 PXE Support

Select Enabled to enable Ipv4 PXE boot support. If this feature is disabled, it will not create the Ipv4 PXE boot option. The options are Disabled and **Enabled**.

Ipv4 HTTP Support

Select Enabled to enable Ipv4 HTTP boot support. If this feature is disabled, it will not create the Ipv4 HTTP boot option. The options are Enabled and **Disabled**.

Ipv6 PXE Support

Select Enabled to enable Ipv6 PXE boot support. If this feature is disabled, it will not create the Ipv6 PXE boot option. The options are Disabled and **Enabled**.

Ipv6 HTTP Support

Select Enabled to enable Ipv6 HTTP boot support. If this feature is disabled, it will not create the Ipv6 HTTP boot option. The options are Enabled and **Disabled**.

PXE Boot Wait Time

Use this feature to select the wait time to press the <ESC> key to abort the PXE boot. The default is **0**.

Media Detect Time

Use this feature to select the wait time in seconds for the BIOS ROM to detect the LAN media (Internet connection or LAN port). The default is **1**.

▶Super IO Configuration

Super IO Chip AST2500

▶Serial Port 1 Configuration

Serial Port 1

Select Enabled to enable the onboard serial port specified by the user. The options are **Enabled** and Disabled.

Device Settings

This feature displays the base I/O port address and the Interrupt Request address of a serial port specified by the user.

Note: This item is hidden when Serial Port 1 is set to Disabled.

Change Settings

This feature specifies the base I/O port address and the Interrupt Request address of Serial Port 1. Select **Auto** for the BIOS to automatically assign the base I/O and IRQ address to a serial port specified.

The options for Serial Port 1 are **Auto**, (IO=3F8h; IRQ=4), (IO=3F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12), (IO=2F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12); (IO=3E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12), and (IO=2E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12).

▶Serial Port 2 Configuration

Serial Port 2

Select Enabled to enable the onboard serial port specified by the user. The options are **Enabled** and Disabled.

Device Settings

This feature displays the base I/O port address and the Interrupt Request address of a serial port specified by the user.

Note: This item is hidden when Serial Port 1 is set to Disabled.

Change Settings

This feature specifies the base I/O port address and the Interrupt Request address of Serial Port 2. Select Auto for the BIOS to automatically assign the base I/O and IRQ address to a serial port specified. The options for Serial Port 2 are **Auto**, (IO=2F8h; IRQ=3), (IO=3F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12), (IO=2F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12); (IO=3E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12), and (IO=2E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12).

Serial Port 2 Attribute

Select SOL to use COM Port 2 as a Serial_Over_LAN (SOL) port for console redirection. The options are COM and **SOL**.

▶Serial Port Console Redirection

COM 1 Console Redirection

Select Enabled to enable COM Port 1 for Console Redirection, which will allow a client machine to be connected to a host machine at a remote site for networking. The options are Enabled and **Disabled**.

If the item above set to Enabled, the following items will become available for configuration:

▶Console Redirection Settings (when COM1 Console Redirection is Enabled)

Terminal Type

Use this feature to select the target terminal emulation type for Console Redirection. Select VT100 to use the ASCII Character set. Select VT100+ to add color and function key support. Select ANSI to use the Extended ASCII Character Set. Select VT-UTF8 to use UTF8 encoding to map Unicode characters into one or more bytes. The options are ANSI, VT100, **VT100+**, and VT-UTF8.

Bits Per second

Use this feature to set the transmission speed for a serial port used in Console Redirection. Make sure that the same speed is used in the host computer and the client computer. A lower transmission speed may be required for long and busy lines. The options are 9600, 19200, 38400, 57600 and **115200** (bits per second).

Data Bits

Use this feature to set the data transmission size for Console Redirection. The options are 7 (Bits) and **8 (Bits)**.

Parity

A parity bit can be sent along with regular data bits to detect data transmission errors. Select Even if the parity bit is set to 0, and the number of 1's in data bits is even. Select Odd if the parity bit is set to 0, and the number of 1's in data bits is odd. Select None if you do not want to send a parity bit with your data bits in transmission. Select Mark to add a mark as a parity bit to be sent along with the data bits. Select Space to add a Space as a parity bit to be sent with your data bits. The options are **None**, Even, Odd, Mark and Space.

Stop Bits

A stop bit indicates the end of a serial data packet. Select 1 Stop Bit for standard serial data communication. Select 2 Stop Bits if slower devices are used. The options are **1** and 2.

Flow Control

Use this feature to set the flow control for Console Redirection to prevent data loss caused by buffer overflow. Send a "Stop" signal to stop sending data when the receiving buffer is full. Send a "Start" signal to start sending data when the receiving buffer is empty. The options are **None** and Hardware RTS/CTS.

VT-UTF8 Combo Key Support

Select Enabled to enable VT-UTF8 Combination Key support for ANSI/VT100 terminals. The options are **Enabled** and Disabled**.**

Recorder Mode

Select Enabled to capture the data displayed on a terminal and send it as text messages to a remote server. The options are **Disabled** and Enabled.

Resolution 100x31

Select Enabled for extended-terminal resolution support. The options are Disabled and **Enabled**.

Legacy OS Redirection Resolution

Use this feature to select the number of rows and columns used in Console Redirection for legacy OS support. The options are **80x24** and 80x25.

Putty KeyPad

This feature selects Function Keys and KeyPad settings for Putty, which is a terminal emulator designed for the Windows OS. The options are **VT100**, LINUX, XTERMR6, SCO, ESCN, and VT400.

Redirection After BIOS Post

Use this feature to enable or disable legacy Console Redirection after BIOS POST. When the option-Bootloader is selected, legacy Console Redirection is disabled before booting the OS. When the option-Always Enable is selected, legacy Console Redirection remains enabled upon OS bootup. The options are **Always Enable** and Bootloader.

SOL (Serial-Over-LAN)/COM2

Console Redirection (for SOL/COM2)

Select Enabled to use the SOL port for Console Redirection. The options are **Enabled** and Disabled.

*If the item above set to Enabled, the following items will become available for user's configuration:

▶Console Redirection Settings (for SOL/COM2)

Use this feature to specify how the host computer will exchange data with the client computer, which is the remote computer used by the user.

Terminal Type

Use this feature to select the target terminal emulation type for Console Redirection. Select VT100 to use the ASCII Character set. Select VT100+ to add color and function key support. Select ANSI to use the Extended ASCII Character Set. Select VT-UTF8 to use UTF8 encoding to map Unicode characters into one or more bytes. The options are ANSI, VT100, **VT100+**, and VT-UTF8.

Bits Per second

Use this feature to set the transmission speed for a serial port used in Console Redirection. Make sure that the same speed is used in the host computer and the client computer. A lower transmission speed may be required for long and busy lines. The options are 9600, 19200, 38400, 57600 and **115200** (bits per second).

Data Bits

Use this feature to set the data transmission size for Console Redirection. The options are 7 (Bits) and **8 (Bits)**.

