# X11DPFF-SN

USER'S MANUAL

Revision 1.1b

The information in this user's manual has been carefully reviewed and is believed to be accurate. The vendor assumes no responsibility for any inaccuracies that may be contained in this document, and makes no commitment to update or to keep current the information in this manual, or to notify any person or organization of the updates. **Please Note: For the most up-to-date version of this manual, please see our website at www.supermicro.com.**

Super Micro Computer, Inc. ("Supermicro") reserves the right to make changes to the product described in this manual at any time and without notice. This product, including software and documentation, is the property of Supermicro and/or its licensors, and is supplied only under a license. Any use or reproduction of this product is not allowed, except as expressly permitted by the terms of said license.

IN NO EVENT WILL SUPER MICRO COMPUTER, INC. BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL, SPECULATIVE OR CONSEQUENTIAL DAMAGES ARISING FROM THE USE OR INABILITY TO USE THIS PRODUCT OR DOCUMENTATION, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. IN PARTICULAR, SUPER MICRO COMPUTER, INC. SHALL NOT HAVE LIABILITY FOR ANY HARDWARE, SOFTWARE, OR DATA STORED OR USED WITH THE PRODUCT, INCLUDING THE COSTS OF REPAIRING, REPLACING, INTEGRATING, INSTALLING OR RECOVERING SUCH HARDWARE, SOFTWARE, OR DATA.

Any disputes arising between manufacturer and customer shall be governed by the laws of Santa Clara County in the State of California, USA. The State of California, County of Santa Clara shall be the exclusive venue for the resolution of any such disputes. Supermicro's total liability for all claims will not exceed the price paid for the hardware product.

FCC Statement: This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in industrial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the manufacturer's instruction manual, may cause harmful interference with radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case you will be required to correct the interference at your own expense.

California Best Management Practices Regulations for Perchlorate Materials: This Perchlorate warning applies only to products containing CR (Manganese Dioxide) Lithium coin cells. "Perchlorate Material-special handling may apply. See www.dtsc.ca.gov/hazardouswaste/perchlorate".

WARNING: This product can expose you to chemicals including lead, known to the State of California to cause cancer and birth defects or other reproductive harm. For more information, go to www.P65Warnings.ca.gov.

The products sold by Supermicro are not intended for and will not be used in life support systems, medical equipment, nuclear facilities or systems, aircraft, aircraft devices, aircraft/emergency communication devices or other critical systems whose failure to perform be reasonably expected to result in significant injury or loss of life or catastrophic property damage. Accordingly, Supermicro disclaims any and all liability, and should buyer use or sell such products for use in such ultra-hazardous applications, it does so entirely at its own risk. Furthermore, buyer agrees to fully indemnify, defend and hold Supermicro harmless for and against any and all claims, demands, actions, litigation, and proceedings of any kind arising out of or related to such ultra-hazardous use or sale.

Manual Revision 1.1b

Release Date: September 17, 2020

# 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 X11DPFF-SN motherboard.

## About This Motherboard

The X11DPFF-SN motherboard features dual Intel® Xeon Scalable-SP or 2nd Generation Intel® Xeon Scalable-SP processors (Socket P0) with the TDP (Thermal Design Power) of up to 165W and two UPIs (Ultra Path Interconnects) of up to 10.4 GT/s (See the note below). With the Intel C621 built-in, this motherboard supports twelve SATA 3.0 connections, two PCI-E 3.0 low-profile riser slots, four NVMe ports, one Super I/O (SIOM) slot, two hybrid M.2 slots, and up to 3TB DDR4 ECC 2933*2666/2400/2133 MHz memory in 12 DIMM slots. It also supports up to 4TB memory with DCPMM modules. The X11DPFF-SN offers unprecedented system capability and unparalleled I/O expandability, optimized for High-Performance Computing (HPC) and Hyper-converge/Hyper-scale platforms. This motherboard is ideal for use in web-hosting, Hadoop applications, and ERP/MRP servers. 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/.

**Notes**: **1.** UPI/memory speeds are dependent on the processors installed in your system. **2.** Support for 2933 MHz memory is dependent on the CPU SKU

## Manual Organization

**Chapter 1** describes the features, specifications, and performance of the motherboard, and provides detailed information on the C621 chipset.

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

**Chapter 3** 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** provides UEFI BIOS Error Beep Codes.

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

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

**Appendix D** provides UEFI BIOS Recovery instructions**.**

**Appendix E** provides information on how to configure VROC RAID settings.

**Appendix F** provides information on how to configure secure boot settings.

**Appendix G** provides information on how to configure iSCSI settings.

**Appendix H** provides information on how to configure Network Interface Card (NIC) settings

# Contacting Supermicro


**Headquarters**

| | |
|---|---|
| Address: | Super Micro Computer, Inc.<br>980 Rock Ave.<br>San Jose, CA 95131 U.S.A. |
| Tel: | +1 (408) 503-8000 |
| Fax: | +1 (408) 503-8008 |
| Email: | marketing@supermicro.com (General Information)<br>support@supermicro.com (Technical Support) |
| Website: | www.supermicro.com |

**Europe**

| | |
|---|---|
| Address: | Super Micro Computer B.V.<br>Het Sterrenbeeld 28, 5215 ML<br>'s-Hertogenbosch, The Netherlands |
| Tel: | +31 (0) 73-6400390 |
| Fax: | +31 (0) 73-6416525 |
| Email: | sales@supermicro.nl (General Information)<br>support@supermicro.nl (Technical Support)<br>rma@supermicro.nl (Customer Support) |
| Website: | www.supermicro.nl |

**Asia-Pacific**

| | |
|---|---|
| Address: | Super Micro Computer, Inc.<br>3F, No. 150, Jian 1st Rd.<br>Zhonghe Dist., New Taipei City 235<br>Taiwan (R.O.C) |
| Tel: | +886-(2) 8226-3990 |
| Fax: | +886-(2) 8226-3992 |
| Email: | support@supermicro.com.tw |
| Website: | www.supermicro.com.tw |

# Table of Contents


***Chapter 1 Introduction***

1.1 Checklist ....9
Quick Reference Table ....13
Motherboard Features ....15
1.2 Processor and Chipset Overview ....19
1.3 Special Features ....20
1.4 System Health Monitoring ....20
Onboard Voltage Monitoring ....20
Fan Status Monitor with Firmware Control ....20
Environmental Temperature Control ....20
System Resource Alert ....21
1.5 ACPI Features ....21
1.6 Power Supply ....21
1.7 Advanced Power Management ....21
Intel® Intelligent Power Node Manager (IPNM) ....21
Management Engine (ME) ....22
1.8 Intel® Optane DC Persistent Memory Overview ....22

***Chapter 2 Installation***

2.1 Static-Sensitive Devices ....23
Precautions ....23
Unpacking ....23
2.2 Motherboard Installation ....24
Tools Needed ....24
Location of Mounting Holes ....24
Installing the Motherboard ....25
2.3 Processor and Heatsink Installation ....26
Intel Xeon Scalable-SP and 2nd Gen Intel Xeon Scalable-SP Processors ....26
Overview of the Processor Socket Assembly ....27
Overview of the Processor Heatsink Module (PHM) ....28
Attaching the Processor to the Narrow Processor Clip to Create the Processor Package Assembly ....29
Attaching the Processor Package Assembly to the Heatsink to Form the Processor Heatsink Module (PHM) ....30

Preparing the CPU Socket for Installation ....31
Removing the Dust Cover from the CPU Socket ....31
Installing the Processor Heatsink Module (PHM) ....32
Removing the Processor Heatsink Module (PHM) from the Motherboard ....33
2.4 Memory Support and Installation ....34
Memory Support ....34
General Memory Population Requirements ....34
DDR4 Memory Support for Intel Xeon Scalable-SP Processors ....35
DDR4 Memory Support for 2nd Gen Intel Xeon Scalable-SP Processors ....36
DIMM Population Guidelines for Optimal Performance ....37
DIMM Population Table ....38
DIMM Installation ....41
DIMM Module Removal ....41
2.5 Front Panel I/O Ports and Connectors ....42
2.6 Connectors and Headers ....47
2.7 Jumper Settings ....57
How Jumpers Work ....57
2.8 LED Indicators ....61

***Chapter 3 Troubleshooting***

3.1 Troubleshooting Procedures ....65
Before Power On ....65
No Power ....65
System Boot Failure ....65
Memory Errors ....66
Losing the System's Setup Configuration ....66
When the System Becomes Unstable ....67
3.2 Technical Support Procedures ....68
3.3 Frequently Asked Questions ....69
3.4 Battery Removal and Installation ....71
3.5 Returning Merchandise for Service ....72

***Chapter 4 UEFI BIOS***

4.1 Introduction ....73
4.2 Main Setup ....74
4.3 Advanced Setup Configurations ....76

4.4 Event Logs ....121
4.5 IPMI ....123
4.6 Security Settings ....126
4.7 Boot Settings ....130
4.8 Save & Exit ....132
***Appendix A UEFI BIOS POST Codes***
A.1 BIOS Error POST (Beep) Codes ....134
A.2 Additional BIOS POST Codes ....134
***Appendix B Software Installation***
B.1 Microsoft Windows OS Installation ....135
B.2 Driver Installation ....137
B.3 SuperDoctor® 5 ....138
B.4 IPMI ....139
B.5 Logging into the BMC (Baseboard Management Controller) ....139
***Appendix C Standardized Warning Statements***
***Appendix D UEFI BIOS Recovery***
D.1 Overview ....143
D.2 Recovering the UEFI BIOS Image ....143
D.3 Recovering the Main BIOS Block with a USB Device ....144
***Appendix E Configuring VROC RAID Settings***
E.1 All Intel VMD Controllers Menu ....148
E.2 Configuring RAID Settings ....152
E.3 Use of Journaling Drive ....168
***Appendix F Secure Boot Settings***
F.1 Boot Mode Select Feature ....172
F.2 Secure Boot/ Secure Boot Mode/ CSM Support Features ....173
F.3 Secure Boot Settings ....174
F.4 Key Management Settings ....177
***Appendix G Configuring iSCSI Settings***
G.1 PCIe/PCI/PnP Features ....194
G.2 Configuring iSCSI Settings ....197
***Appendix H Configuring Network Interface Card (NIC) Settings***
H.1 Network Interface Card (NIC) Settings ....216

# 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.

In addition to the motherboard, several important parts that are included with your shipment are listed below. If anything listed is damaged or missing, please contact your retailer.

## 1.1 Checklist

This motherboard was designed to be used with an SMCI-proprietary chassis as an integrated server platform. There will be no shipping package included in the shipment.

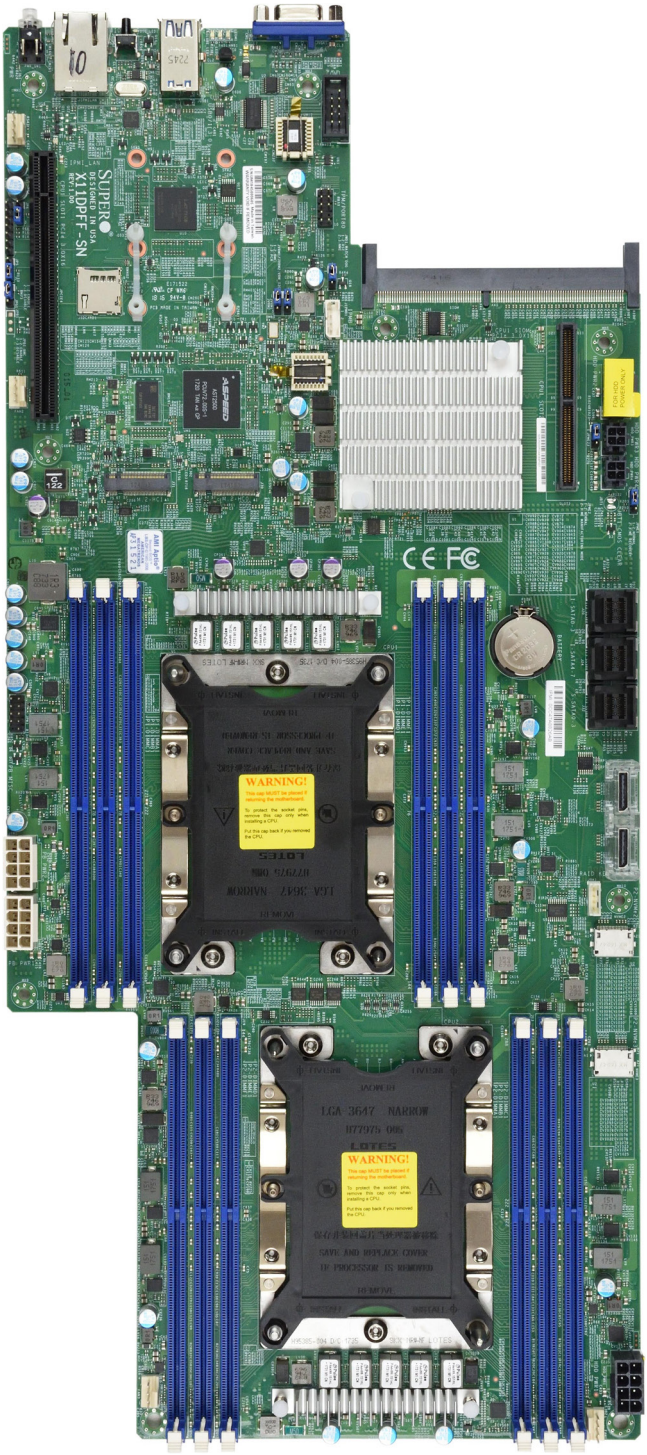
## Important Links

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

- Supermicro product manuals: http://www.supermicro.com/support/manuals/
- Product drivers and utilities: http://www.supermicro.com/wftp
- Product safety info: http://www.supermicro.com/about/policies/safety_information.cfm
- A secure data deletion tool designed to fully erase all data from storage devices can be found at our website: https://www.supermicro.com/about/policies/disclaimer.cfm?url=/wftp/utility/Lot9_Secure_Data_Deletion_Utility/
- If you have any questions, please contact our support team at: support@supermicro.com

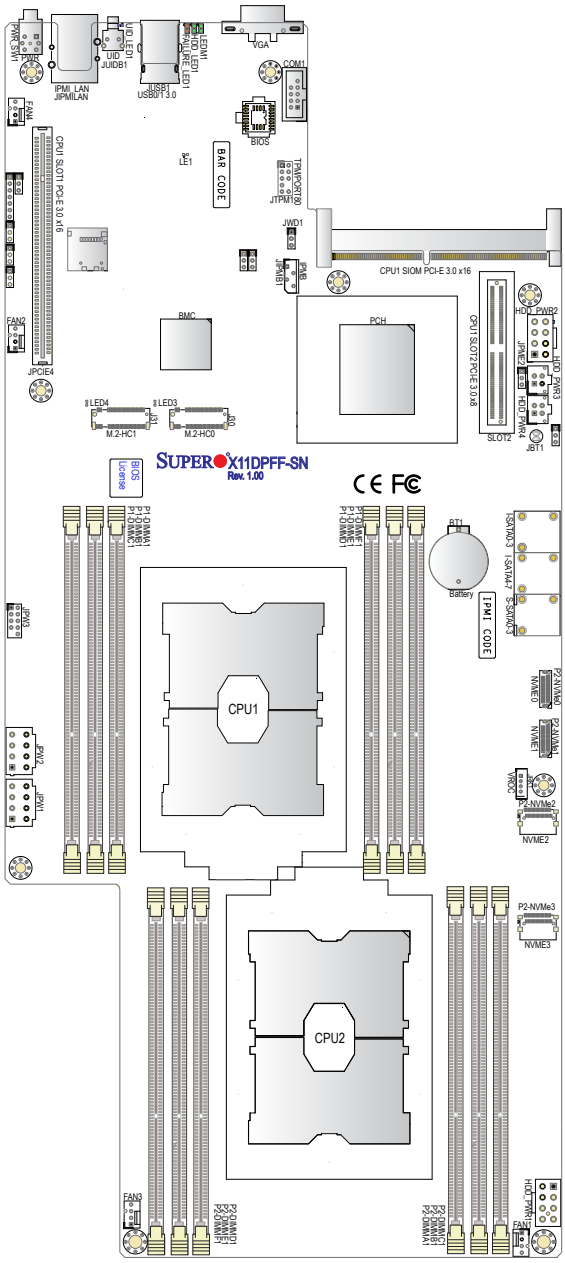
This manual may be periodically updated without notice. Please check the Supermicro website for possible updates to the manual revision level.

**Figure 1-1. X11DPFF-SN 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. X11DPFF-SN Motherboard Layout**
**(not drawn to scale)**

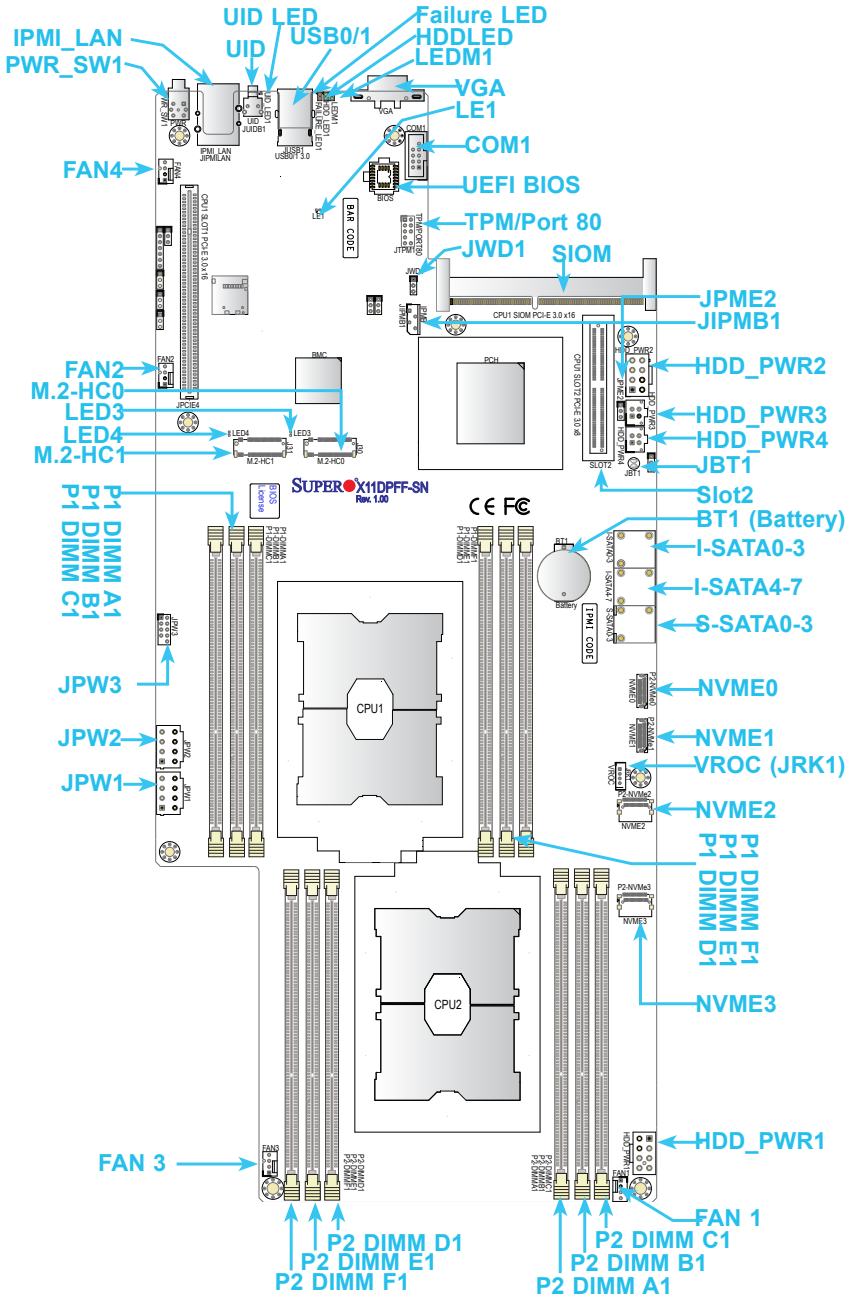



**Notes:**

**1.** Components not documented are for internal testing only.

**2.** Intel VMD is supported by PCI-E Slots (JPCIE4 and SLOT2) and NVMe Ports (NVME0/1/2/3). After you've enabled VMD in the BIOS on a PCI-E slot of your choice, this PCI-E slot will be dedicated for VMD use only, and it will no longer support any PCI-E device. To re-activate this slot for PCI-E use, please disable VMD in the BIOS.

**Figure 1-3. X11DPFF-SN Motherboard Layout for Quick Reference (not drawn to scale)**




**Notes:**

- See Chapter 2 for detailed information on jumpers, I/O ports, and front panel connections.
- "▪" indicates the location of Pin 1.
- Jumpers/components/LED indicators not indicated are used for internal testing only.
- 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.
- 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.

## Quick Reference Table

| Jumper | Description | Default Setting |
|---|---|---|
| JBT1 | CMOS Clear | Open (Normal) |
| JPME2 | ME Manufacturing Mode | Pins 1-2 (Normal) |
| JWD1 | Watch Dog Timer Enable | Pins 1-2 (Reset) |

| Connector | Description |
|---|---|
| Battery (BT1) | Onboard CMOS battery |
| CPU1 Slot1 PCI-E (JPCIE4) | PCI-E 3.0 x16 slot supported by CPU1 |
| CPU1 Slot2 PCI-E (Slot 2) | PCI-E 3.0 x8 slot supported by CPU1 |
| CPU1 SIOM (SIOM) | PCI-E 3.0 x16 Super IO Module (SIOM) slot supported by CPU1 |
| COM (JCOM1) | COM Port1 |
| FAN1-FAN4 | System/CPU cooling fan headers |
| IPMB (JIPMB1) | System Management Bus header for IPMI 2.0 |
| IPMI_LAN (JIPMILAN) | Dedicated IPMI_LAN port supported by BMC (Baseboard Management Controller) |
| HDD_PWR1/2 | 8-pin power connectors (1/2) header used for HDD devices |
| HDD_PWR3/4 | 4-pin power connectors (3/4) header used for HDD devices |
| JPW1/JPW2 (PB PWR1/2) | 12-V 8-pin power connectors for ADPs (via cables connected to power adaptor cards) |
| JPW3 (PB MISC) | 8-pin auxiliary power connector for ADP (via a cable connected to a power adaptor card) |
| M.2-HC0/M.2-HC1 (J30/J31) | PCI-E/SATA hybrid M.2 slots (M.2 slots with both PCI-E and SATA support) |
| PN-NVMe01/2/3 (NVME0/1/2/3) | Onboard NVMe connectors used for PCI-E high-speed storage devices supported by CPU2 |
| PWR (PWR_SW1) | Front panel power (on/off) switch |
| (I-)SATA0-3, 4-7 | SATA 3.0 connections supported by Intel PCH (I-SATA 0-3, 4-7) |
| (S-)SATA0-3 | SATA 3.0 ports supported by Intel PCH (S-SATA 0-3) |
| TPM/Port80 (JTPM1) | Trusted Platform Module (TPM)/Port 80 connector |
| USB0/1 (JUSB1) | Front panel USB 3.0 ports 0/1 |
| UID (JUID1) | Unit Identifier (UID) button |
| VGA (JVGA1) | VGA port |
| VROC (JRK1) | Intel VROC RAID Key header for NVMe SSD |

| LED | Description | Status |
|---|---|---|
| FAILURE_LED1 | Overheat/Fan Fail LED | Solid Red: OH/Fan Failure |
| HDD_LED1 | HDD Activity LED | Blinking Green: HDD Active |
| LE1 | CPLD Heartbeat LED | Blinking Green: CPLD Normal |
| LED3 | M.2 LED (for M.2-HC0-J30) | Blinking Green: M.2-HC0 Active |
| LED4 | M.2 LED (for M.2-HC1-J31) | Blinking Green: M.2-HC1 Active |
| LEDM1 | BMC Heartbeat LED | Blinking Green: BMC Normal |
| UID_LED1 | UID LED | Solid Blue: Unit Identified |

**Note 1**: Intel VMD is supported by PCI-E Slots (JPCIE4 and SLOT2) and NVMe Ports (NVME0/1/2/3)

**Note 2**: After you've enabled VMD in the BIOS on a PCI-E slot of your choice, this PCI-E slot will be dedicated for VMD use only, and it will no longer support any PCI-E device. To re-activate this slot for PCI-E use, please disable VMD in the BIOS.

## Motherboard Features

| Motherboard Features | |
|---|---|
| **CPU** | |
| • This motherboard supports dual Intel Xeon Scalable-SP and 2nd Gen Intel Xeon Scalable-SP processors which offer two Intel UltraPath Interconnects (UPIs) links of up to 10.4 GT/s<br>**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 in this chapter to determine which slots or devices may be affected. | |
| **Memory** | |
| • Integrated memory controller embedded in the processor supports up to 3TB of 3DS Load Reduced DIMM (3DS LRDIMM), Load Reduced DIMM (LRDIMM), 3DS Registered DIMM (3DS RDIMM), Registered DIMM (RDIMM), and NVDIMM DDR4 (288-pin) ECC memory with speed of 2933*/2666/2400/2133 MHz in 12 slots<br>**Note: 1.** Up to 4TB of memory is supported with DCPMM modules installed. **2.** Support for 2933 MHz memory is dependent on the CPU SKU. | |
| **DIMM Size** | |
| • Up to 128 GB at 1.2V<br>**Note 1:** Memory speed support depends on the processors used in the system.<br>**Note 2:** For the latest CPU/memory updates, please refer to our website at http://www.supermicro.com/products/motherboard. | |
| **Chipset** | |
| • Intel C621 chipset | |
| **Expansion Slots** | |
| • One (1) PCI-E 3.0 x16 slot supported by CPU 1 (JPCIE4)<br>• One (1) PCI-E 3.0 x8 slot supported by CPU 1 (Slot2)<br>• One (1) PCI-E 3.0 x16 Super I/O Module slot supported by CPU 1 (SIOM)<br>• Four (4) NVMe for PCI-E high-speed storageb devices supported by CPU2 (PN-NVMe 0/1/2/3)<br>• One (1) Riser card header for SDD1 devices<br>• Two (2) PCI-E M.2 slots (M.2-HC0/M.2-HC1) | |
| **BaseBoard Management Controller (BMC)** | |
| • ASPEED AST 2500 Baseboard Controller (BMC) supports IPMI 2.0<br>• One (1) Dedicated IPMI LAN located on the IO front panel (JIPMILAN) | |
| **Graphics** | |
| • Graphics controller via ASPEED AST 2500 BMC (Baseboard Management Controller) | |
| **Network Connection** | |
| • SIOM Networking support<br>• One (1) IPMI-dedicated LAN port supported by the AST2500 BMC on the I/O front panel | |
| **I/O Devices** | |
| • Serial (COM) Port | • One (1) Fast UART 16550 port on the motherboard (JCOM1) |
| • SATA 3.0 | • Two (2) SATA 3.0 headers with eight (8) SATA connections supported by Intel PCH (I-SATA 0-3, 4-7)<br>• One (1) SATA 3.0 header with four (4) SATA connections supported by Intel PCH (S-SATA 0-3) |
| • RAID (PCH) | • RAID 0, 1, 5, and 10 |

## Motherboard Features

### Peripheral Devices

- Two (2) USB 3.0 ports on the I/O front panel (USB 0/1)

### UEFI BIOS

- 32 MB SPI AMI UEFI BIOS® SM Flash UEFI BIOS
- Support of ACPI 3.0/4.0, USB keyboard, BMC GPIO, PCI-E F/W 3.0, Plug-and-Play (PnP), SPI dual/quad speed, riser-card auto detection, and SMUEFI BIOS 2.7 or later

### Power Management

- Main switch override mechanism
- Power-on mode for AC power recovery
- Intel® Intelligent Power Node Manager 4.0 (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, and PCH
- CPU System LED and control
- CPU Thermal Trip support
- Status monitor for on/off control
- CPU Thermal Design Power (TDP) support of up to 165W (See Note 1 on next page.)

### Fan Control

- Fan status monitoring via IPMI
- Dual cooling zone
- Multi fan speed control support via onboard BMC
- Pulse Width Modulation (PWM) fan control

### System Management

- Trusted Platform Module (TPM) support
- PECI (Platform Environment Control Interface) 2.0 support
- System resource alert via SuperDoctor® 5
- Watch Dog, NMI, IPMIView, SMCIIPMITOOL, SSH, SPM, SUM-Inband, SUM-OOB, Server platform service
- Chassis intrusion header and detection (Note: For Chassis Intrusion to work properly, please connect an optional external speaker to the onboard speaker header at JD1.)

### LED Indicators

- CPU/Overheating
- Fan Failure
- System Heartbeat
- HDD Activity, UID LED
- BMC Heartbeat LED
- LAN Activity
- PCI-E M.2 Slot Activity LED

### Dimensions

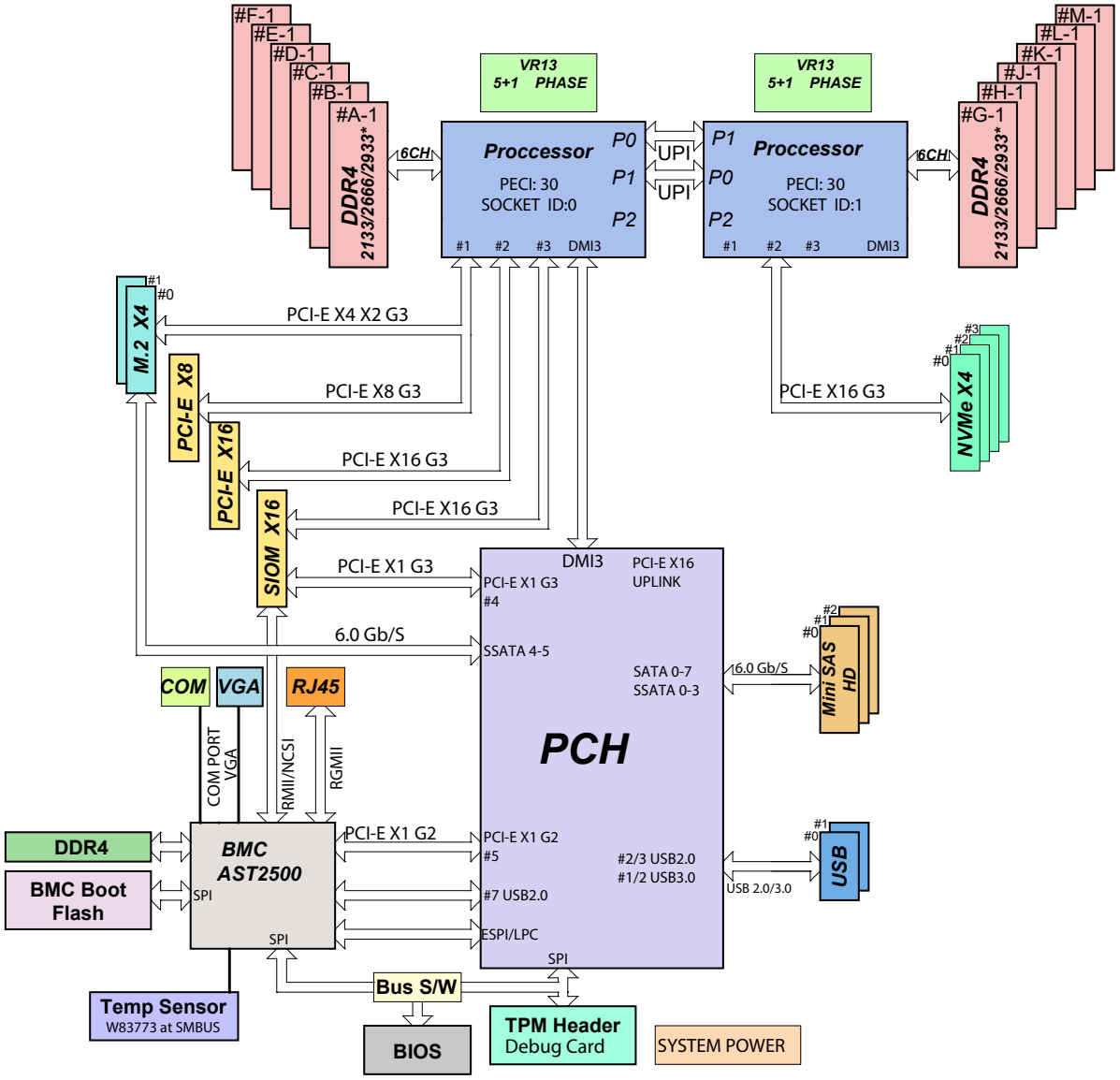
- 18.73" (L) x 8.54" (W) (475.74 mm x 216.92 mm)

**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 login information upon initial system power-on. The manufacturer default username is ADMIN and the password is ADMIN. For proper BMC configuration, please refer to http://www.supermicro.com .

**Figure 1-3.**
**System Block Diagram for the X11DPFF-SN Motherboard**




*Note: Support for 2933 MHz memory is dependent on the CPU SKU.

**Note 1:** 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.

**Note 2:** When installing an NVMe device on a motherboard, please be sure to connect the first NVMe(NVME0) port first for your system to work properly.

## 1.2 Processor and Chipset Overview

Built upon the functionality and capability of Intel Xeon Scalable-SP and 2nd Generation Intel Xeon Scalable-SP processors (Socket P0) with support of C621 chipset, this motherboard provides superb system performance, efficient power management, and a rich feature set based on cutting-edge technologies to address the needs of next-generation users. It offers innovative solutions with unprecedented system reliability and scalability to meet the demands of High Performance Computing (HPC) platforms.