Parity

A parity bit can be sent along with regular data bits to detect data transmission errors. Select Even if the parity bit is set to 0, and the number of 1's in data bits is even. Select Odd if the parity bit is set to 0, and the number of 1's in data bits is odd. Select None if you do not want to send a parity bit with your data bits in transmission. Select Mark to add a mark as a parity bit to be sent along with the data bits. Select Space to add a Space as a parity bit to be sent with your data bits. The options are **None**, Even, Odd, Mark and Space.

Stop Bits

A stop bit indicates the end of a serial data packet. Select 1 Stop Bit for standard serial data communication. Select 2 Stop Bits if slower devices are used. The options are **1** and 2.

Flow Control

Use this feature to set the flow control for Console Redirection to prevent data loss caused by buffer overflow. Send a "Stop" signal to stop sending data when the receiving buffer is full. Send a "Start" signal to start data-sending when the receiving buffer is empty. The options are **None** and Hardware RTS/CTS.

VT-UTF8 Combo Key Support

Select Enabled to enable VT-UTF8 Combination Key support for ANSI/VT100 terminals. The options are **Enabled** and Disabled**.**

Recorder Mode

Select Enabled to capture the data displayed on a terminal and send it as text messages to a remote server. The options are **Disabled** and Enabled.

Resolution 100x31

Select Enabled for extended-terminal resolution support. The options are Disabled and **Enabled**.

Legacy OS Redirection Resolution

Use this feature to select the number of rows and columns used in Console Redirection for legacy OS support. The options are **80x24** and 80x25.

Putty KeyPad

This feature selects Function Keys and KeyPad settings for Putty, which is a terminal emulator designed for the Windows OS. The options are **VT100**, LINUX, XTERMR6, SCO, ESCN, and VT400.

Redirection After BIOS Post

Use this feature to enable or disable legacy Console Redirection after BIOS POST (Power-On Self-Test). When this feature is set to Bootloader, legacy Console Redirection is disabled before booting the OS. When this feature is set to Always Enable, legacy Console Redirection remains enabled upon OS boot. The options are **Always Enable** and Bootloader.

▶Legacy Console Redirection Settings

Legacy Console Redirection Settings

Use the feature to select the COM port to display redirection of Legacy OS and Legacy OPROM messages. The options are COM1 and **COM2/SOL**.

Serial Port for Out-of-Band Management/Windows Emergency Management Services (EMS)

The submenu allows the user to configure Console Redirection settings to support Out-of-Band Serial Port management.

Console Redirection (for EMS)

Select Enabled to use a COM port selected by the user for EMS Console Redirection. The options are **Disabled** and Enabled.

If the item above set to Enabled, the following items will become available for user's configuration:

▶EMS Console Redirection Settings

Out-of-Band Management Port

The feature selects a serial port in a client server to be used by the Windows Emergency Management Services (EMS) to communicate with a remote host server. The options are **COM1 (Console Redirection)** and COM2/SOL (Console Redirection).

Terminal Type

Use this feature to select the target terminal emulation type for Console Redirection. Select VT100 to use the ASCII character set. Select VT100+ to add color and function key support. Select ANSI to use the extended ASCII character set. Select VT-UTF8 to use UTF8 encoding to map Unicode characters into one or more bytes. The options are ANSI, VT100, VT100+, and **VT-UTF8**.

Bits Per Second

This feature sets the transmission speed for a serial port used in Console Redirection. Make sure that the same speed is used in both host computer and the client computer. A lower transmission speed may be required for long and busy lines. The options are 9600, 19200, 57600, and **115200** (bits per second).

Flow Control

Use this feature to set the flow control for Console Redirection to prevent data loss caused by buffer overflow. Send a "Stop" signal to stop data-sending when the receiving buffer is full. Send a "Start" signal to start data-sending when the receiving buffer is empty. The options are **None,** Hardware RTS/CTS, and Software Xon/Xoff.

The setting for each these features is displayed:

Data Bits, Parity, Stop Bits

▶ACPI Settings

Use this feature to configure Advanced Configuration and Power Interface (ACPI) power management settings for your system.

NUMA Support (Available when the OS supports this feature)

Select Enabled to enable Non-Uniform Memory Access support to enhance system performance. The options are **Enabled** and Disabled.

WHEA Support

Select Enabled to support the Windows Hardware Error Architecture (WHEA) platform and provide a common infrastructure for the system to handle hardware errors within the Windows OS environment to reduce system crashes and to enhance system recovery and health monitoring. The options are **Enabled** and Disabled.

High Precision Timer

Select Enabled to activate the High Precision Event Timer (HPET) that produces periodic interrupts at a much higher frequency than a Real-time Clock (RTC) does in synchronizing multimedia streams, providing smooth playback and reducing the dependency on other timestamp calculation devices, such as an x86 RDTSC Instruction embedded in the CPU. The High Performance Event Timer is used to replace the 8254 Programmable Interval Timer. The options are **Enabled** and Disabled.

▶Trusted Computing (Available when a TPM device is detected and PTT Support under "Server ME Config" is not Enabled)

When a TPM (Trusted-Platform Module) device is detected in your machine, the following information will display.

- TPM2.0 Device Found

- Vendor

- Firmware Version

Security Device Support

If this feature and the TPM jumper (JPT1), if available, are both enabled, the onboard security (TPM) device will be enabled in the BIOS to enhance data integrity and system security. Please note that the OS will not show the security device. Neither TCG EFI protocol nor INT1A interaction will be available for use. If you have made changes on the setting on this item, be sure to reboot the system for the change to take effect. The options are Disable and **Enable**. If this option is set to Enable, the following screen and items will display:

```
            Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
            Trusted Computing

                                                         Enables or Disables BIOS
     TPM20 Device Found                                  support for security device.
     Vendor: IFX                                         O.S. will not show Security
     Firmware Version: 7.61                              Device. TCG EFI protocol and
                                                         INT1A interface will not be
     Security Device Support        [Enable]             available.
     Active PCR banks               SHA-1,SHA256
     Available PCR banks            SHA-1,SHA256


     Pending operation              [None]
     Platform Hierarchy             [Enabled]
     Storage Hierarchy              [Enabled]
     Endorsement Hierarchy          [Enabled]
     PH Randomization               [Disabled]           →←: Select Screen
                                                         ↑↓: Select Item
                                                         Enter: Select
     TXT Support                    [Disabled]           +/-: Change Opt.
                                                         F1: General Help
                                                         F2: Previous Values
                                                         F3: Optimized Defaults
                                                         F4: Save & Exit
                                                         ESC: Exit




            Version 2.19.1266. Copyright (C) 2017 American Megatrends, Inc.
```

- Active PCR Banks

- Available PCR Banks

Pending Operation

Use this feature to schedule a TPM-related operation to be performed by a security (TPM) device at the next system boot to enhance system data integrity. Your system will reboot to carry out a pending TPM operation. The options are **None** and TPM Clear.

Note: Your system will reboot to carry out a pending TPM operation.

Platform Hierarchy (for TPM Version 2.0 and above)

Select Enabled for TPM Platform Hierarchy support which will allow the manufacturer to utilize the cryptographic algorithm to define a constant key or a fixed set of keys to be used for initial system boot. This early boot code is shipped with the platform and is included in the list of "public keys". During system boot, the platform firmware uses this trusted public key to verify a digital signature in an attempt to manage and control the security of the platform firmware used in a host system via a TPM device. The options are **Enabled** and Disabled.

Storage Hierarchy

Select Enabled for TPM Storage Hierarchy support that is intended to be used for non-privacy-sensitive operations by the platform owner such as an IT professional or the end user. Storage Hierarchy has an owner policy and an authorization value, both of which can be set and are held constant (-rarely changed) through reboots. This hierarchy can be cleared or changed independently of the other hierarchies. The options are **Enabled** and Disabled.

Endorsement Hierarchy

Select Enabled for Endorsement Hierarchy support, which contains separate controls to address the user's privacy concerns because the primary keys in this hierarchy are certified by the TPM or a manufacturer to be constrained to an authentic TPM device that is attached to an authentic platform. A primary key can be an encrypted, and a certificate can be created using TPM2_ ActivateCredential. It allows the user to independently enable "flag, policy, and authorization value" without involving other hierarchies. A user with privacy concerns can disable the endorsement hierarchy while still using the storage hierarchy for TPM applications and permitting the platform software to use the TPM. The options are **Enabled** and Disabled.

PH (Platform Hierarchy) Randomization (for TPM Version 2.0 and above)

Select Enabled for Platform Hierarchy Randomization support, which is used only during the platform developmental stage. This feature cannot be enabled in the production platforms. The options are **Disabled** and Enabled.

TXT Support

Select Enabled to enable Intel Trusted Execution Technology (TXT) support to enhance system security and data integrity. The options are **Disabled** and Enabled.

> **Note 1**: If the option for this item (TXT Support) is set to Enabled, be sure to disable EV DFX (Device Function On-Hide) support for the system to work properly. (EV DFX is under "IIO Configuration" in the "Chipset/North Bridge" submenu).

> **Note 2:** For more information on TPM, please refer to the TPM manual at http://www.supermicro.com/manuals/other.

▶Intel® Virtual RAID on CPU

When this submenu is selected and the RAID devices are detected, the BIOS screen displays the following items:

Intel® VROC with VMD Technology 5.2.0.1023

4.4 Event Logs

Use this feature to configure Event Log settings.
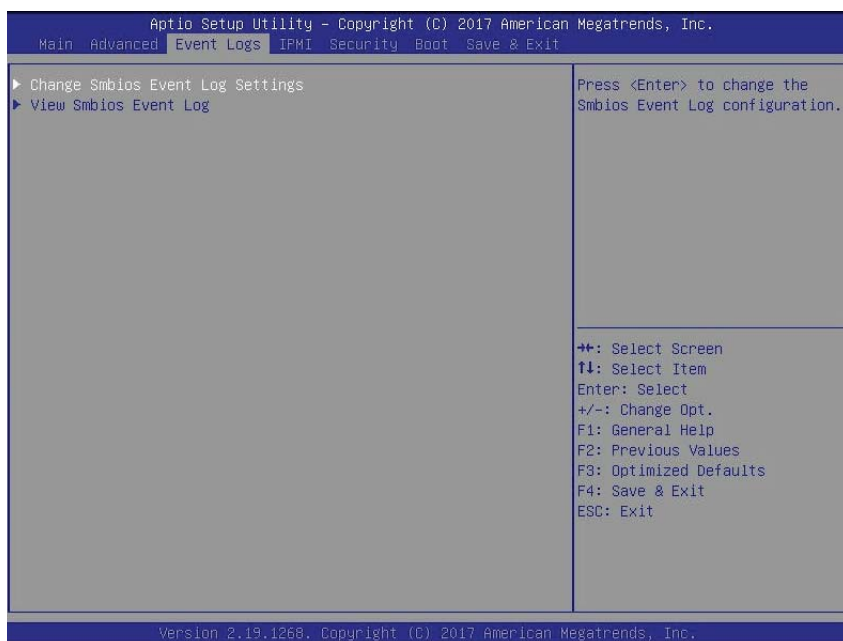
▶Change SMBIOS Event Log Settings

Enabling/Disabling Options

SMBIOS Event Log

Select Enabled to enable SMBIOS (System Management BIOS) Event Logging during system boot. The options are **Enabled** and Disabled.

Erasing Settings

Erase Event Log

Select Enabled to erase all error events in the SMBIOS (System Management BIOS) log before an event logging is initialized at bootup. The options are **No**, Yes, Next Reset, and Yes, Next Reset.

When Log is Full

Select Erase Immediately to immediately erase all errors in the SMBIOS event log when the event log is full. Select Do Nothing for the system to do nothing when the SMBIOS event log is full. The options are **Do Nothing** and Erase Immediately.

SMBIOS Event Log Standard Settings

Log System Boot Event

Select Enabled to log system boot events. The options are Enabled and **Disabled**.

MECI (Multiple Event Count Increment)

Enter the increment value for the multiple event counter. Enter a number between 1 to 255. The default setting is **1**.

METW (Multiple Event Count Time Window)

Use this feature to specify how long (in minutes) the multiple event counter should wait before generating a new event log. Enter a number between 0 to 99. The default setting is **60**.

> **Note**: Please reboot the system for the changes to take effect.

Custom Options

Log OEM Codes

Select Enabled to log EFI Status Codes as OEM Codes. The options are **Enabled** and Disabled.

Convert OEM Codes

Select Enabled to convert EFI Status Codes to that of standard SMBIOS Type. The options are **Disabled** and Enabled.
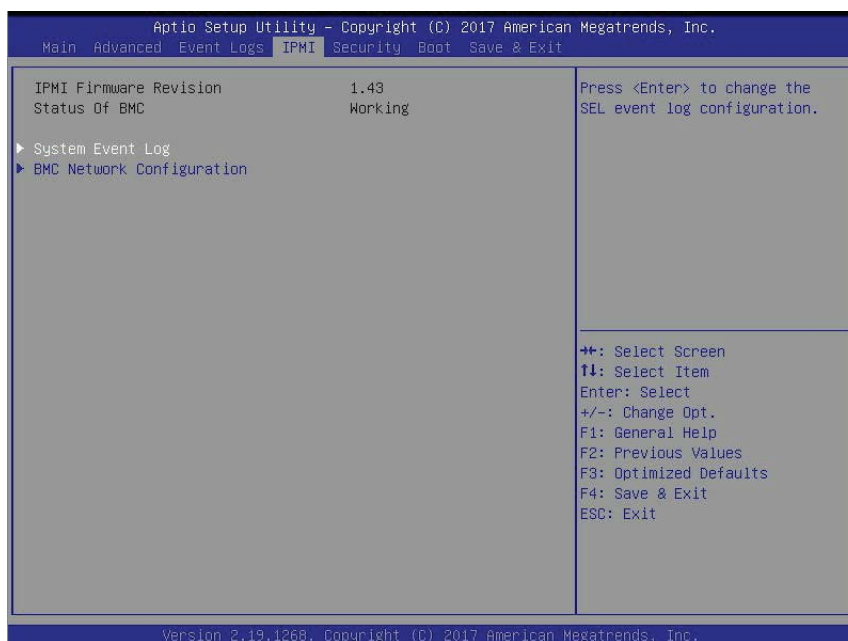
▶View SMBIOS Event Log