***Features Supported by Intel Xeon Scalable-SP Processors***

Intel Xeon Scalable-SP processors support the following features:

- Intel AVX-512 instruction support to handle complex workloads
- 1.5x memory bandwidth increased to 6 channels
- Hot plug and enclosure management with Intel Volume Management Device (Intel VMD)
- Rich set of available IOs with increased PCI-E lanes (48 lanes)
- Integrated Intel Ethernet Connection X722 with iWARP RDMA

***New features supported by 2nd Gen Intel Xeon Scalable-SP Processors***

2nd Gen Intel Xeon Scalable-SP processors support the following features:

- Higher performance for a wider range of workloads with per-core performance increase
- Support of Optane DC Persistent Memory (DCPMM) with affordable, persistent, and large capacity
- Up to 2993 MHz memory supported (Refer to Section 1.8 for details.)
- Vector Neural Network Instruction (VNNI) support for Accelerate Deep Learning & Artificial Intelligence (AI) workloads
- Speed Select Technology provides multiple CPU profiles that can be set in the BIOS. (This feature is available on select CPU SKUs).
- Seamless hardware security mitigations & performance/frequency flexibility

**Note 1**: DCPMM memory and 2933 MHz memory are supported by 2nd Gen Intel Xeon Scalable-SP processors only.

# 1.3 Special Features

This section describes the health monitoring features of the X11DPFF-SN motherboard. The motherboard has an onboard ASPEED 2500 Baseboard Management Controller (BMC) that supports system health monitoring.

## Recovery from AC Power Loss

The Basic I/O System (UEFI 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 UEFI 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 X11DPFF-SN motherboard. The motherboard has an onboard Baseboard Management Controller (BMC) chip (AST2500) that supports system health monitoring.

## 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 IPMI WebGUI and IPMIView. Real time readings of these voltage levels are all displayed in IPMI.

## 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.

## 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 pre-defined or a manufacturer-defined threshold, system/CPU cooling fans will be turned on for system cooling to prevent the CPU or the system from overheating.

**Note:** To avoid possible system overheating, please be sure to provide adequate air-flow 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, or 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 appropriate Windows operating systems. For detailed information on OS support, please refer to our website at www.supermicro.com.

## 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 Advanced Power Management

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

### Intel® Intelligent Power Node Manager (IPNM)

Intel's 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.

## 1.8 Intel® Optane DC Persistent Memory Overview

2nd Gen Intel Xeon Scalable-SP processors support new DCPMM (Optane™ DC Persistent Memory Modules) technology that offers data persistence with higher capacity than existing memory modules and lower latency than NVMe SSDs. DCPMM memory provides hyper-speed storage capability for high performance computing platforms with flexible configuration options.

# Chapter 2

# Installation

## 2.1 Static-Sensitive Devices

Electrostatic Discharge (ESD) can damage electronic components. To avoid damaging your motherboard and your system, 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

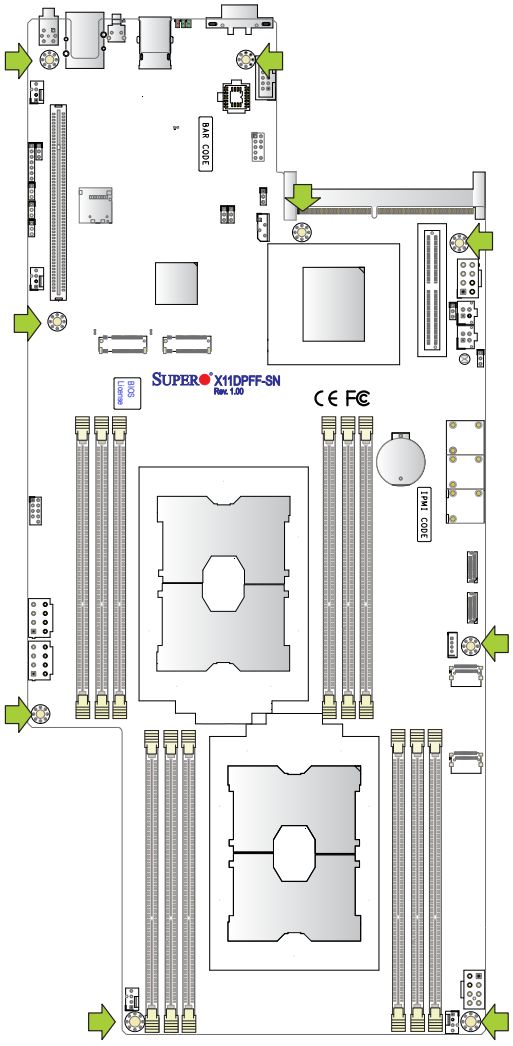
All motherboards have standard mounting holes to fit different types of chassis. Make sure that the locations of all the mounting holes for both the motherboard and the chassis match. Although a chassis may have both plastic and metal mounting fasteners, metal ones are highly recommended because they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

### Tools Needed

Phillips Screwdriver (1)

Phillips Screws (9)

Standoffs (9) if needed



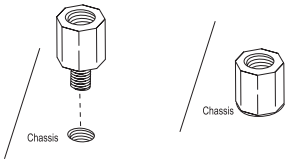

### Location of Mounting Holes

**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.

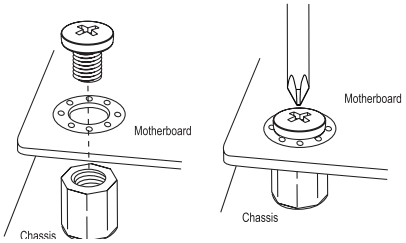
## Installing the Motherboard

Follow the instructions below to install the motherboard into your system.

1. Install the front I/O panel as needed.
2. Locate the mounting holes on the motherboard. See the previous page for the locations.
3. Locate the matching mounting holes on the chassis. Align the mounting holes on the motherboard against the mounting holes on the chassis.




4. Install standoffs in the chassis as needed.




5. Install the motherboard into the chassis carefully to avoid damaging other motherboard components.
6. 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.
7. Repeat Step 5 to insert #6 screws into all mounting holes.
8. Make sure that the motherboard is securely placed in the chassis.

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

## 2.3 Processor and Heatsink Installation

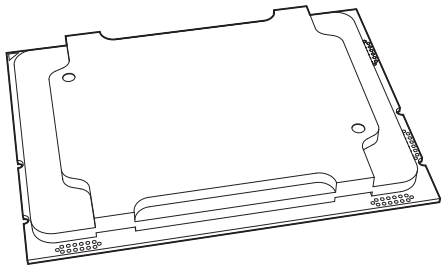
**Warning:** When handling the processor package, avoid placing direct pressure on the label area of the CPU or the socket. Also, improper CPU installation or socket misalignment can cause serious damage to the CPU and the motherboard which may result in RMA repairs. Please read and follow all instructions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

### Intel Xeon Scalable-SP and 2nd Gen Intel Xeon Scalable-SP Processors

**Note: The Intel Xeon Scalable-SP processor contain two models-the F model processor and the Non-F model processors. However This motherboard only supports the Non-F model processors**



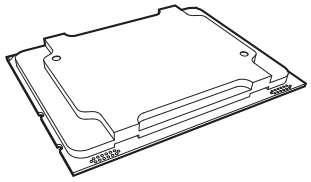
**Intel Xeon Scalable-SP and 2nd Gen Intel Xeon Scalable-SP Processor**

**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.

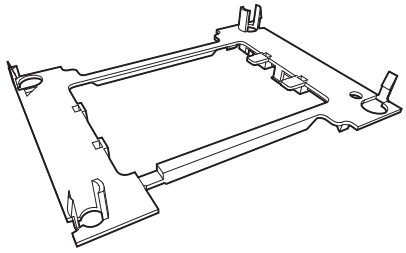
## Overview of the Processor Socket Assembly

The processor socket assembly contains 1) Intel Xeon Scalable-SP or 2nd Gen Intel Xeon Scalable-SP processors, 2) the narrow processor clip, 3) the dust cover, and 4) the CPU socket.

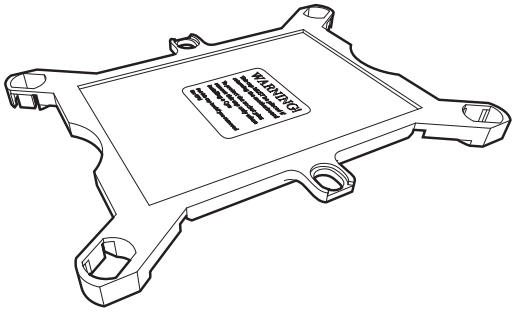
**1. Intel Processor**



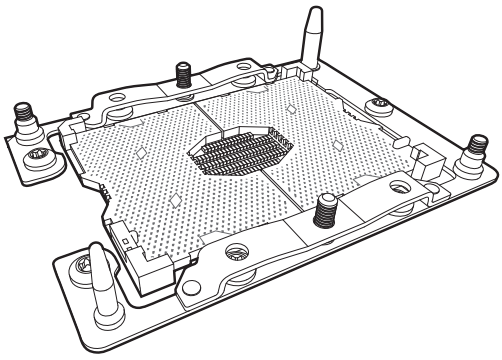
**2. Narrow processor clip (the plastic processor package carrier used for the CPU)**



**3. Dust Cover**



**4. CPU Socket**

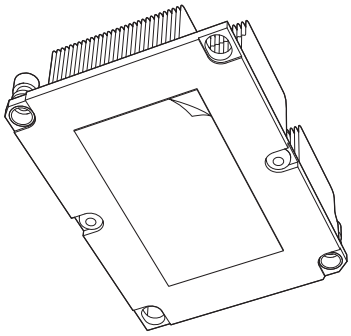


**Note**: Be sure to cover the CPU socket with the dust cover when the CPU is not installed.

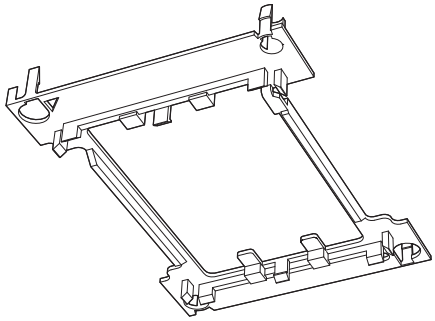
## Overview of the Processor Heatsink Module (PHM)

The Processor Heatsink Module (PHM) contains 1) a heatsink, 2) a narrow processor clip, and 3) Intel Xeon Scalable-SP or 2nd Gen Intel Xeon Scalable-SP processor.

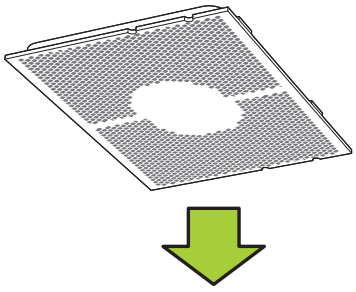
**1. Heatsink**



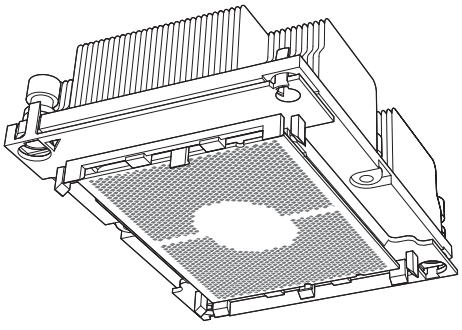
**2. Narrow processor clip**



**3. Intel Processor**



**Processor Heatsink Module (PHM)**

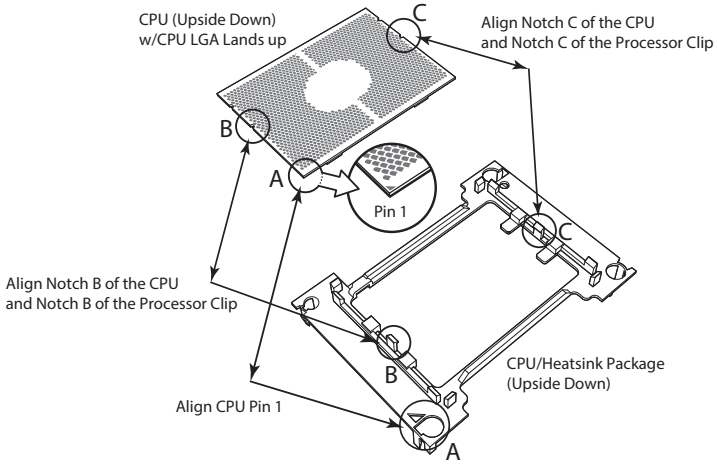


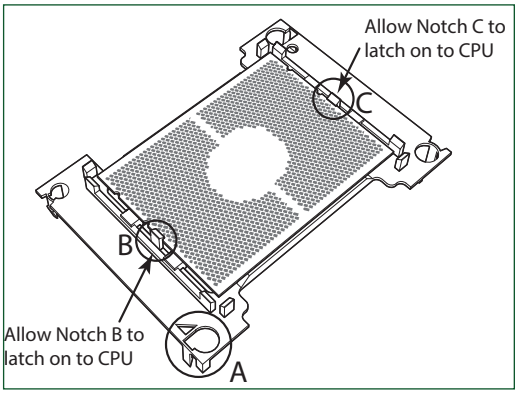
## Attaching the Processor to the Narrow Processor Clip to Create the Processor Package Assembly

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).

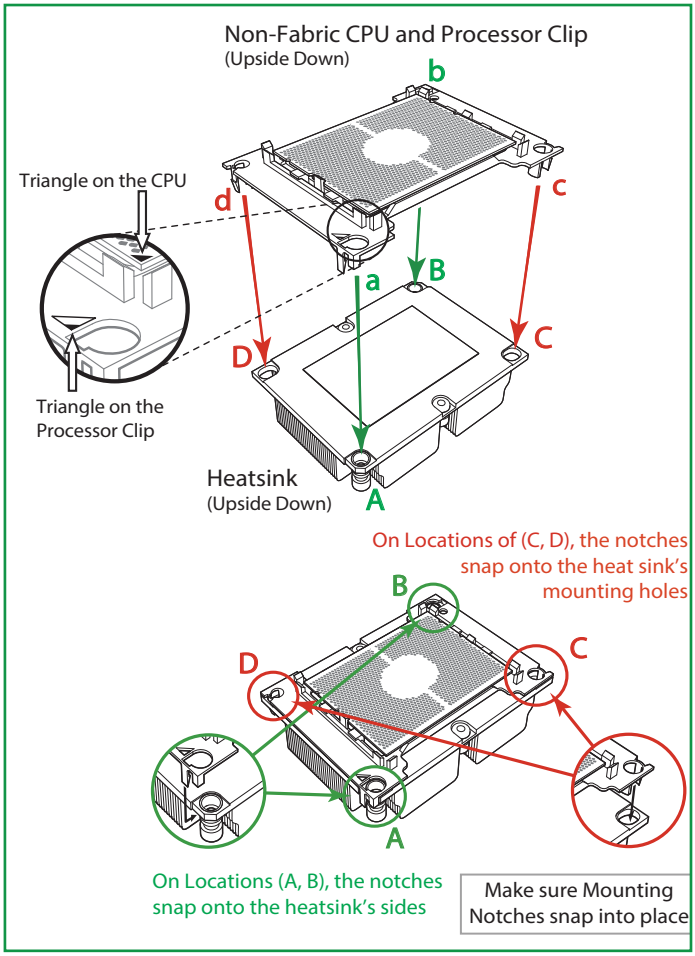
1. Locate "1" on the heatsink label and the triangular corner next to it on the heatsink. With your index finger pressing against the screw at this triangular corner, carefully hold and turn the heatsink upside down with the thermal-grease side facing up. Remove the protective thermal film if present, 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.

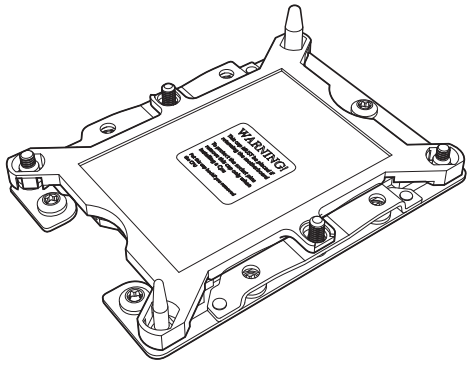
4. Also align the triangular corner ("B") at the diagonal side of the heatsink with the corresponding clips on the processor package assembly ("b").

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).



## 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 (P socket), and 4) a back plate. These components are pre-installed on the motherboard before shipping.

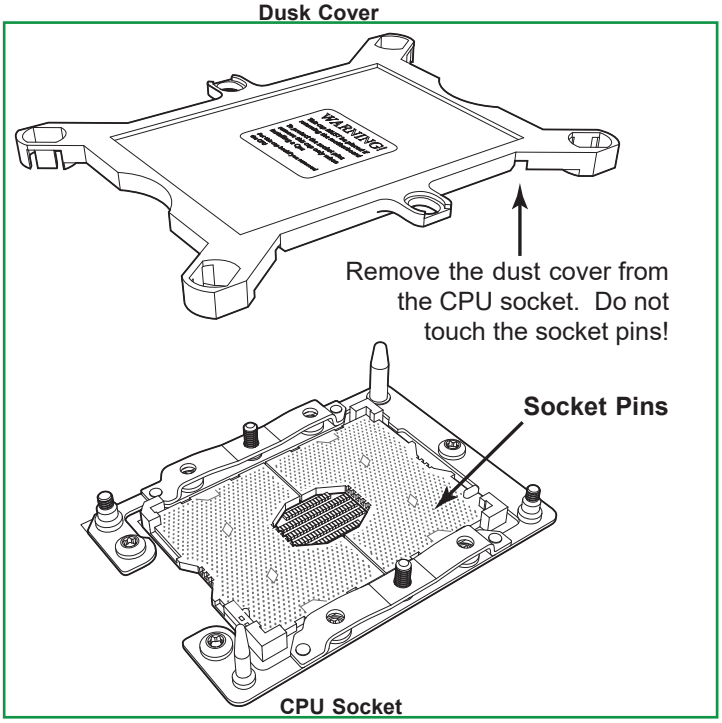


**CPU Socket w/Dust Cover On**

## 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.



## Installing the Processor Heatsink Module (PHM)

1. Once you have assembled the processor heatsink module (PHM) by following the instructions listed on page 27, 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.