This item allows the user to view the event in the system event log. Select this feature and press <Enter> to view the status of an event in the log. The following categories are displayed: **Date/Time/Error Code/Severity**

4.5 IPMI

Use this feature to configure Intelligent Platform Management Interface (IPMI) settings.

```
             Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
       Main  Advanced  Event Logs  IPMI  Security  Boot  Save & Exit

     IPMI Firmware Revision           1.43              Press <Enter> to change the
     Status Of BMC                    Working           SEL event log configuration.

   ▶ System Event Log
   ▶ BMC Network Configuration



                                                        →←: Select Screen
                                                        ↑↓: Select Item
                                                        Enter: Select
                                                        +/-: Change Opt.
                                                        F1: General Help
                                                        F2: Previous Values
                                                        F3: Optimized Defaults
                                                        F4: Save & Exit
                                                        ESC: Exit



             Version 2.19.1268. Copyright (C) 2017 American Megatrends, Inc.
```

When you select this submenu and press the <Enter> key, the following information will display:

- IPMI Firmware Revision: This feature indicates the IPMI firmware revision used in your system.

- Status of BMC: This feature indicates IPMI status of your system.

▶System Event Log

Enabling/Disabling Options

SEL Components

Select Enabled for all system event logging at bootup. The options are **Enabled** and Disabled.

Erasing Settings

Erase SEL

Select Yes, On next reset to erase all system event logs upon next system reboot. Select Yes, On every reset to erase all system event logs upon each system reboot. Select No to keep all system event logs after each system reboot. The options are **No,** Yes, On next reset, and Yes, On every reset.

When SEL is Full

This feature allows the user to specify what the BIOS should do when the system event log is full. Select Erase Immediately to erase all events in the log when the system event log is full. The options are **Do Nothing** and Erase Immediately.

Custom EFI Logging Options

Log EFI Status Codes

Select EFI (Extensible Firmware Interface) Status Codes to log EFI status codes. Select Error Codes to log EFI error codes. Select Progress Code to log the EFI progress code. Select both to log both EFI error codes and progress codes The options are Both, **Error Code**, Progress Code, and Disabled. (**Note**: After making changes on a setting, be sure to reboot the system for the changes to take effect.)

▶BMC Network Configuration

The following items will be displayed:

- IPMI LAN Selection: This feature displays the IPMI LAN setting. The default setting is **Failover**.

- IPMI Network Link Status: This item displays the IPMI Network Link status. The default setting is **Dedicated LAN**.

- Current Configuration Address Source: This feature displays the source of the current IPMI LAN address. The default setting is **DHCP (Dynamic Host Configuration Protocol)**.

- Station IP Address: This feature displays the Station IP address for this computer. This should be in decimal and in dotted quad form (i.e., 192.168.10.253).

- Subnet Mask: This feature displays the sub-network that this computer belongs to. The value of each three-digit number separated by dots should not exceed 255.

- Station MAC Address: This feature displays the Station MAC address for this computer. Mac addresses are 6 two-digit hexadecimal numbers.

- Gateway IP Address: This feature displays the Gateway IP address for this computer. This should be in decimal and in dotted quad form (i.e., 192.168.10.253).

- VLAN: Select Enabled to enable IPMI VLAN support. The options are **Enabled** and Disabled.

Update IPMI LAN Configuration

Select Yes for the BIOS to implement all IP/MAC address changes at the next system boot. The options are **No** and Yes. If this option is set to Yes, the following items will display:

IPMI LAN Selection

Use this feature to select the type of the IPMI LAN. The options are Dedicated, Shared, and **Failover**.

VLAN

Select Enabled for IPMI VLAN support. The options are **Disabled** and Enabled.

Configuration Address Source

Use this feature to select the IP address source for this computer. If Static is selected, you will need to know the IP address of this computer and enter it to the system manually in the field. If DHCP is selected, AMI BIOS will search for a DHCP (Dynamic Host Configuration Protocol) server attached to the network and request the next available IP address for this computer. The options are **DHCP** and Static. When the option: Static is selected, the following features will be displayed:

- Station IP Address

- Subnet Mask

- Gateway IP Address

4.6 Security Settings

This menu allows the user to configure the following security settings for the system.

```
                Aptio Setup Utility – Copyright (C) 2017 American Megatrends, Inc.
        Main  Advanced  Event Logs  IPMI  Security  Boot  Save & Exit

     Password Description                              Set Administrator Password

     If ONLY the Administrator's password is set,
     then this only limits access to Setup and is
     only asked for when entering Setup.
     If ONLY the User's password is set, then this
     is a power on password and must be entered to
     boot or enter Setup. In Setup the User will
     have Administrator rights.
     The password length must be
     in the following range:
     Minimum length                    3
     Maximum length                    20
                                                  →←: Select Screen
     Administrator Password                       ↑↓: Select Item
     User Password                                Enter: Select
     Password Check                  [Setup]      +/-: Change Opt.
                                                  F1: General Help
    ▶ Secure Boot                                 F2: Previous Values
                                                  F3: Optimized Defaults
                                                  F4: Save & Exit
                                                  ESC: Exit



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```

Administrator Password

Use this feature to set the administrator password which is required to enter the BIOS setup utility. The length of the password should be from 3 characters to 20 characters long.

User Password

Use this feature to set the user password which is required to enter the BIOS setup utility. The length of the password should be from 3 characters to 20 characters long.

Password Check

Select Setup for the system to check for a password at Setup. Select Always for the system to check for a password at bootup or upon entering the BIOS Setup utility. The options are **Setup** and Always.

▶Secure Boot

When you select this submenu and press the <Enter> key, the following items will display:
• System Mode
• Secure Boot
• Vendor Keys

Attempt Secure Boot

If this feature is set to Enabled, Secure Boot will be activated when a Platform Key (PK) is entered. A Platform Key is a security key used to manage the security settings of the platform firmware used in your system. The options are Enabled and **Disabled.**

Secure Boot Mode

Use this feature to select the desired secure boot mode for the system. The options are Standard and **Custom**.

CSM Support

Select Enabled to enable Compatibility Service Module (CMS) which will support Legacy BIOS through UEFI to enhance system performance. The options are **Enabled** and Disabled

▶Key Management

Provision Factory Default Keys

Select Enabled to install all manufacturer default keys to configure the following system security settings. The options are Enabled and **Disabled**.

▶Install All Factor Defaults

Select Yes to install all manufacturer defaults to configure the following system security settings. The options are **Yes** and No.

▶Reset to Setup Mode

Select Yes to reset the settings to setup mode. The options are **Yes** and No.

▶Enroll EFI Image

Select this item and press <Enter> to select an EFI (Extensible Firmware Interface) image for the system to operate in Secure Boot mode.

▶Save All Secure Boot Variables

This feature allows the user to set and save the secure boot key variables specified by the user.

▶Platform Key (PK)

This feature allows the user to enter and configure a set of values to be used as a platform firmware key for the system. This set of values also indicate the size, the keys numbers, and the key source of the Platform Key. The options are **Save to File**, Set New, and Erase.

▶Key Exchange Keys

This feature allows the user to enter and configure a set of values to be used as a Key-Exchange-Keys for the system. This set of values also indicate the size, the keys numbers, and the key source of the Key-Exchange-Keys. The options are **Save to File**, Set New, and Erase.

▶Authorized Signatures

This feature allows the user to enter and configure a set of values to be used as Authorized Signatures for the system. These values also indicate the size, the keys numbers, and the key source of the Authorized Signatures. The options are **Set New** and Append.

Secure Boot Variable/Size/Key#/Key Sources The options are **Save to File**, Set New, and Erase.

▶Forbidden Signatures

This feature allows the user to enter and configure a set of values to be used as Forbidden Signatures for the system. These values also indicate the size, the keys numbers, and the key source of the Forbidden Signatures. The options are **Save to File**, Set New, and Erase.
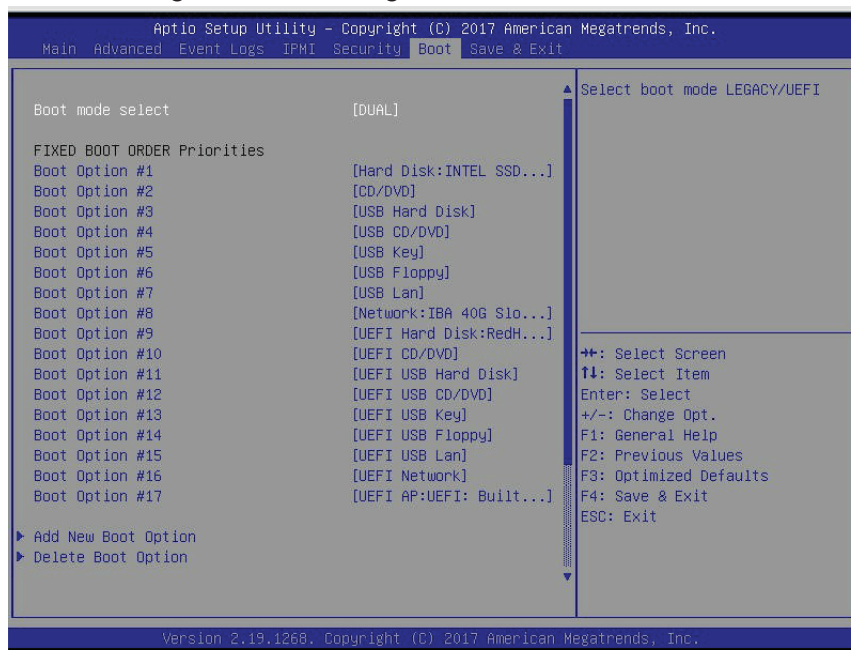
▶Authorized TimeStamps

This feature allows the user to set and save the timestamps for Authorized Signatures to indicate when these signatures were entered into the system. The options are **Save to File**, Set New, and Erase.

▶OsRecovery Signatures

This feature allows the user to set and save the Authorized Signatures used for OS recovery. The options are **Save to File**, Set New, and Erase.

4.7 Boot Settings

Use this feature to configure Boot Settings:

```
                Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
          Main  Advanced  Event Logs  IPMI  Security  Boot  Save & Exit

                                                          Select boot mode LEGACY/UEFI
       Boot mode select              [DUAL]

       FIXED BOOT ORDER Priorities
       Boot Option #1               [Hard Disk:INTEL SSD...]
       Boot Option #2               [CD/DVD]
       Boot Option #3               [USB Hard Disk]
       Boot Option #4               [USB CD/DVD]
       Boot Option #5               [USB Key]
       Boot Option #6               [USB Floppy]
       Boot Option #7               [USB Lan]
       Boot Option #8               [Network:IBA 40G Slo...]
       Boot Option #9               [UEFI Hard Disk:RedH...]
       Boot Option #10              [UEFI CD/DVD]            →←: Select Screen
       Boot Option #11              [UEFI USB Hard Disk]     ↑↓: Select Item
       Boot Option #12              [UEFI USB CD/DVD]        Enter: Select
       Boot Option #13              [UEFI USB Key]           +/-: Change Opt.
       Boot Option #14              [UEFI USB Floppy]        F1: General Help
       Boot Option #15              [UEFI USB Lan]           F2: Previous Values
       Boot Option #16              [UEFI Network]           F3: Optimized Defaults
       Boot Option #17              [UEFI AP:UEFI: Built...] F4: Save & Exit
                                                            ESC: Exit
     ▶ Add New Boot Option
     ▶ Delete Boot Option

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```

Boot Mode Select

Use this feature to select the type of devices to be used for system boot. The options are Legacy, UEFI (Unified Extensible Firmware Interface), and **Dual.**

Fixed Boot Order Priorities

This feature prioritizes the order of a bootable device from which the system will boot. Press <Enter> on each entry from top to bottom to select devices.

When the item above -"Boot Mode Select" is set to **Dual** (default), the following items will be displayed for configuration:

- Boot Option #1 - Boot Option #17

When the item above -"Boot Mode Select" is set to Legacy, the following items will be display for configuration:

- Boot Option #1 - Boot Option #8

When the item above -"Boot Mode Select" is set to UEFI, the following items will be display for configuration:
- Boot Option #1 - Boot Option #9

Add New Boot Option

This feature allows the user to add a new boot option to the boot priority features for your system.

Add Boot Option

Use this feature to specify the name for the new boot option.

Path for Boot Option

Use this feature to enter the path for the new boot option in the format fsx:\path\filename.efi.

Boot Option File Path

Use this feature to specify the file path for the new boot option.

Create

After the name and the file path for the boot option are set, press <Enter> to create the new boot option in the boot priority list.

▶Add New Driver Option

Use this feature to select a new driver to add to the boot priority list.

Add Driver Option

Use this feature to specify the name of the driver that the new boot option is added to.

Path for Driver Option

Use this feature to specify the path to the driver that the new boot option is added to.

Driver Option File Path

Use this feature to specify the file path of the driver that the new boot option is added to.

Create

After the driver option name and the file path are set, press <Enter> to enter to submenu and click OK to create the new boot option drive.

▶Delete Boot Option

Use this feature to select a boot device to delete from the boot priority list.

Delete Boot Option

Use this feature to remove an EFI boot option from the boot priority list.