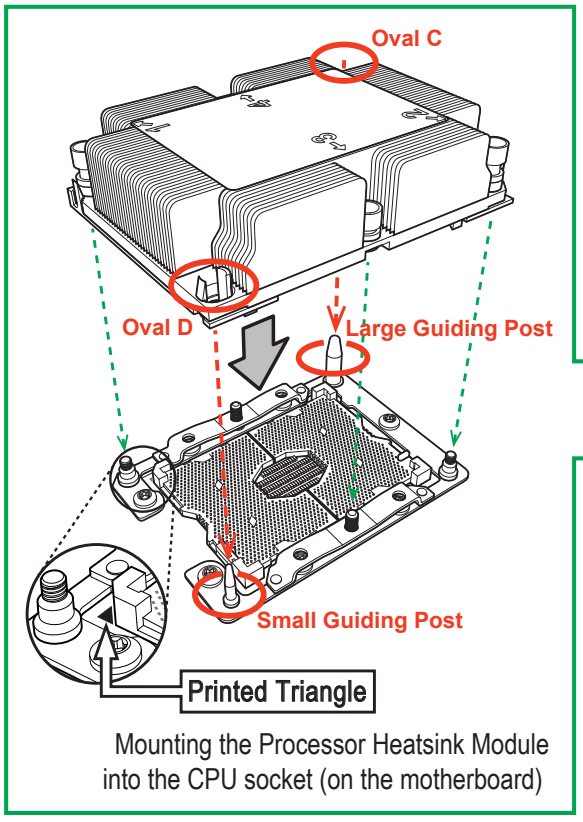
2. Locate the triangle (pin 1) on the CPU socket, and locate the triangle (pin 1) at the corner of the PHM that is closest to "1." (If you have difficulty locating pin 1 of the PHM, turn the PHM upside down. With the LGA-lands side facing up, you will note the hollow triangle located next to a screw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

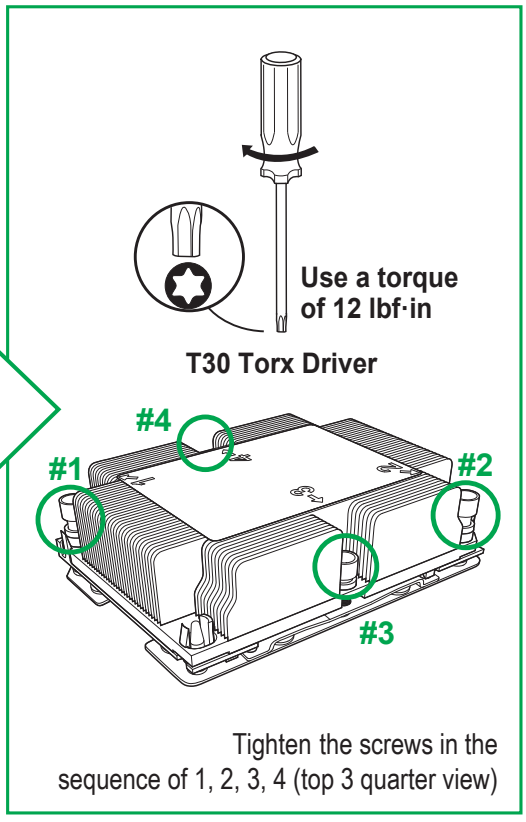
4. Once they are properly aligned, insert the two diagonal oval holes on the heatsink into the guiding posts.

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)



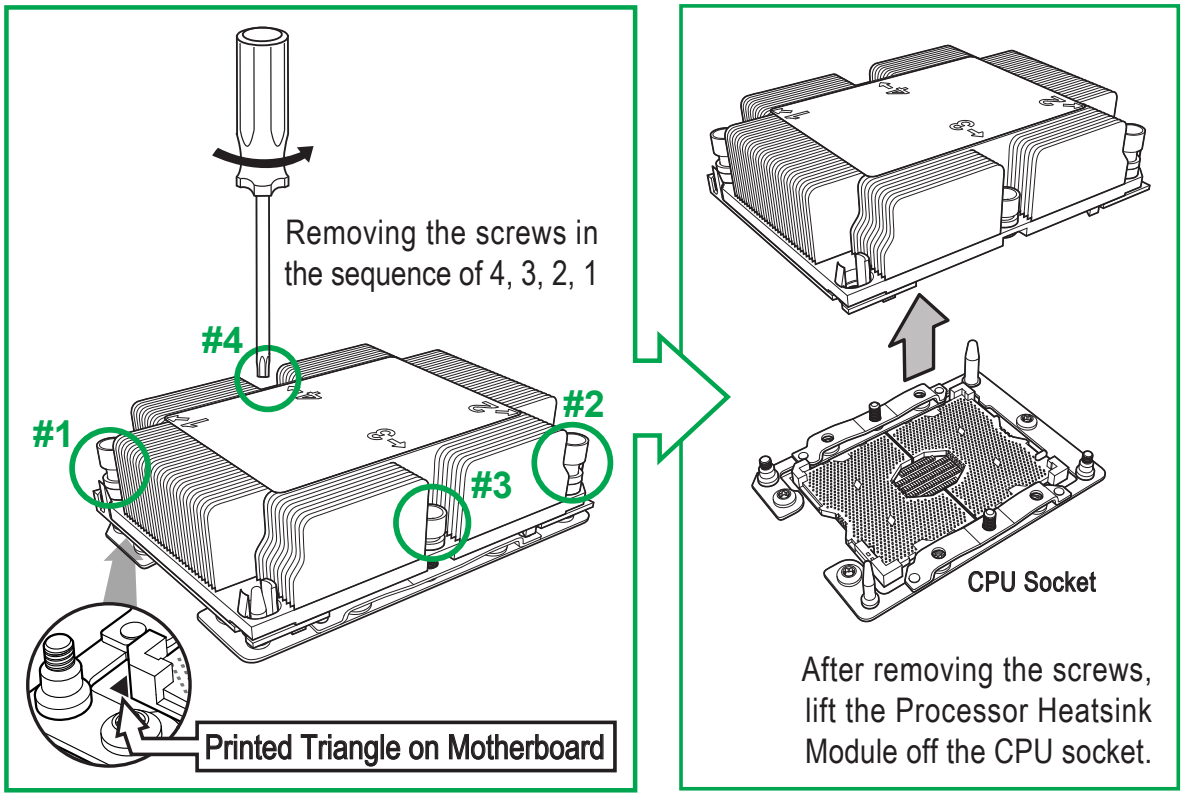

Tighten the screws in the sequence of 1, 2, 3, 4 (top 3 quarter view)

## 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.



# 2.4 Memory Support and Installation

**Notes**: Check the Supermicro website for recommended memory modules. Exercise extreme care when installing or removing DIMM modules to prevent any damage.

## Memory Support

The motherboard supports up to 3TB of 3DS Load Reduced DIMM (3DS LRDIMM), Load Reduced DIMM (LRDIMM), 3DS Registered DIMM (3DS RDIMM), Registered DIMM (RDIMM), Non-Volatile DIMM (NV-DIMM) DDR4 (288-pin) ECC 2933*/2666/2400/2133 MHz memory in 12 slots (*Note 1 below). This motherboard also supports up to 4TB memory with DCPMM modules installed based on the DCPMM population table on page"DCPMM Memory Population Tables for 2nd Gen Intel Xeon Scalable-SP Processors" on page 40.

**Notes**: **1.** Support for 2933 MHz memory is dependent on the CPU SKU. **2.** 16Gb-based memory modules are supported by 2nd Gen Intel Xeon Scalable-SP processors only.

## General Memory Population Requirements

1. Be sure to use the memory modules of the same type and speed on the motherboard. Mixing of memory modules of different types and speeds is not allowed.
2. Using unbalanced memory topology such as populating two DIMMs in one channel while populating one DIMM in another channel on the same motherboard will result in reduced memory performance.
3. Populating memory slots with a pair of DIMM modules of the same type and size will result in interleaved memory, which will improve memory performance.

# DDR4 Memory Support for Intel Xeon Scalable-SP Processors

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

# DDR4 Memory Support for 2nd Gen Intel Xeon Scalable-SP Processors

| DDR4 Memory Support | | | | | | | |
|---|---|---|---|---|---|---|---|
| Type | Ranks Per DIMM & Data Width | DIMM Capacity (GB) | | | Speed (MT/s); Voltage (V); Slots Per Channel (SPC) and DIMMs Per Channel (DPC) | | |
| | | | | | 1 Slot Per Channel | 2 Slots Per Channel | |
| | | DRAM Density | | | 1DPC (1-DIMM Per Channel) | 1DPC (1-DIMM Per Channel) | 2DPC (2-DIMM Per Channel) |
| | | 4Gb* | 8Gb | 16Gb | 1.2 V | 1.2 V | 1.2 V |
| RDIMM | SRx4 | 4GB | 8GB | 16GB | 2933 | 2933 | 2933 |
| RDIMM | SRx8 | 8GB | 16GB | 32GB | 2933 | 2933 | 2933 |
| RDIMM | DRx8 | 8GB | 16GB | 32GB | 2933 | 2933 | 2933 |
| RDIMM | DRx4 | 16GB | 32GB | 64GB | 2933 | 2933 | 2933 |
| RDIMM 3Ds | QRX4 | N/A | 2H-64GB | 2H-128GB | 2933 | 2933 | 2933 |
| RDIMM 3Ds | 8RX4 | N/A | 4H-128GB | 4H-256GB | 2933 | 2933 | 2933 |
| LRDIMM | QRx4 | 32GB | 64GB | 128GB | 2933 | 2933 | 2933 |
| LRDIMM 3Ds | QRX4 | N/A | 2H-64GB | 2H-128GB | 2933 | 2933 | 2933 |
| LRDIMM 3Ds | 8Rx4 | N/A | 4H-128GB | 4H-256GB | 2933 | 2933 | 2933 |

**Notes**: **1.** 2933 MHz memory support in two-DIMMs per-channel (2DPC) configuration can be achieved by using memory purchased from Supermicro. **2.** Support for 2933 MHz memory is dependent on the CPU SKU. **3.** 16Gb-based memory modules are supported by 2nd Gen Intel Xeon Scalable-SP processors only.

## DIMM Population Guidelines for Optimal Performance

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

### *Key Parameters for DIMM Configuration*

| 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), 3DS RDIMM, LRDIMM, 3DS LRDIMM |
| **DIMM Construction** | non-3DS RDIMM Raw Cards: A/B (2Rx4), C (1Rx4), D (1Rx8), E (2Rx8)<br>3DS RDIMM Raw Cards: A/B (4Rx4)<br>non-3DS LRDIMM Raw Cards: D/E (4Rx4)<br>3DS LRDIMM Raw Cards: A/B (8Rx4) |

### *DIMM Mixing Guidelines*

| General DIMM Mixing Guidelines |
|---|
| **DIMM Mixing Rules** |
| • All DIMMs must be all DDR4 DIMMs.<br>• x4 and x8 DIMMs can be mixed in the same channel.<br>• Mixing of LRDIMMs and RDIMMs is not allowed in the same channel, across different channels, and across different sockets.<br>• 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 Table for the Motherboard Using Intel Xeon Scalable-SP and 2nd Gen Intel Xeon Scalable-SP Processors*

| Memory Population Tables for X11DP Motherboards w/12 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 recomended)** | 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 |
| **When 2 CPUs are used:** | Memory Population Sequence |
| **2 CPUs & 2 DIMMs** | CPU1: P1-DIMMA1<br>CPU2: P2-DIMMA1 |
| **2 CPUs & 4 DIMMs** | CPU1: P1-DIMMA1/P1-DIMMD1<br>CPU2: P2-DIMMA1/P2-DIMMD1 |
| **2 CPUs & 6 DIMMs** | CPU1: P1-DIMMC1/P1-DIMMB1/P1-DIMMA1<br>CPU2: P2-DIMMC1/P2-DIMMB1/P2-DIMMA1 |
| **2 CPUs & 8 DIMMs** | CPU1: P1-DIMMB1/P1-DIMMA1/P1-DIMMD1/P1-DIMME1<br>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<br>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<br>CPU2: P2-DIMMC1/P2-DIMMB1/P2-DIMMA1/P2-DIMMD1/P2-DIMME1/P2-DIMMF1 |

**Note**: Please refer to the Memory Configuration User Guide for the X11 UP/DP/MP Motherboards that is posted on our website for detailed information on memory support for this motherboard.

## *Memory Rank Sparing Tables for the X11DP Motherboards (w/12 Slots)*

| Dual Rank Memory Rank Sparing (16GB DIMM) | | |
|---|---|---|
| **Memory Population** | **Total RAM Detected** | |
| | One Rank Configuration | Two Rank Configuration |
| A1 | 8GB | 8GB |
| A1+B1 | 16GB | 16GB |
| A1+B1+C1 | 24GB | 24GB |
| A1+B1+C1+D1 | 32GB | 32GB |
| A1+B1+C1+D1+E1 | 40GB | 40GB |
| A1+B1+C1+D1+E1+F1 | 49GB | 49GB |

| Quad Rank Memory Rank Sparing (64GB DIMM) | | |
|---|---|---|
| **Memory Population** | **Total RAM Detected** | |
| | One Rank Configuration | Two Rank Configuration |
| A1 | 48GB | 32GB |
| A1+B1 | 96GB | 64GB |
| A1+B1+C1 | 144GB | 96GB |
| A1+B1+C1+D1 | 192GB | 128GB |
| A1+B1+C1+D1+E1 | 240GB | 160GB |
| A1+B1+C1+D1+E1+F1 | 288GB | 192GB |

## *DCPMM Memory Population Tables for 2nd Gen Intel Xeon Scalable-SP Processors*

**Note:** Only 2nd Gen Intel Xeon Scalable-SP (82xx/62xx/52xx/4215 series) processors support DCPMM memory.

| Symmetric Population within 1 CPU Socket | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Modes** | **P1-DIMMF1** | **P1-DIMME1** | **P1-DIMMD1** | **P1-DIMMA1** | **P1-DIMMB1** | **P1-DIMMC1** | **Channel Config.** |
| **AD** | ***DCPMM*** | DRAM1 | DRAM1 | DRAM1 | DRAM1 | ***DCPMM*** | **1-1-1** |
| **MM** | ***DCPMM*** | DRAM1 | DRAM1 | DRAM1 | DRAM1 | ***DCPMM*** | **1-1-1** |
| **AD + MM** | ***DCPMM*** | DRAM3 | DRAM3 | DRAM3 | DRAM3 | ***DCPMM*** | **1-1-1** |

| Legend (for the table above) | | | | | |
|---|---|---|---|---|---|
| | **DDR4 Type** | | | | **Capacity** |
| **DRAM1** | RDIMM | 3DS RDIMM | LRDIMM | 3DS LRDIMM | Refer to Validation Matrix (DDR4 DIMMs validated with DCPMM) below. |
| **DRAM2** | RDIMM | - | | - | |
| **DRAM3** | RDIMM | 3DS RDIMM | LRDIMM | - | |

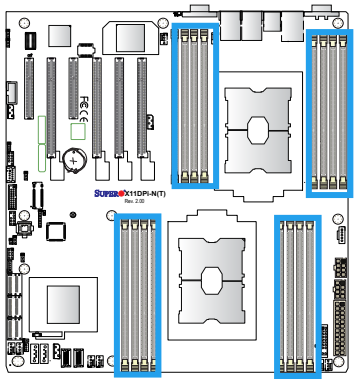
**Note**: DDR4 single rank x8 is not available for DCPMM Memory Mode or App-Direct Mode.

| Legend (for the first table above) | |
|---|---|
| | **Capacity** |
| **DCPMM** | Any Capacity (Uniformly for all channels for a given configuration) |

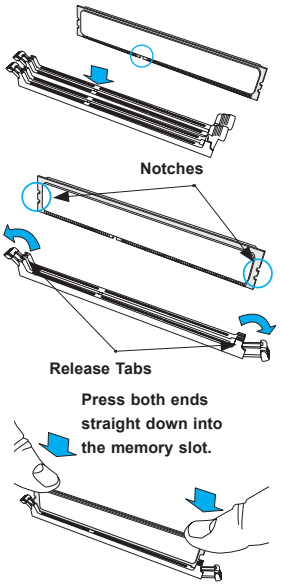
- Mode definitions: AD=App Direct Mode, MM=Memory Mode, AD+MM=Mixed Mode
- For MM, general DDR4-to-DCPMM ratio is between 1:4 and 1:16. Excessive capacity for DCPMM can be used for AD.
- For each individual population, rearrangements between channels are allowed as long as the resulting population is compliant with the X11 memory population rules for the 2nd Gen Intel Xeon Scalable-SP processors.
- For each individual population, please use the same DDR4 DIMM in all slots.
- For each individual population, sockets are normally symmetric with exceptions for 1 DCPMM per socket and 1 DCPMM per node case. Currently, DCPMM modules operate at 2666 MHz.
- No mixing of DCPMM and NVMDIMMs within the same platform is allowed.
- This DCPMM population guide targets a balanced DCPMM-to-DRAM-cache ratio in MM and MM + AD modes.

| Validation Matrix (DDR4 DIMMs Validated w/DCPMM) | | | |
|---|---|---|---|
| **DIMM Type** | **Ranks Per DIMM & Data Width (Stack)** | **DIMM Capacity (GB)** | |
| | | **DRAM Density** | |
| | | **4Gb** | **8Gb** |
| **RDIMM** | 1Rx4 | 8GB | 16GB |
| | 2Rx8 | 8GB | 16GB |
| | 2Rx4 | 16GB | 32GB |
| **LRDIMM** | 4Rx4 | N/A | 64GB |
| **LRDIMM 3DS** | 8Rx4 (4H) | N/A | 128GB |

## DIMM Installation

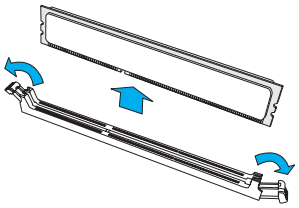


1. Please follow the instructions given in the previous section to install the DIMM modules on the motherboard. For the system to work properly, please use memory modules of the same type and speed on the motherboard.
2. Push the release tabs outwards on both ends of the DIMM slot to unlock it.
3. Align 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 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 Module Removal

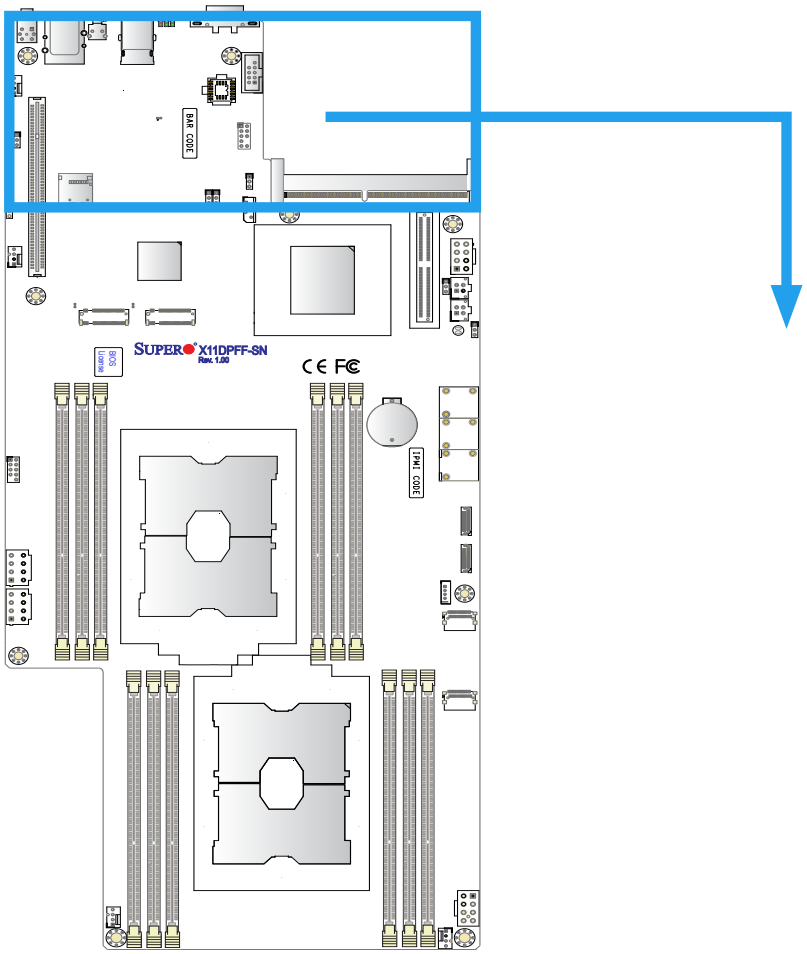
Press the release tabs on both ends of the DIMM socket to release the DIMM module from the socket as shown in the drawing on the right.



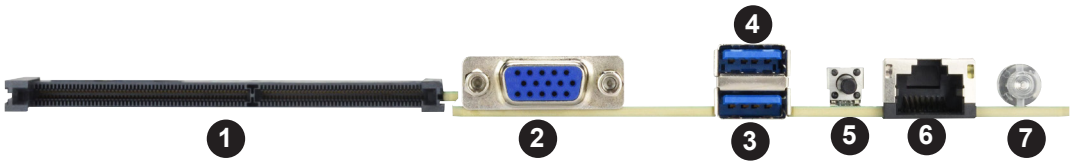
**Warnings: 1.** Please do not use excessive force when pressing the release tabs on the ends of the DIMM socket to avoid causing any damage to the DIMM module or the DIMM socket. **2.** Please handle DIMM modules with care. Carefully follow all the instructions given on Page 1 of this chapter to avoid ESD-related damages done to your memory modules or components.

## 2.5 Front Panel I/O Ports and Connectors

See the layout below for the locations and descriptions of the various I/O ports and connectors on the front panel of the motherboard.




**Front Panel I/O Port Locations and Definitions**




| Front Panel I/O Ports | | | |
|---|---|---|---|
| **No.** | **Description** | **No.** | **Description** |
| 1. | SIOM (Super I/O Module) Slot | 5. | UID (Unit Identifier) |
| 2. | VGA Port | 6. | Dedicated IPMI_LAN |
| 3. | USB 0 (USB 3.0) | 7. | Power Switch (Power-on/Power-Off switch) |
| 4. | USB 1 (USB 3.0) | | |

### Universal Serial Bus (USB) Ports

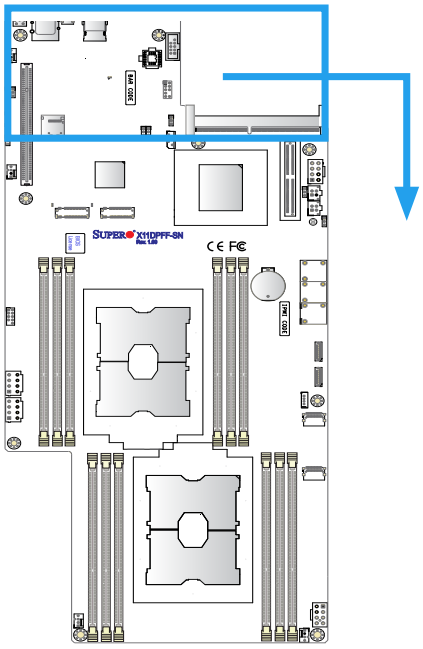
There are two USB 3.0 port (USB 0/1) on the I/O front panel. Please refer to the table below for pin-out definitions.

**Front Panel USB 0/1 (3.0) Pin Definitions**

| Pin# | Definition | Pin# | Definition |
|---|---|---|---|
| A1 | VBUS | B1 | Power |
| A2 | D- | B2 | USB_N |
| A3 | D+ | B3 | USB_P |
| A4 | GND | B4 | GND |
| A5 | Stda_SSRX- | B5 | USB3_RN |
| A6 | Stda_SSRX+ | B6 | USB3_RP |
| A7 | GND | B7 | GND |
| A8 | Stda_SSTX- | B8 | USB3_TN |
| A9 | Stda_SSTX+ | B9 | USB3_TP |

### IPMI_LAN

A dedicated IPMI LAN port, which is supported by the AST 2500 BMC (Baseboard Management Controller) is located next to the power switch on the front panel. This ethernet port accepts an RJ45 type cable. Please refer to the LED Indicator section for LAN LED information.



1. USB 0 (3.0)
2. USB 1 (3.0)
3. IPMI_LAN

### Unit Identifier Switch/UID LED Indicator

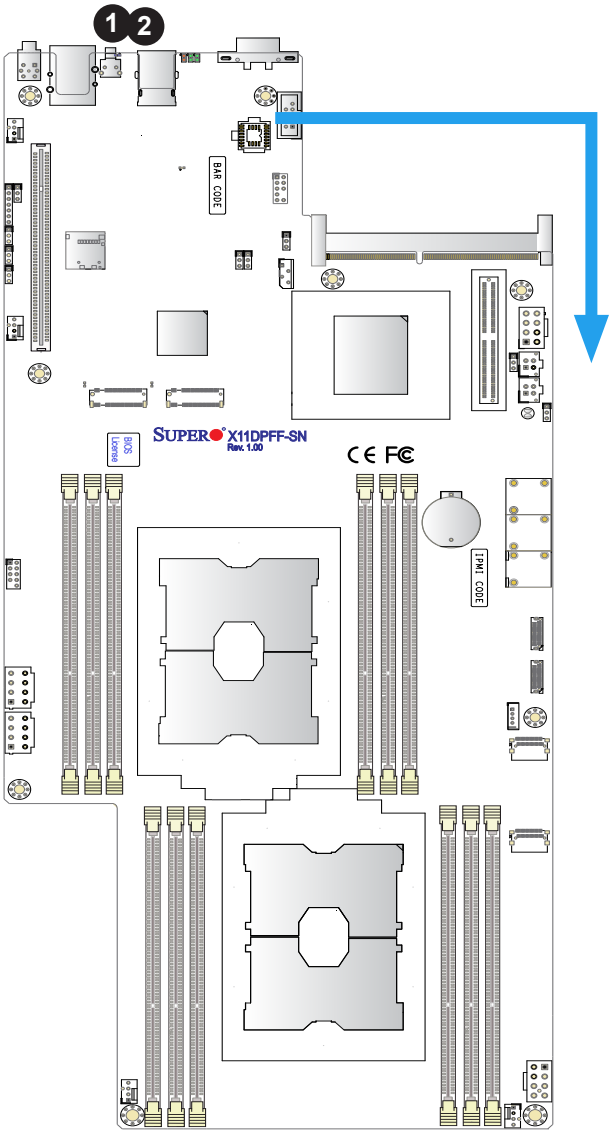
A Unit Identifier (UID) switch, located on the front panel, and the UID LED (UIDLED1), located next to the UID switch on the motherboard, provide easy identification of a system that may be in need of service. When you press the UID switch, the UID LED will be turned on. Press the switch again to turn off the UID LED. Please note that the UID switch 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 |



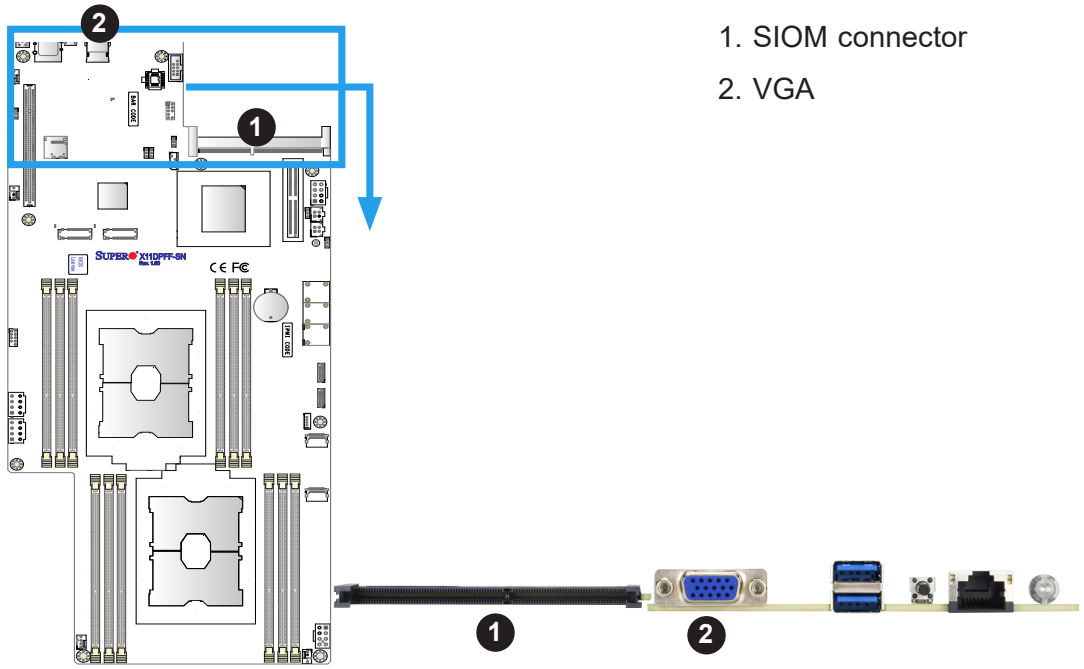

1. UID Switch
2. UID LED (on the motherboard)

### Super I/O Module (SIOM)

A Supermicro proprietary SIOM (Super I/O Module) connector, supported by CPU1, is located at SIOM in your system. This SIOM slot supports PCI-E 3.0x 16 add-on cards. Connect your PCI-E devices via appropriate cables to this slot for PCI-E I/O support. For your system to work properly, please use the PCI-E devices that are fully compliant with the PCI-E standard only. See the graphics below for the location of the SIOM slot.

### VGA Port

A VGA port is located next to the SIOM slot on the front panel. Use this connection for VGA display.



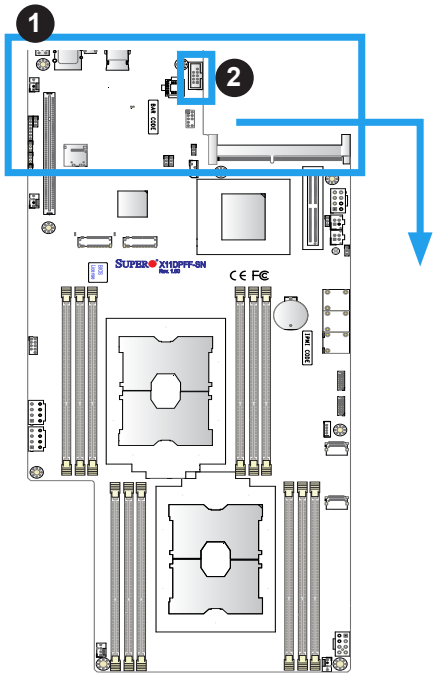

1. SIOM connector
2. VGA

### Power Switch

A power switch is located next to the IPMI_LAN on the front panel. Press this switch to turn on or turn off the system power.

### Serial Port

A COM port (JCOM1) port is located near the front panel on the motherboard. This COM port provides serial communication support. See the layout below for the location.




1. Power Switch
2. COM Port

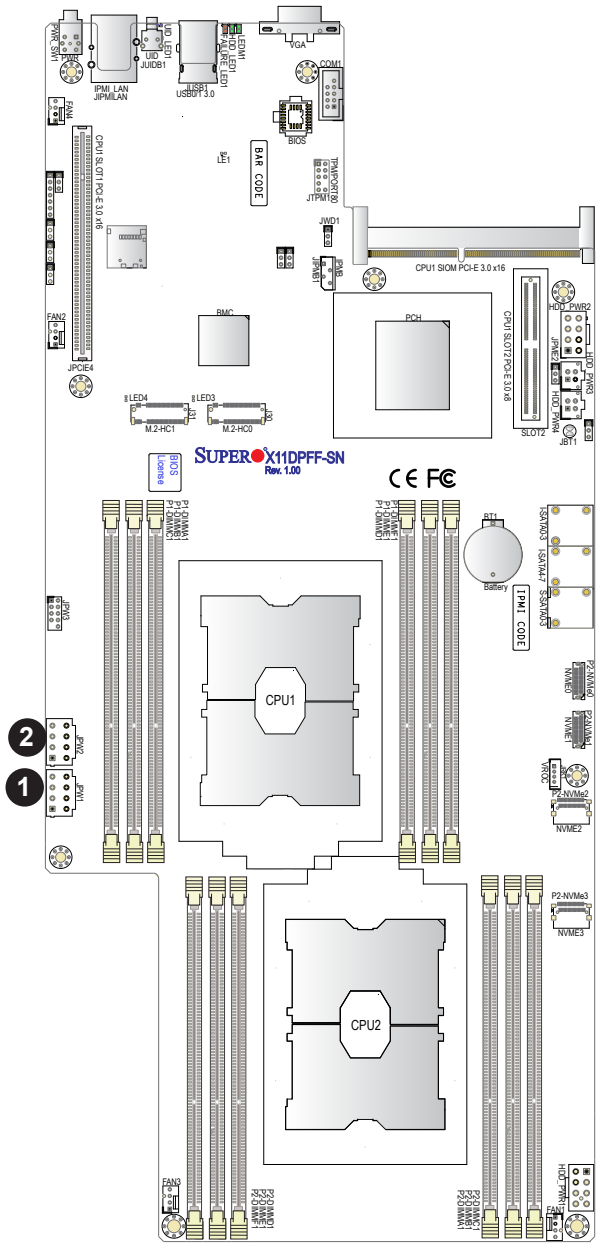
# 2.6 Connectors and Headers

### 8-Pin Power Connectors for Power Adaptor Cards

Two 8-pin 12V power connectors, located at JPW1/JPW2, are used to provide main power to your system via power adaptor cards. Connect appropriate power cables to JPW1/JPW2 and the power adaptor cards to supply power to your system. See the table below for pin definitions.