▶Delete Driver Option

Use this item to select a boot driver to delete from the boot priority list.

Delete Drive Option
Select the target boot driver to delete from the boot priority list.

▶Hard Disk Drive BBS Priorities

• Boot Option #1 - #5

▶Network Drive BBS Priorities

• Boot Option #1

▶USB Key Drive BBS Priorities

• Boot Option #1

▶UEFI Hard Disk Drive BBS Priorities

• Boot Option #1

▶UEFI USB Key Drive BBS Priorities

• Boot Option #1

▶UEFI Application Boot Priorities

• Boot Option #1

4.8 Save & Exit

Select the Save & Exit tab from the BIOS setup screen to configure the settings below.
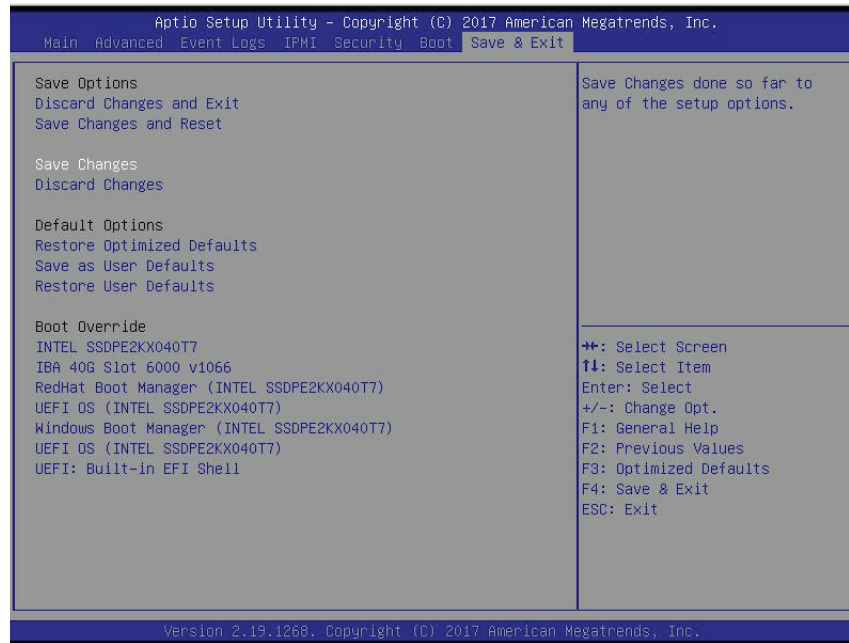
Save Options

Discard Changes and Exit

Select this option to quit the BIOS setup without making any permanent changes to the system configuration and reboot the computer. Select Discard Changes and Exit from the Exit menu and press <Enter>.

Save Changes and Reset

When you have completed the system configuration changes, select this option to leave the BIOS setup utility and reboot the computer for the new system configuration parameters to take effect. Select Save Changes and Exit from the Exit menu and press <Enter>.

Save Changes

When you have completed the system configuration changes, select this option to save all changes made. This will not reset (reboot) the system.

Discard Changes

Select this option and press <Enter> to discard all the changes and return to the AMI BIOS setup utility.

Default Options

Restore Optimized Defaults

To set this feature, select Restore Defaults from the Exit menu and press <Enter> to load manufacturer default settings which are intended for maximum system performance but not for maximum stability.

Save As User Defaults

To set this feature, select Save as User Defaults from the Exit menu and press <Enter>. This enables the user to save any changes to the BIOS setup for future use.

Restore User Defaults

To set this feature, select Restore User Defaults from the Exit menu and press <Enter>. Use this feature to retrieve user-defined settings that were saved previously.

Boot Override

This feature allows the user to override the Boot priorities sequence in the Boot menu, and immediately boot the system with a device specified by the user instead of the one specified in the boot list. This is a one-time override.

Appendix A

Software Installation

A.1 Installing Software Programs

The Supermicro FTP site contains drivers and utilities for your system at ftp://ftp.supermicro.com. Some of these must be installed, such as the chipset driver.

After accessing the FTP site, go into the CDR_Images directory and locate the ISO file for your motherboard. Download this file to create a CD/DVD of the drivers and utilities it contains. (You may also use a utility to extract the ISO file if preferred.)

After creating a CD/DVD with the ISO files, insert the disk into the CD/DVD drive on your system and the display shown in the image below should appear.

Another option is to go to the Supermicro website at http://www.supermicro.com/products/. Find the product page for your motherboard here, where you may download individual drivers and utilities to your hard drive or a USB flash drive and install from there.

Note: To install the Windows OS, please refer to the instructions posted on our website at http://www.supermicro.com/support/manuals/.
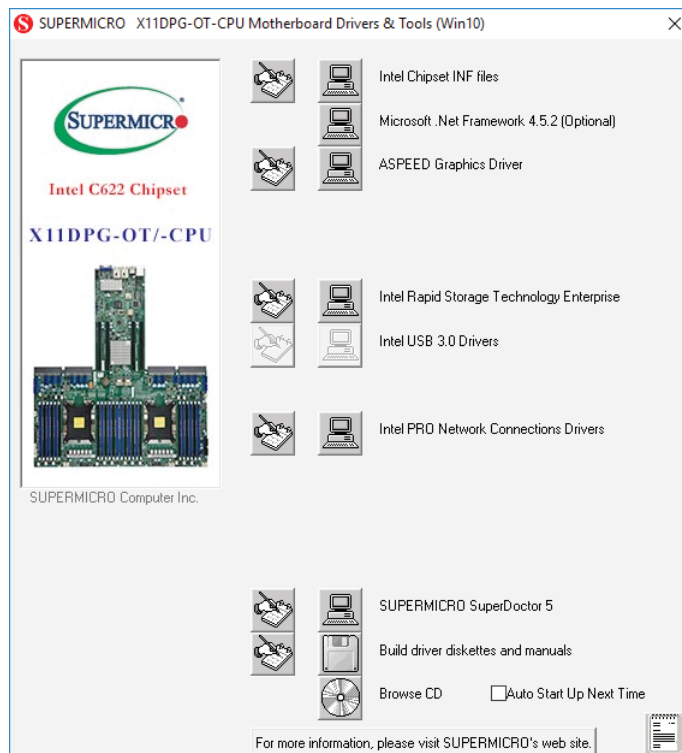
Driver/Tool Installation Display Screen

Click the icons showing a hand writing on the paper to view the readme files for each item. Click a computer icon to the right of an item to install an item (from top to the bottom) one at a time. After installing each item, you must reboot the system before proceeding with the next item on the list. The bottom icon with a CD on it allows you to view the entire contents of the CD.

When making a storage driver diskette by booting into a driver CD, please set the SATA Configuration to "Compatible Mode" and configure SATA as IDE in the BIOS Setup. After making the driver diskette, be sure to change the SATA settings back to your original settings.