**12V 8-pin Power Pin Definitions**

| Pin# | Definition |
|---|---|
| 1 - 4 | Ground |
| 5 - 8 | +12V |



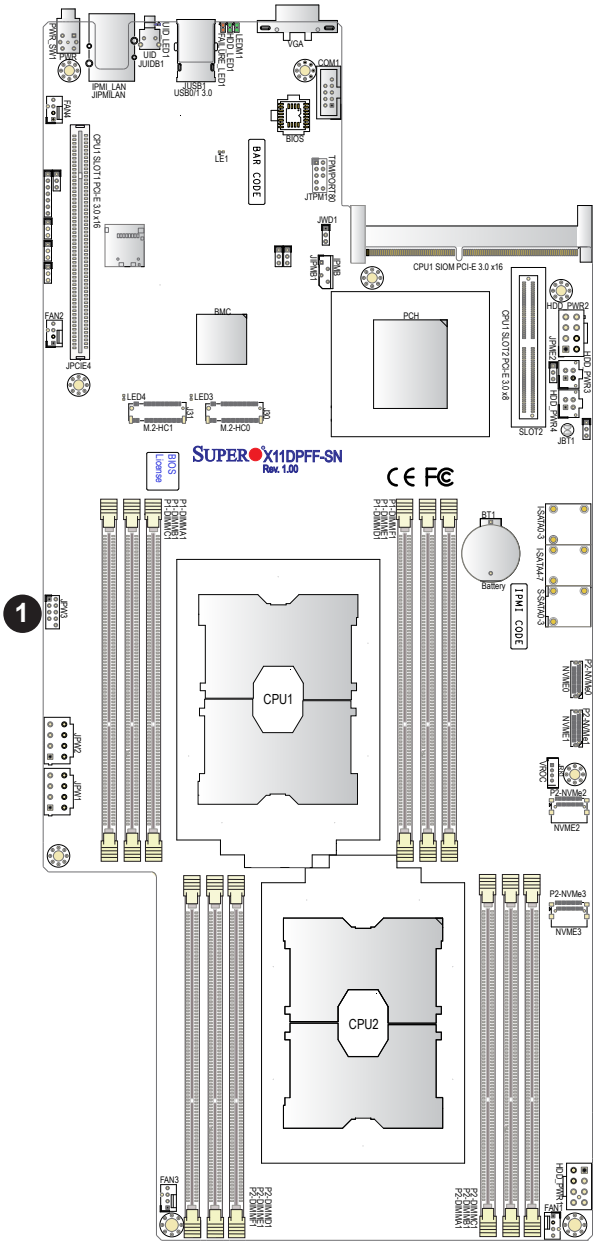

1. JPW1
2. JPW2

### Auxiliary Power Connector

The Auxiliary power connector is located at JPW3. Connect an appropriate power cable to JPW3 and a power adaptor card to provide power to your devices. See the table below for pin definitions.

**Auxiliary Power Connector Pin Definitions**

| Pin# | Definitions | Pin# | Definition |
|---|---|---|---|
| 1 | P5V_STBY | 2 | P5V_STBY |
| 3 | SMBCLK_P12V_HS | 4 | SCL_PMB_R |
| 5 | SMBDAT_P12V_HS | 6 | SDA_PMB_R |
| 7 | PS_ON_N_PWR | 8 | PS_PMBUS_ALERT_N |
| | | 10 | Ground |



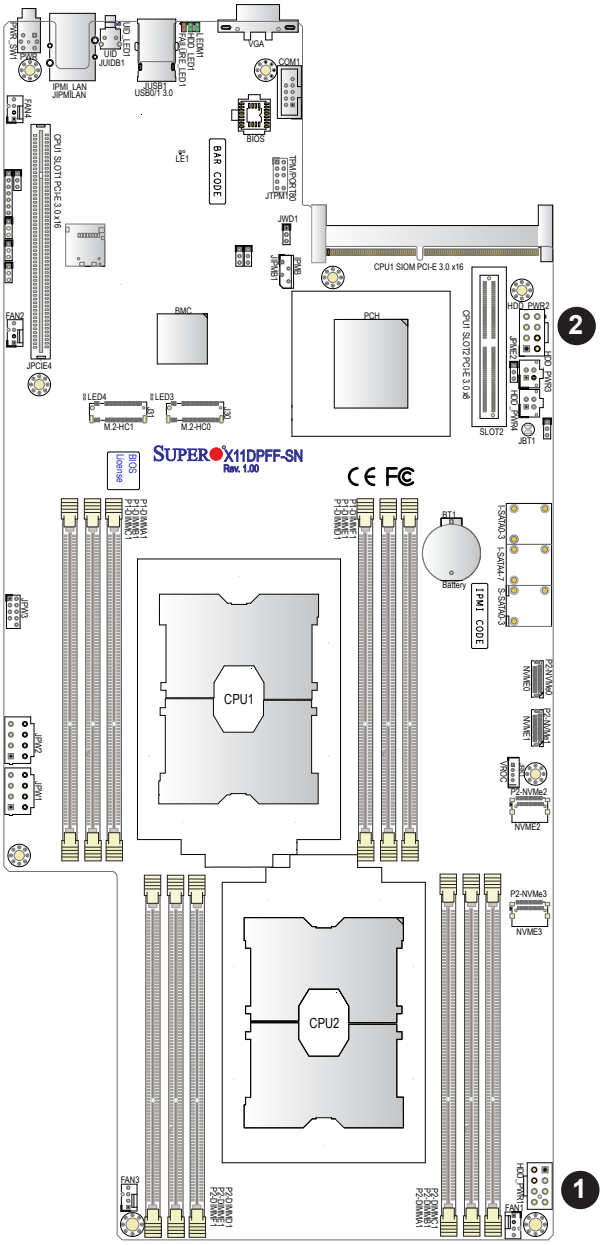

1. JPW3

### 8-Pin HDD Power Connectors

Two 8-pin HDD power connectors, located at HDD_PWR1/2, provide power to HDD devices. Connect appropriate power cables to use HDD power connectors. See the table below for pin definitions.

**8-pin Power HDD_PWR1/2 Pin Definitions**

| Pin# | Definitions | Pin# | Definition |
|---|---|---|---|
| 1 | Ground | 2 | P12V |
| 2 | Ground | 4 | P12V |
| 3 | Ground | 6 | P5V |
| 4 | Ground | 10 | P5V |



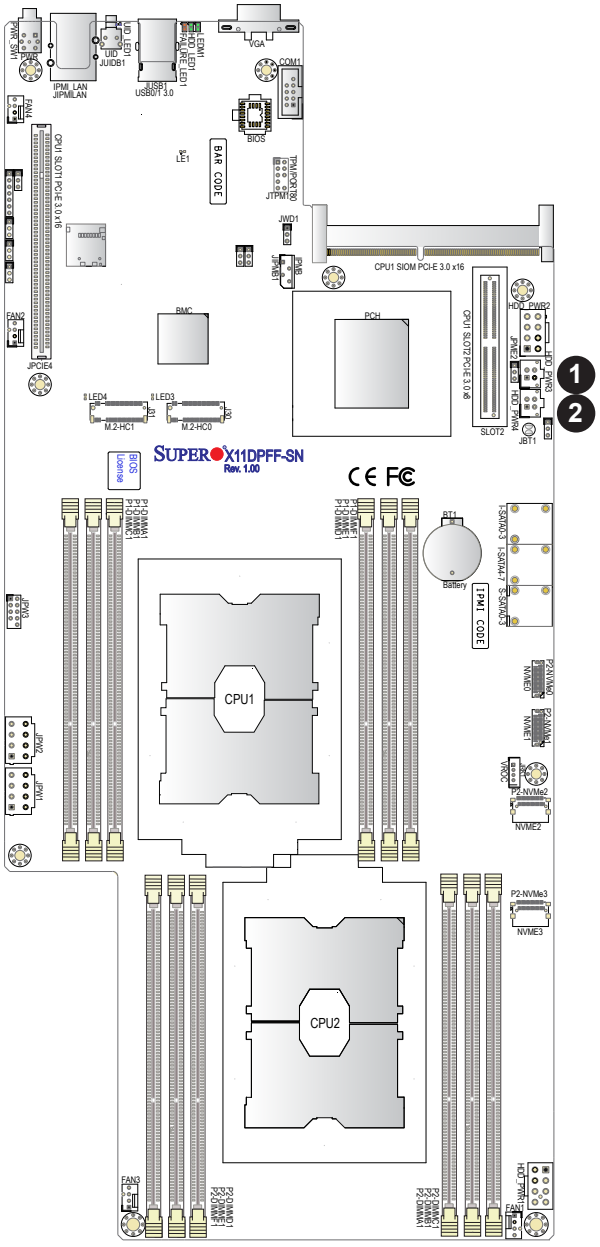

1. HDD_PWR1
2. HDD_PWR2

### 4-Pin HDD Power Connectors

In addition to 8-pin HDD power connectors, there are two 4-pin HDD power connectors (HDD_PWR3/4) on the motherboard. Connect appropriate power cables to these connectors to supply power to your HDD devices. See the table below for pin definitions.

**4-pin Power HDD_PWR3/4 Pin Definitions**

| Pin# | Definitions | Pin# | Definition |
|---|---|---|---|
| 1 | NA | 3 | P12V |
| 2 | Ground | 4 | P5V |

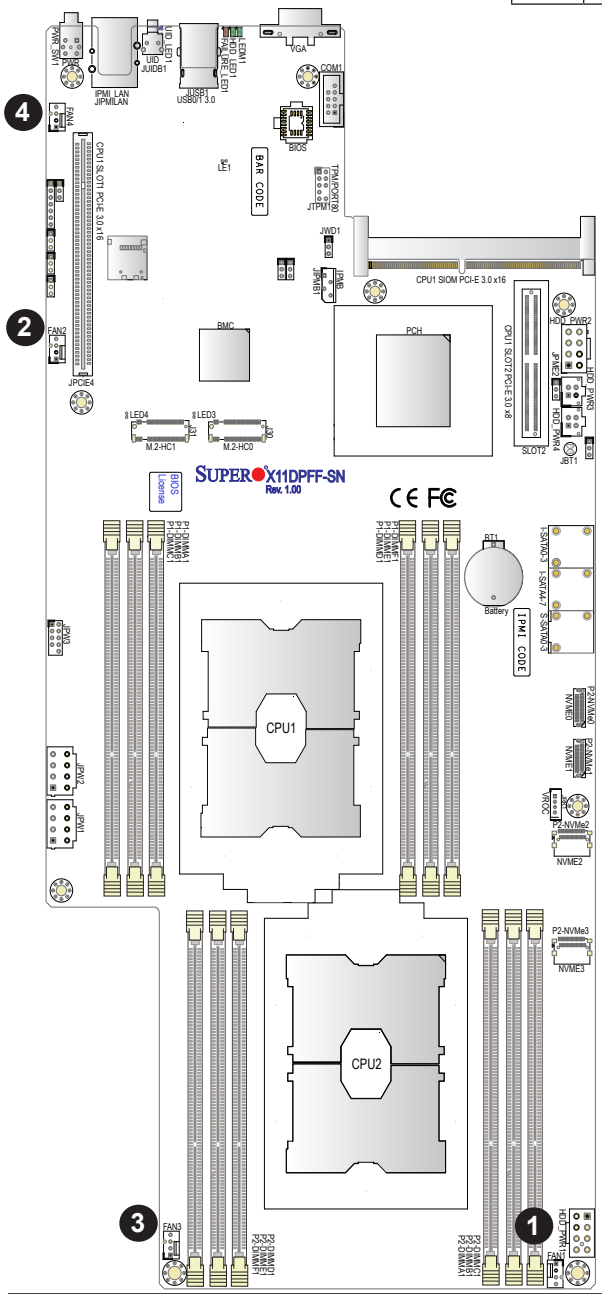



1. HDD_PWR3
2. HDD_PWR4

### Onboard Fan Headers

Four 4-pin fan headers (FAN1-FAN4) are located on the motherboard to provide CPU/system cooling. These fan headers support both 3-pin fans and 4-pin fans; however, onboard fan speed control is available only when all 4-pin fans are used in your system. Fan speed control is supported by a thermal management setting in the BMC (Baseboard Management Controller). See the table below for pin definitions.

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

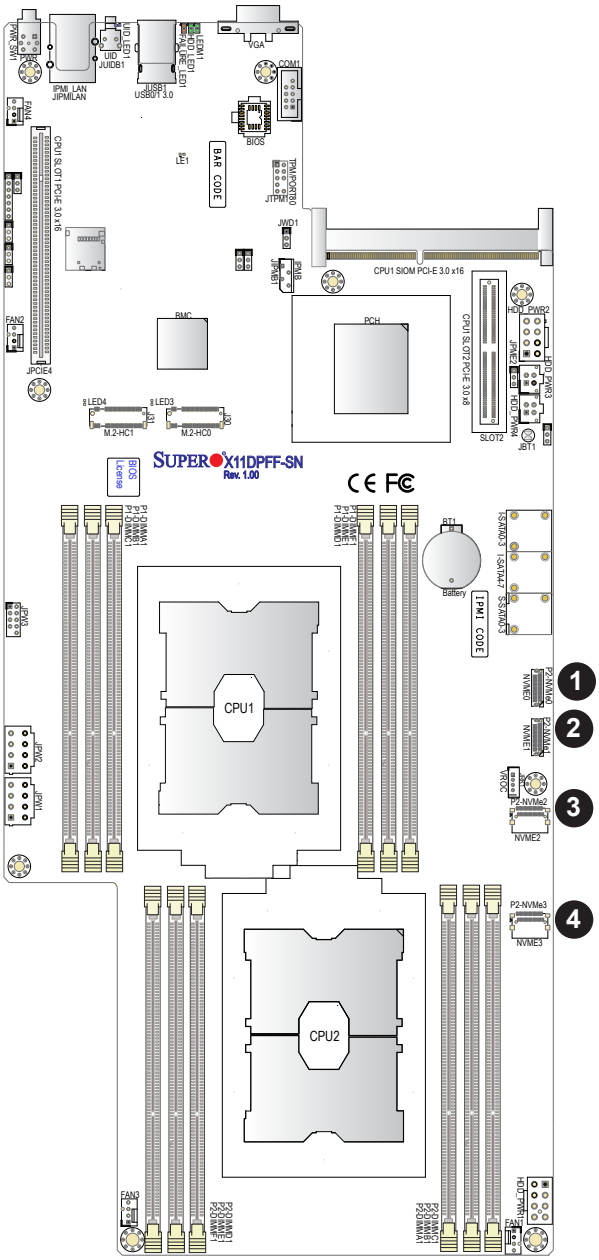



1. FAN1
2. FAN2
3. FAN3
4. FAN4

### NVMe Connectors

Four NVMe connectors (NVME0/NVME1/NVME2/NVME3), supported by CPU2, can be used for PCI-E high-speed storage devices. For the locations of onboard NVMe connectors, please refer to the layout below.

**Note**: When installing an NVMe device on a motherboard, please be sure to connect the first NVMe port (NVME0) first for your system to work properly.

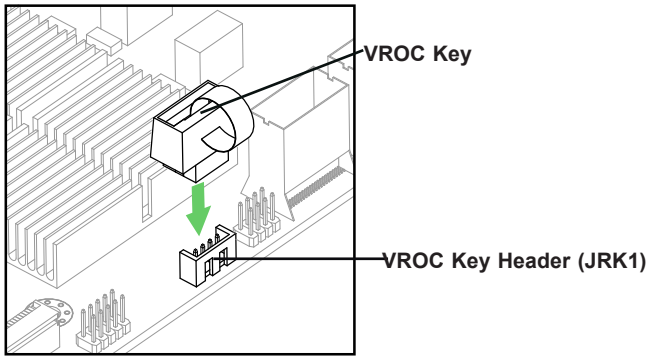



1. NVME0
2. NVME1
3. NVME2
4. NVME3

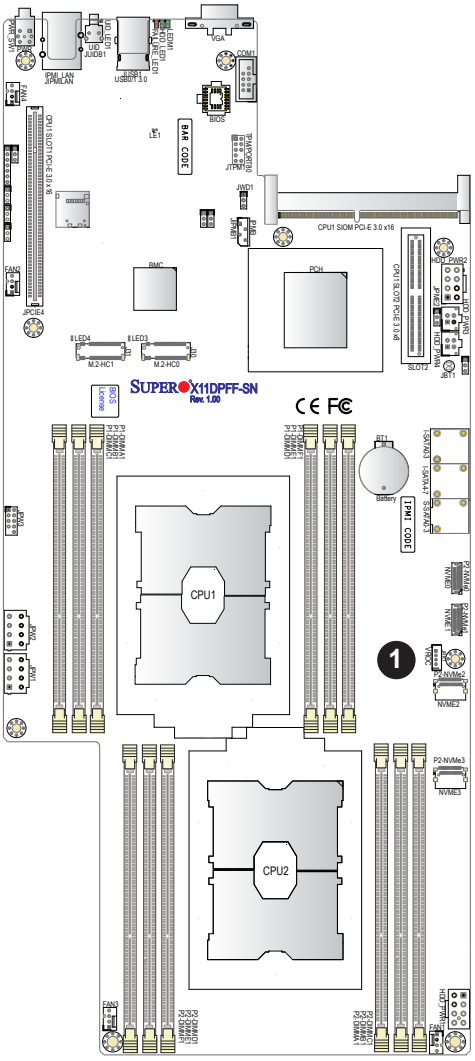
### VROC RAID Key Header

A VROC RAID Key header is located at JRK1 on the motherboard. Install a VROC RAID Key on JRK1 for NVMe RAID support as shown in the illustration below. Please refer to the layout below for the location of JRK1.

| Intel RAID Key Pin Definitions | |
|---|---|
| **Pins** | **Definition** |
| 1 | GND |
| 2 | PU 3.3V Stdby |
| 3 | GND |
| 4 | PCH RAID KEY |




**Note:** The graphics contained in this user's manual are for illustration only. The components installed in your system may or may not look exactly the same as the graphics shown in the manual.

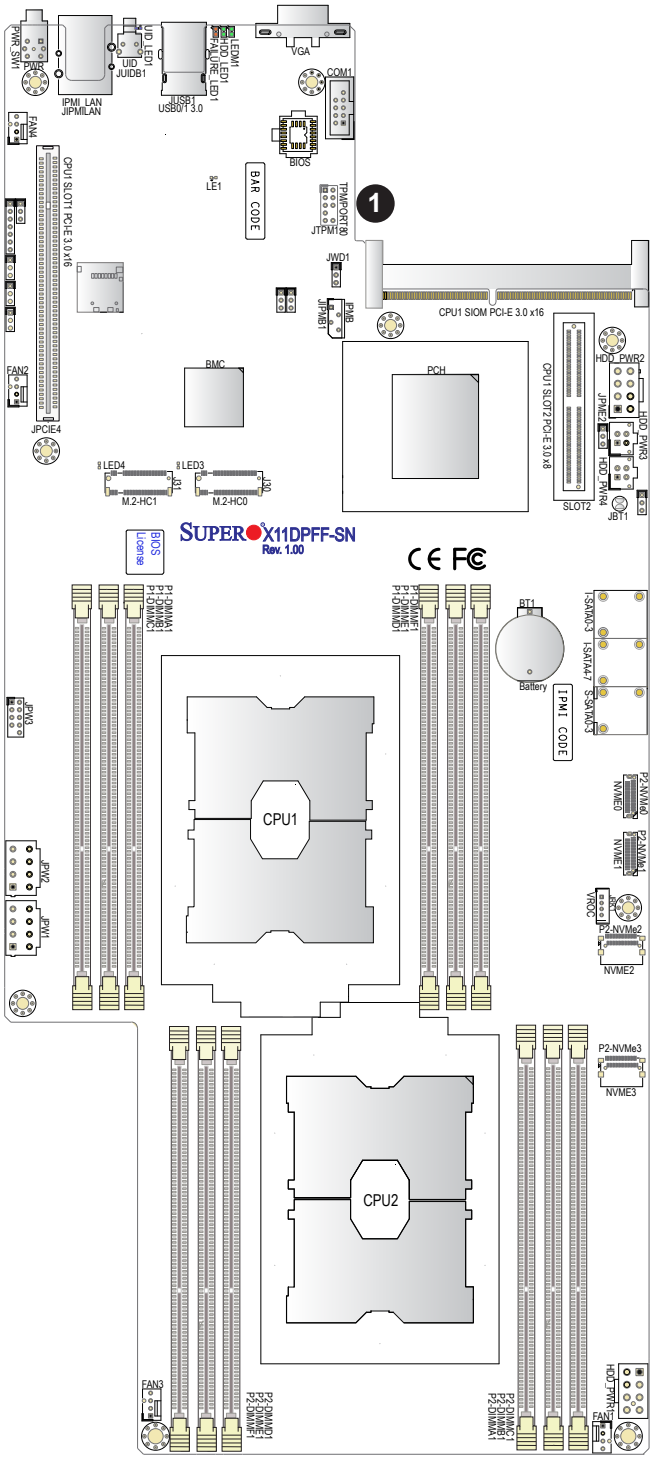



1. VROC RAIDKey

### TPM/Port 80 Header

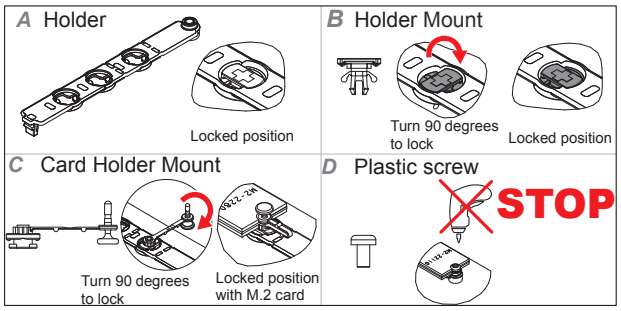
The JTPM1 header is used to connect a Trusted Platform Module (TPM)/Port 80 card, which is available from Supermicro. A TPM/Port 80 module is a security device that supports encryption and authentication in hard drives. It allows the motherboard to deny access if the TPM associated with the hard drive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

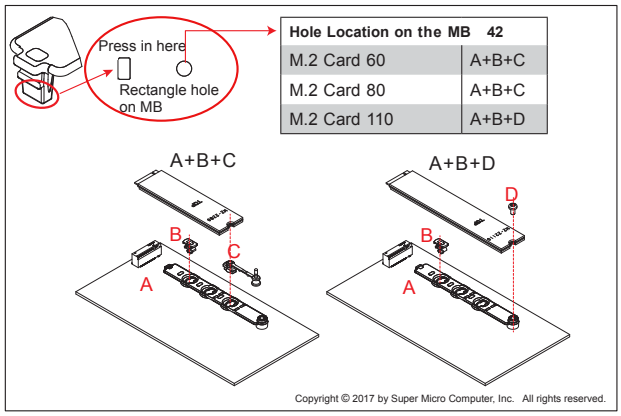
1. TPM/Port 80 Header

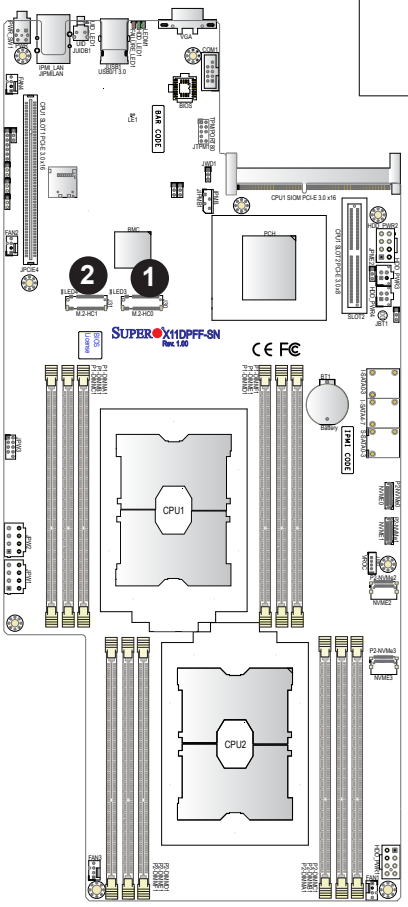


### PCI-E/SATA M.2 Hybrid Slots

This motherboard has two PCI-E/SATA Hybrid M.2 slots located at M.2-HC0 (J30)/M.2-HC1 (J31). The M.2, formerly known as "Next Generation Form Factor (NGFF)", replaces a mini PCI-E/SATA device and supports a variety of card sizes. M.2 offers increased functionality and improved spatial efficiency. The M.2 sockets located on the motherboard support PCI-E 3.0 X4 (32 Gb/s)/SATA SSD cards in the 2260, 2280, and 22110 form factors.



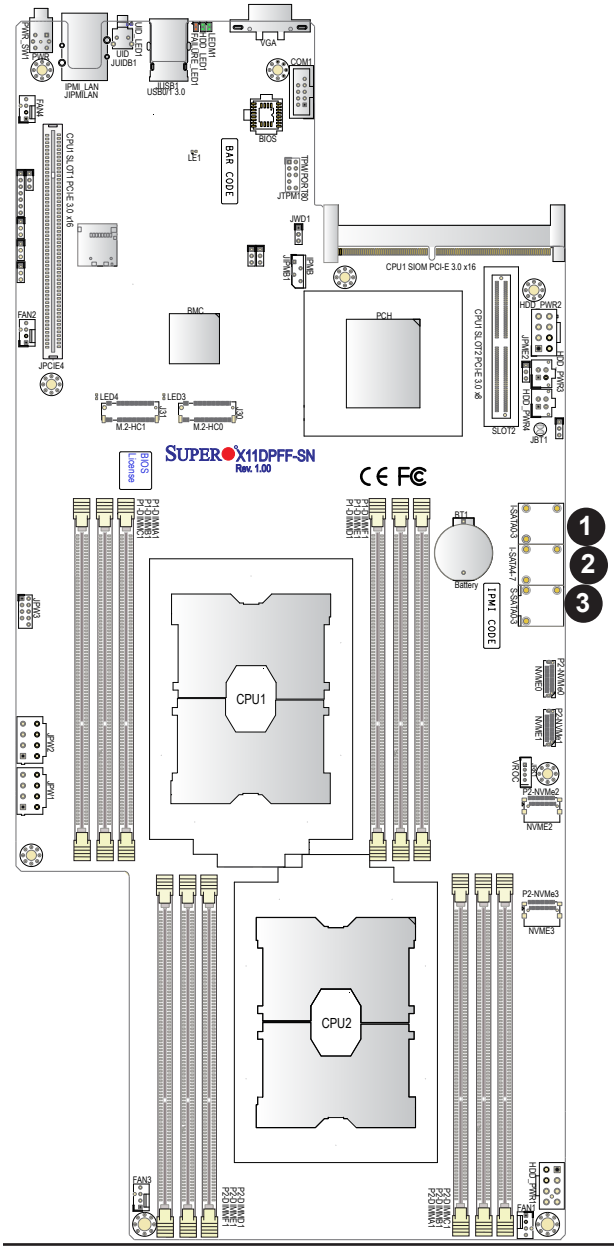




1.M.2-HC0 (J30) (supported by CPU1)

2.M.2-HC1 (J31) (supported by CPU1)

### I-SATA 3.0 and S-SATA 3.0 Ports

Two (I-SATA) connectors and one S-SATA connector, supported by Intel PCH, are located on the motherboard. The two (I-)SATA connectors provide eight SATA 3.0 connections (I-SATA 0-3, 4-7), while the S-SATA connector provides four S-SATA 3.0 (S-SATA 0-3) connections. See the layout below for SATA connections.



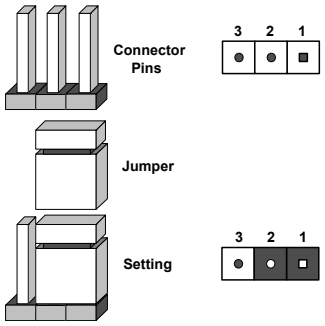

1. I-SATA0-3
2. I-SATA4-7
3. S-SATA0-3

# 2.7 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.



### CMOS Clear

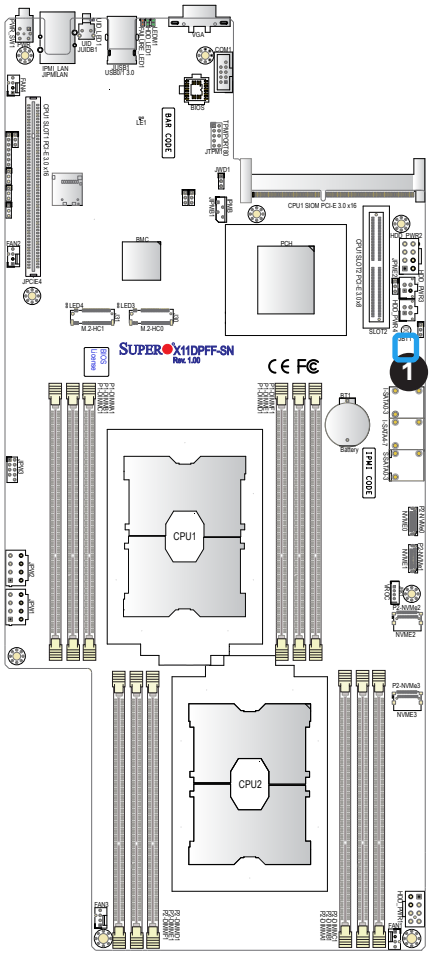
JBT1 is used to clear CMOS, which will also clear any passwords. Instead of pins, this jumper consists of contact pads to prevent accidentally clearing the contents of CMOS.

***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**

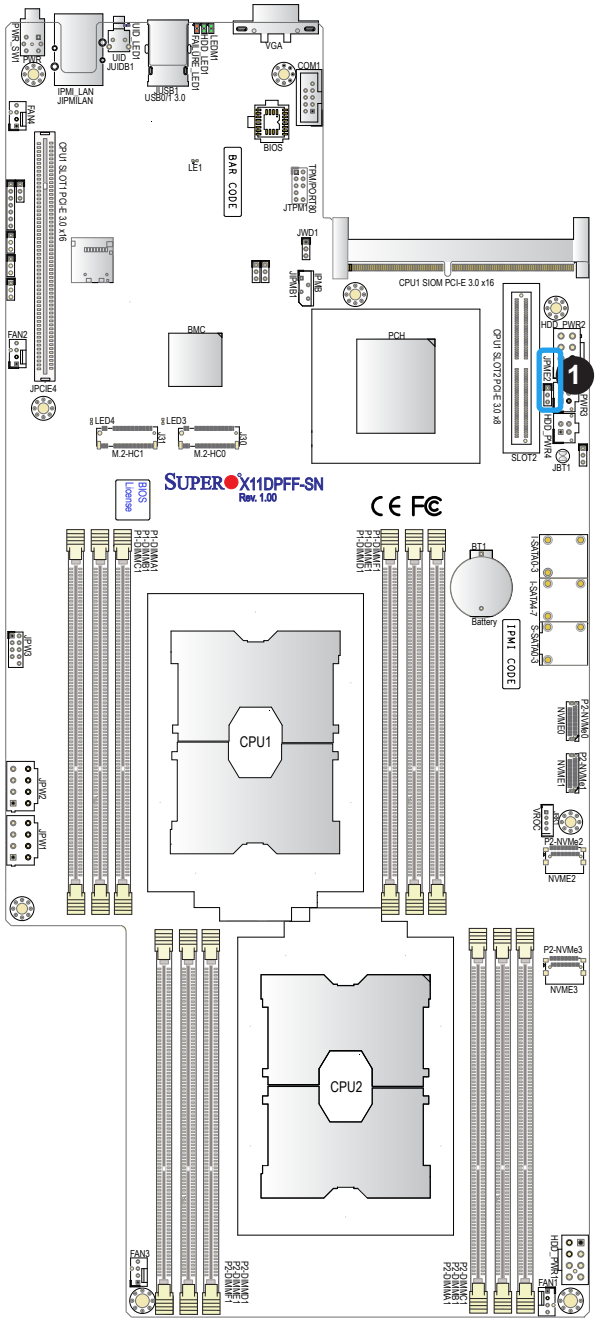
1. Clear CMOS

## ME Manufacturing Mode

Close pins 1 and 2 of JPME2 to bypass SPI flash security and force the system to use the ME 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.

| ME Manufacturing Mode Jumper Settings | |
|---|---|
| **Jumper Setting** | **Definition** |
| Pins 1-2 | Normal (Default) |
| Pins 2-3 | Manufacturing Mode |

1. ME Manufacturing Mode

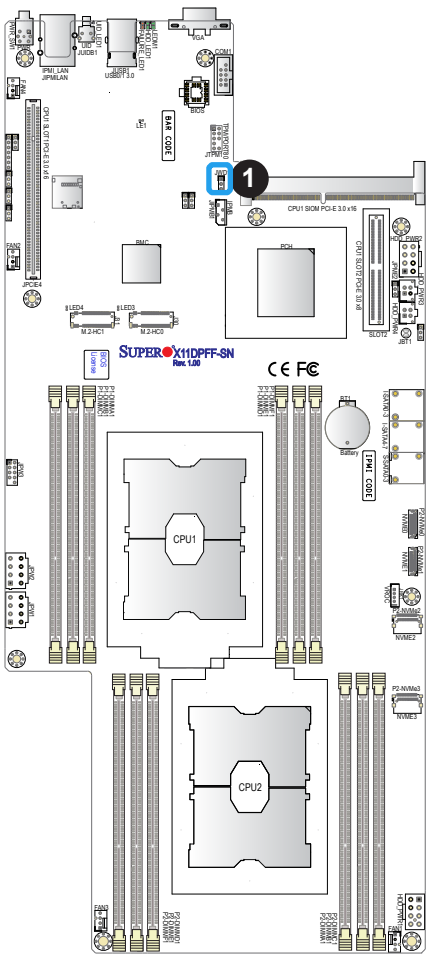


### Watch Dog

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

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

| Watch Dog Jumper Settings | |
|---|---|
| **Jumper Setting** | **Definition** |
| Pins 1-2 | Reset (default) |
| Pins 2-3 | NMI |
| Open | Disabled |