A.2 SuperDoctor® 5

The Supermicro SuperDoctor 5 is a hardware monitoring program that functions in a command-line or web-based interface in Windows and Linux operating systems. The program monitors system health information such as CPU temperature, system voltages, system power consumption, fan speed, and provides alerts via email or Simple Network Management Protocol (SNMP).

SuperDoctor 5 comes in local and remote management versions and can be used with Nagios to maximize your system monitoring needs. With SuperDoctor 5 Management Server (SSM Server), you can remotely control power on/off and reset chassis intrusion for multiple systems with SuperDoctor 5 or IPMI. SD5 Management Server monitors HTTP, FTP, and SMTP services to optimize the efficiency of your operation.

Note: The default Username and Password for SuperDoctor 5 is admin / admin.

SuperDoctor 5 Interface Display Screen (Health Information)

Note: The SuperDoctor 5 program and user's manual can be downloaded from the Supermicro website at http://www.supermicro.com/products/nfo/sms_sd5.cfm.

Appendix B

Standardized Warning Statements

The following statements are industry standard warnings provided to the user to avoid situations that bodily injuries may occur. Should you have questions or experience difficulty, contact Supermicro's Technical Support department for assistance. Only certified technicians should attempt to install or configure components.

Read this section in its entirety before installing or configuring components.

These warnings may also be found on our website at http://www.supermicro.com/about/policies/safety_information.cfm.

Battery Handling

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

電池の取り扱い

電池交換が正しく行われなかった場合、破裂の危険性があります。交換する電池はメーカーが推奨する型、または同等のものを使用下さい。使用済電池は製造元の指示に従って処分して下さい。

警告

电池更换不当会有爆炸危险。请只使用同类电池或制造商推荐的功能相当的电池更换原有电池。请按制造商的说明处理废旧电池。

警告

電池更換不當會有爆炸危險。請使用製造商建議之相同或功能相當的電池更換原有電池。請按照製造商的說明指示處理廢棄舊電池。

Warnung

Bei Einsetzen einer falschen Batterie besteht Explosionsgefahr. Ersetzen Sie die Batterie nur durch den gleichen oder vom Hersteller empfohlenen Batterietyp. Entsorgen Sie die benutzten Batterien nach den Anweisungen des Herstellers.

Attention

Danger d'explosion si la pile n'est pas remplacée correctement. Ne la remplacer que par une pile de type semblable ou équivalent, recommandée par le fabricant. Jeter les piles usagées conformément aux instructions du fabricant.

¡Advertencia!

Existe peligro de explosión si la batería se reemplaza de manera incorrecta. Reemplazar la batería exclusivamente con el mismo tipo o el equivalente recomendado por el fabricante. Desechar las baterías gastadas según las instrucciones del fabricante.

אזהרה !
קיימת סכנת פיצוץ של הסוללה במידה והוחלפה בדרך לא תקינה. יש להחליף את הסוללה בסוג התואם מחברת יצרן מומלצת.

סילוק הסוללות המשומשות יש לבצע לפי הוראות היצרן.

هناك خطر من انفجار في حالة استبدال البطارية بطريقة غير صحيحة فعليك استبدال البطارية
فقط بنفس النوع أو ما يعادلها كما أوصت به الشركة المصنعة
تخلص من البطاريات المستعملة وفقا لتعليمات الشركة الصانعة

경고!

배터리가 올바르게 교체되지 않으면 폭발의 위험이 있습니다. 기존 배터리와 동일하거나 제조사에서 권장하는 동등한 종류의 배터리로만 교체해야 합니다. 제조사의 안내에 따라 사용된 배터리를 처리하여 주십시오.

Waarschuwing

Er is ontploffingsgevaar indien de batterij verkeerd vervangen wordt. Vervang de batterij slechts met hetzelfde of een equivalent type die door de fabrikant aanbevolen wordt. Gebruikte batterijen dienen overeenkomstig fabrieksvoorschriften afgevoerd te worden.

Product Disposal

Warning! Ultimate disposal of this product should be handled according to all national laws and regulations.

製品の廃棄

この製品を廃棄処分する場合、国の関係する全ての法律・条例に従い処理する必要があります。

警告

本产品的废弃处理应根据所有国家的法律和规章进行。

警告

本產品的廢棄處理應根據所有國家的法律和規章進行。

Warnung

Die Entsorgung dieses Produkts sollte gemäß allen Bestimmungen und Gesetzen des Landes erfolgen.

¡Advertencia!

Al deshacerse por completo de este producto debe seguir todas las leyes y reglamentos nacionales.

Attention

La mise au rebut ou le recyclage de ce produit sont généralement soumis à des lois et/ou directives de respect de l'environnement. Renseignez-vous auprès de l'organisme compétent.

סילוק המוצר

אזהרה !
סילוק סופי של מוצר זה חייב להיות בהתאם להנחיות וחוקי המדינה.

عند التخلص النهائي من هذا المنتج ينبغي التعامل معه وفقا لجميع القوانين واللوائح الوطنية

경고!
이 제품은 해당 국가의 관련 법규 및 규정에 따라 폐기되어야 합니다.

Waarschuwing

De uiteindelijke verwijdering van dit product dient te geschieden in overeenstemming met alle nationale wetten en reglementen.

Appendix C

UEFI BIOS Recovery

Warning: Do not upgrade the BIOS unless your system has a BIOS-related issue. Flashing the wrong BIOS can cause irreparable damage to the system. In no event shall Supermicro be liable for direct, indirect, special, incidental, or consequential damages arising from a BIOS update. If you need to update the BIOS, do not shut down or reset the system while the BIOS is updating to avoid possible boot failure.

C.1 Overview

The Unified Extensible Firmware Interface (UEFI) provides a software-based interface between the operating system and the platform firmware in the pre-boot environment. The UEFI specification supports an architecture-independent mechanism that will allow the UEFI OS loader stored in an add-on card to boot the system. The UEFI offers clean, hands-off management to a computer during system boot.

C.2 Recovering the UEFI BIOS Image

A UEFI BIOS flash chip consists of a recovery BIOS block and a main BIOS block (a main BIOS image). The recovery block contains critical BIOS codes, including memory detection and recovery codes for the user to flash a healthy BIOS image if the original main BIOS image is corrupted. When the system power is turned on, the recovery block codes execute first. Once this process is complete, the main BIOS code will continue with system initialization and the remaining POST (Power-On Self-Test) routines.

Note 1: Follow the BIOS recovery instructions below for BIOS recovery when the main BIOS block crashes.

Note 2: When the BIOS recovery block crashes, you will need to follow the procedures to make a Returned Merchandise Authorization (RMA) request. (For a RMA request, please see section 3.5 for more information). Also, you may use the Supermicro Update Manager (SUM) Out-of-Band (OOB) (https://www.supermicro.com.tw/products/nfo/SMS_SUM.cfm) to reflash the BIOS.

C.3 Recovering the Main BIOS Block with a USB Device

This feature allows the user to recover the main BIOS image using a USB-attached device without additional utilities used. A USB flash device such as a USB Flash Drive, or a USB CD/DVD ROM/RW device can be used for this purpose. However, a USB Hard Disk drive cannot be used for BIOS recovery at this time.

The file system supported by the recovery block is FAT (including FAT12, FAT16, and FAT32) which is installed on a bootable or non-bootable USB-attached device. However, the BIOS might need several minutes to locate the SUPER.ROM file if the media size becomes too large due to the huge volumes of folders and files stored in the device.

To perform UEFI BIOS recovery using a USB-attached device, follow the instructions below.

1. Using a different machine, copy the "Super.ROM" binary image file into the Root "\" directory of a USB device or a writable CD/DVD.

   Notes: 1. If you cannot locate the "Super.ROM" file in your drive disk, visit our website at www.supermicro.com to download the BIOS package. Extract the BIOS binary image into a USB flash device and rename it "Super.ROM" for the BIOS recovery use. 2. Before recovering the main BIOS image, confirm that the "Super.ROM" binary image file you are going to download is the same version or a close version meant for your motherboard.

2. Insert the USB device that contains the new BIOS image ("Super.ROM") into your USB drive and reset the system when the following screen appears.

3. After locating the healthy BIOS binary image, the system will enter the BIOS Recovery menu as shown below.
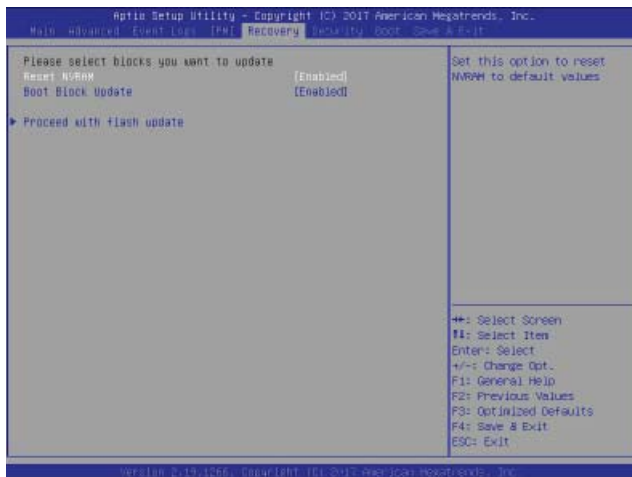
🖉 **Note**: At this point, you may decide whether you want to start the BIOS recovery. If you decide to proceed with BIOS recovery, follow the procedures below.

4. When the screen as shown above displays, use the arrow keys to select the item "Proceed with flash update" and press the <Enter> key. You will see the BIOS recovery progress as shown in the screen below.

🖉 **Note:** _Do not interrupt the BIOS flashing process until it has completed_.
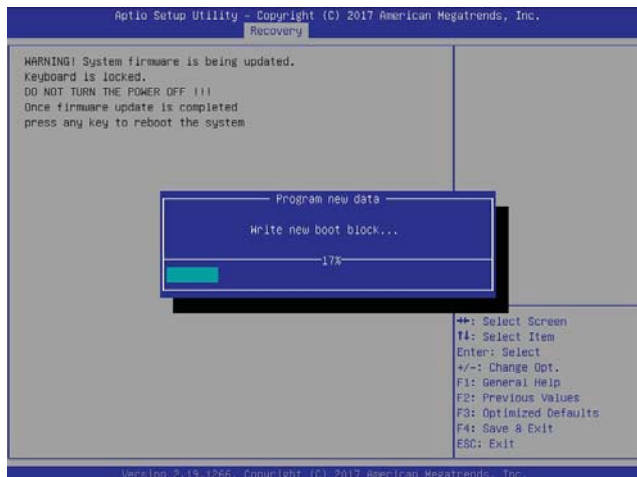
5. After the BIOS recovery process is complete, press any key to reboot the system.
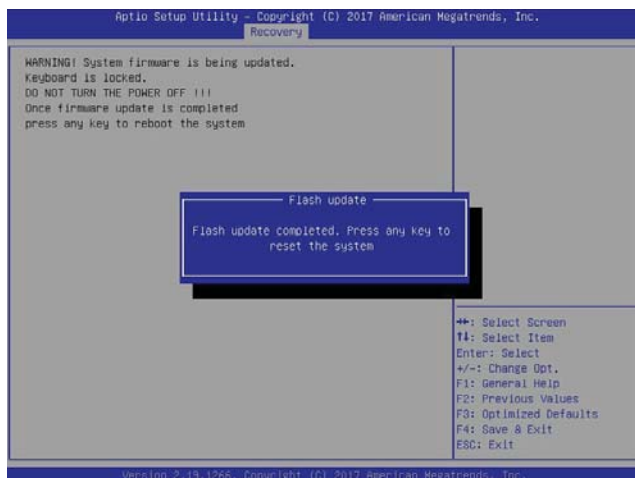
6. Using a different system, extract the BIOS package into a USB flash drive.

7. Press <Del> continuously during system boot to enter the BIOS Setup utility. From the top of the tool bar, select Boot to enter the submenu. From the submenu list, select Boot Option #1 as shown below. Then, set Boot Option #1 to [UEFI AP:UEFI: Built-in EFI Shell]. Press <F4> to save the settings and exit the BIOS Setup utility.
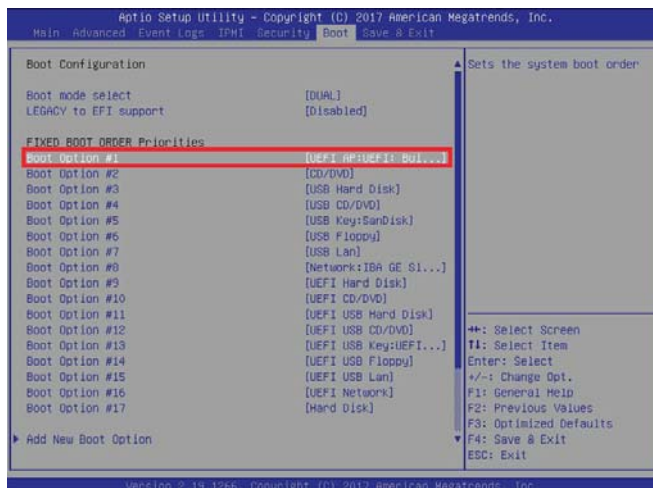
8. When the UEFI Shell prompt appears, type fs# to change the device directory path. Go to the directory that contains the BIOS package you extracted earlier from Step 6. Enter flash.nsh BIOSname.### at the prompt to start the BIOS update process.

> ✎ **Note:** *Do not interrupt this process* until the BIOS flashing is complete.

9. The screen above indicates that the BIOS update process is complete. When you see the screen above, unplug the AC power cable from the power supply, clear CMOS, and plug the AC power cable in the power supply again to power on to reboot the system.

10. Press <Del> continuously to enter the BIOS Setup utility.

11. Press <F3> to load the default settings.

12. After loading the default settings, press <F4> to save the settings and exit the BIOS Setup utility.