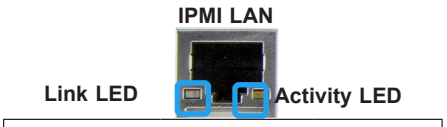



1. Watch Dog

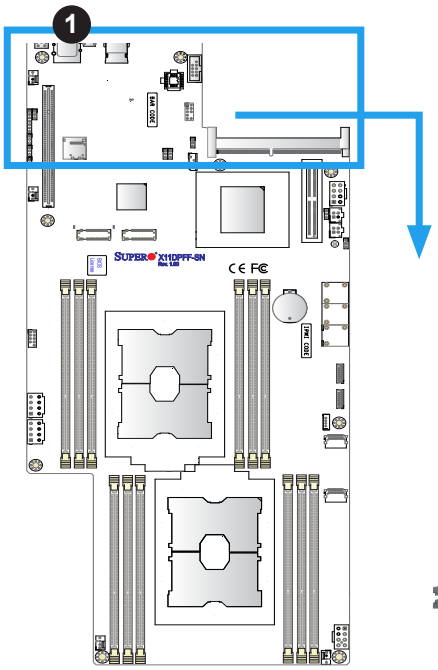
# 2.8 LED Indicators

### Dedicated IPMI LAN LEDs

A dedicated IPMI LAN, supported by the BMC, is located on the I/O front panel of the motherboard. The amber LED on the right indicates activity, while the green LED on the left indicates the speed of the connection. See the table below for more information.




| IPMI LAN Link LED (Left) & Activity LED (Right) | | |
|---|---|---|
| **Color** | **State** | **Definition** |
| **Link (Left)** | **Green: Solid** | **100 Mbps** |
| **Activity (Right)** | **Amber: Blinking** | **Active** |




1. IPMI LAN LEDs

### HDD Activity LED

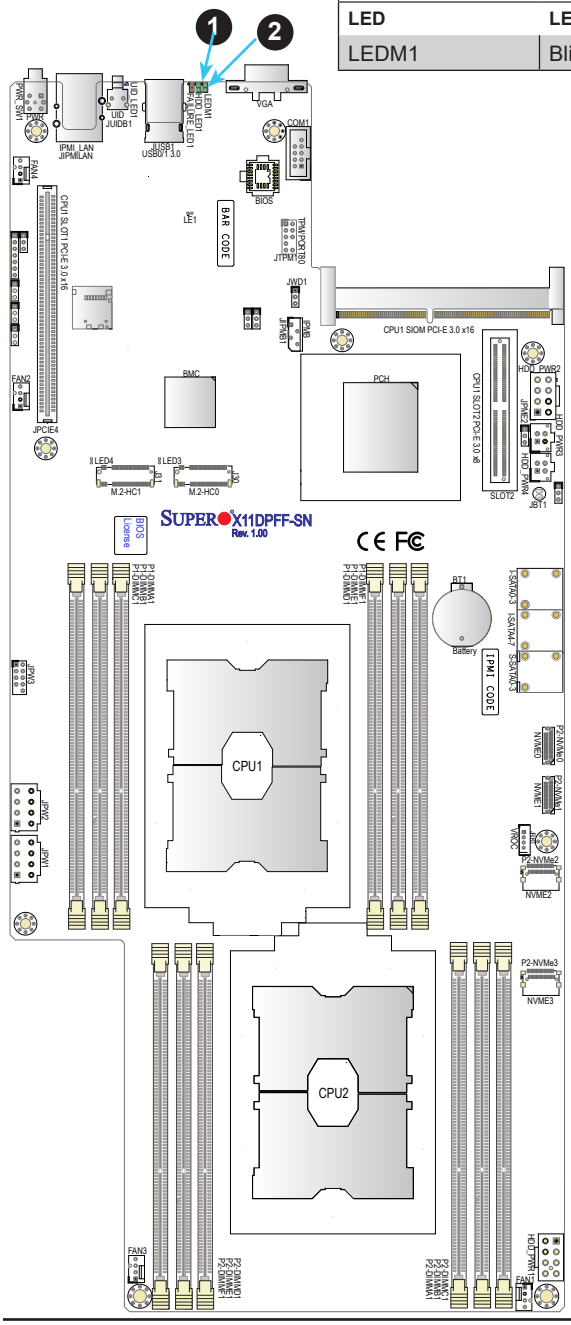
An HDD Activity LED is located at HDD_LED1 on the on the motherboard. When this LED is blinking, your hard drive devices are active. See the table below for the LED status.

| HDD Activity LED Indicator | | |
|---|---|---|
| **LED** | **LED State** | **Definition** |
| HDD_LED1 | Blinking: Green | HDD: Active |

### BMC Heartbeat LED

LEDM1 on the I/O front panel is used as the BMC heartbeat LED. When the LED is blinking green, BMC is normal. See the table below for the LED status.

| BMC Heartbeat LED Indicator | | |
|---|---|---|
| **LED** | **LED State** | **Definition** |
| LEDM1 | Blinking: Green | BMC Normal |




1. HDD Activity LED
2. BMC Heartbeat LED

### Failure LED

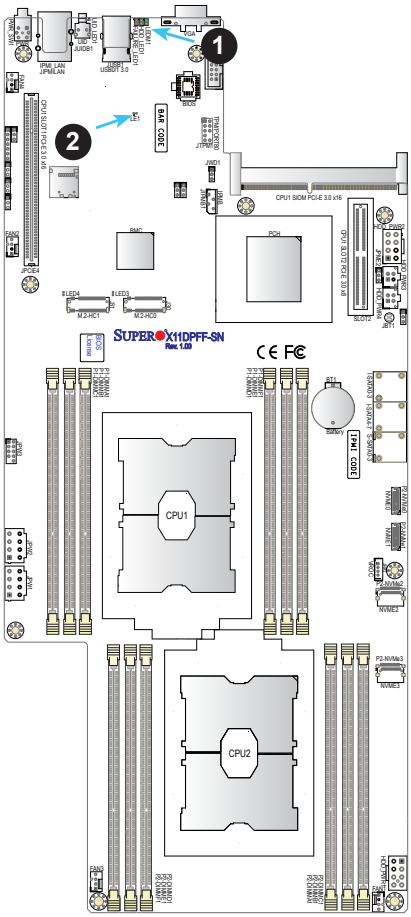
When the Failure LED, located at Failure_LED1, is on, an incident of overheating, and/or fan failure has occurred. Please check your system to resolve the situation.

| Failure LED Indicator | | |
|---|---|---|
| **LED** | **LED State** | **Definition** |
| Failure_LED1 | On: Red | Overheating, and/or Fan Failure |

### CPLD Heartbeat LED

When the CPLD Heartbeat LED, located at LE1, is blinking green, the onboard CPLD (Complex Programmable Logic Device) is normal. See the table below for the LED status.

| CPLD Heartbeat LED Indicator | | |
|---|---|---|
| **LED** | **LED State** | **Definition** |
| LE1 | Blinking: Green | CPLD: Normal |

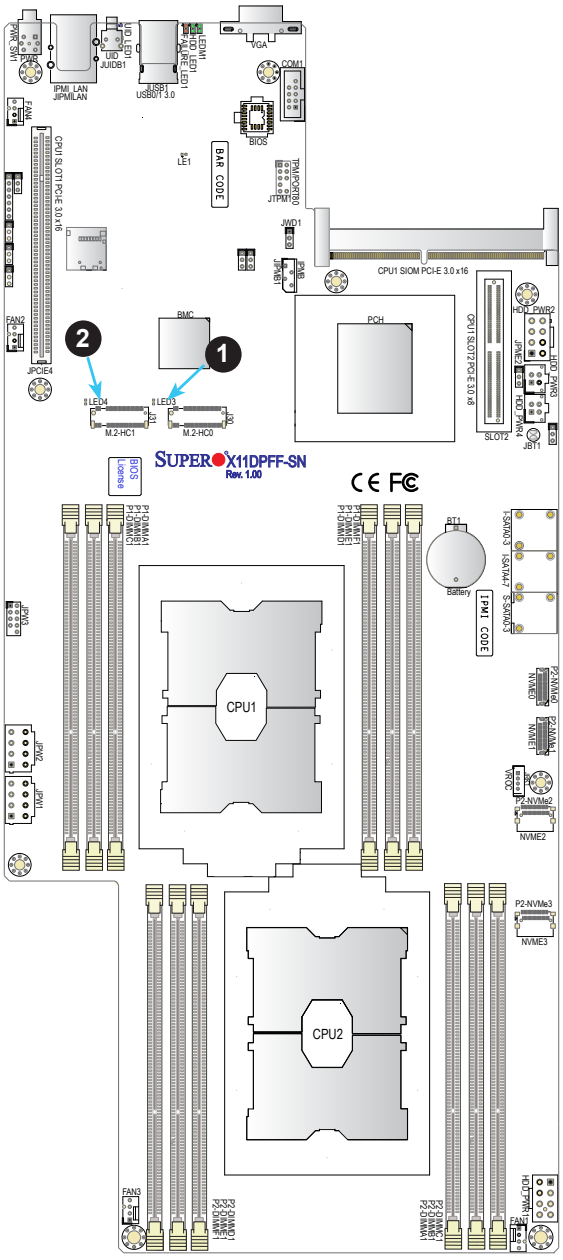



1. Failure LED
2. CPLD Heartbeat LED

### PCI-E/SATA M.2 Hybrid Slot Activity LEDs (LED3/LED4)

The ActivIty LED indicators for the onboard PCI-E/SATA M.2 hybrid slots (M.2-HC0/ M.2-HC1) are located at LED3 and LED4. When these LED indicators are blinking, these M.2 hybrid slots are active. See the table below for details.

| Activiy LED Indicator for PCI-E/SATA M.2 Slots | | |
|---|---|---|
| **LED** | **LED State** | **Definition** |
| LED3 | Blinking: Green | PCI-E/SATA M.2 Slot1 (M.2-HC0-J30): Active |
| LED4 | Blinking: Green | PCI-E/SATA M.2 Slot2 (M.2-HC1-J31): Active |




1. LED3
2. LED4

# 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. Make sure that the power connector is connected to your power supply.
2. Make sure that no short circuits exist between the motherboard and chassis.
3. Disconnect all cables from the motherboard, including those for the keyboard and mouse.
4. Remove all add-on cards.
5. 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

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

1. Check for any error beep from the motherboard speaker if the onboard speaker is available.

- 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 modules. 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.
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/UEFI BIOS support: Make sure that your CPU is supported and that you have the latest UEFI 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 configuration 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. UEFI BIOS upgrades can be downloaded from our website. **Note:** Not all UEFI BIOS can be flashed. It is depending on the modifications to the boot block 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
- UEFI 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:** This motherboard supports up to 3TB of 3DS Load Reduced DIMM (3DS LRDIMM), Load Reduced DIMM (LRDIMM), 3DS Registered DIMM (3DS RDIMM), Registered DIMM (RDIMM), Non-Volatile DIMM (NV-DIMM) DDR4 (288-pin) ECC 2933*/2666/2400/2133 MHz memory in 12 slots. This motherboard also supports up to 4TB with DCPMM modules installed.

**Note**: Support for 2933 MHz memory is dependent on the CPU SKU. See Section 2.4 for details on installing memory.

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

**Answer:** The instant power off function is controlled by the Power Button mode in the Advanced setting in the BIOS. When the On/Off feature is enabled, the motherboard can be instantly powered off as long as the BIOS is in 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.

**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/ResourceApps/BIOS_IPMI_Intel.html. 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. Please refer to the following section for the instructions on how to update your BIOS under UEFI Shell.

**Note**: The SPI BIOS chip used on this motherboard cannot be removed. Send your motherboard back to our RMA Department at Supermicro for repair. For BIOS Recovery instructions, please refer to the AMI BIOS Recovery Instructions posted at http://www.supermicro.com/support/manuals/.

**Question: How do I update my BIOS under UEFI Shell?**

**Note:** We do not recommend that you update your BIOS if you are not experiencing a BIOS-related problem. If you need to update your BIOS, please follow the steps below to properly update your BIOS under UEFI Shell.

1. Download and save the BIOS update package to your computer.
2. Extract the files from the UEFI folder of the BIOS package to a USB stick.

**Note:** The USB stick doesn't have to be bootable; however, it has to be formatted with the FAT/FAT32 file system.

3. Insert the USB stick into a USB port, boot to the UEFI Built-In Shell, and enter the following commands to start the BIOS update:

Shell> fs0:

fs0:\> cd UEFI

fs0:\UEFI> flash.nsh BIOSname#.###

4. The FLASH.NSH script will compare the Flash Descriptor Table (FDT) code in the new BIOS with the existing one in the motherboard:

**a. If a different FDT is found**

- A new file, STARTUP.NSH, will be created, and the system will automatically reboot in 10 seconds without you pressing any key. BIOS will be updated after the system reboots.
- You can also press <Y> to force an immediate system reboot to shorten the process. During system reboot, press the <F11> key to invoke the boot menu and boot into the build-in UEFI Shell. Your BIOS will be updated automatically.

**b. If the FDT is the same**

- BIOS update will be immediately performed without a system reboot initiated.

**Warning:** Do not shut down or reset the system while updating the BIOS to prevent possible system boot failure!

5. Perform an A/C power cycle after the message indicating the BIOS update has completed.
6. Go to the BIOS setup utility, and restore the BIOS settings.

# 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. 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.
3. Remove the battery.

## Proper Battery Disposal

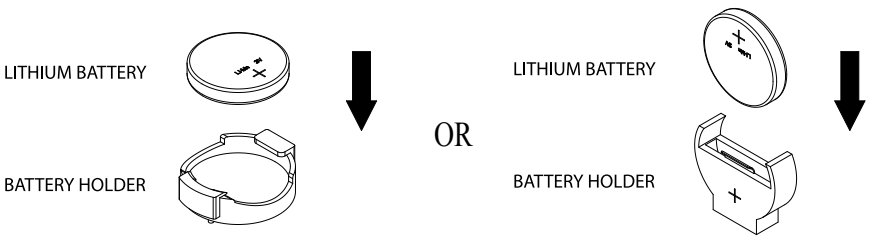
Please handle used batteries carefully. Do not damage the battery in any way; a damaged battery may release hazardous materials into the environment. Do not discard a used battery in the garbage or a public landfill. Please comply with the regulations set up by your local hazardous waste management agency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

## Battery Installation

To install an 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. Identify the battery's polarity. The positive (+) side should be facing up.
4. 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.



## 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 your motherboard 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 any motherboard failure caused by alteration, misuse, abuse, improper handling or maintenance of products.

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

# Chapter 4

# UEFI BIOS

## 4.1 Introduction

This chapter describes the AMIBIOS™ setup utility for the X11DPFF-SN 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 the 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; however, in other cases, other hot keys, such as <F1>, <F2>, may be used for this purpose.) Each main BIOS menu option is described in this manual.

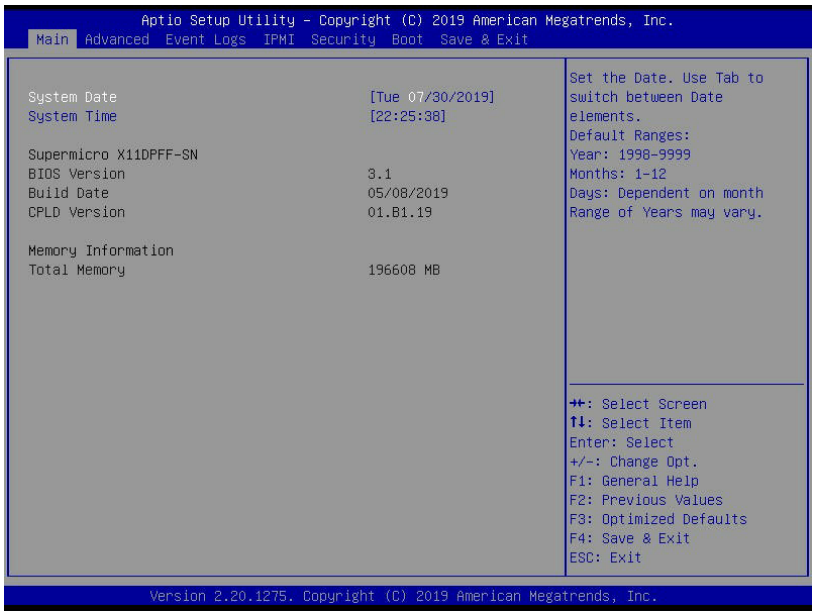
The Main BIOS screen has two main frames. The left frame displays all the options that can be configured. “Grayed-out” options cannot be configured. The right frame displays the key legend. Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it. (Please note that BIOS has default text messages built in, and 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>, <F2>, <F3>, <F4>, <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 see 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.




### System Date/System Time

Use this feature to change the system date and time. To change system date and time settings, please highlight *System Date* or *System Time* using the arrow keys and enter new values using 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 the BIOS build date after the RTC (Real Time Clock) reset.

### Supermicro X11DPFF-SN

### BIOS Version

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

### Build Date

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

### CPLD Version

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

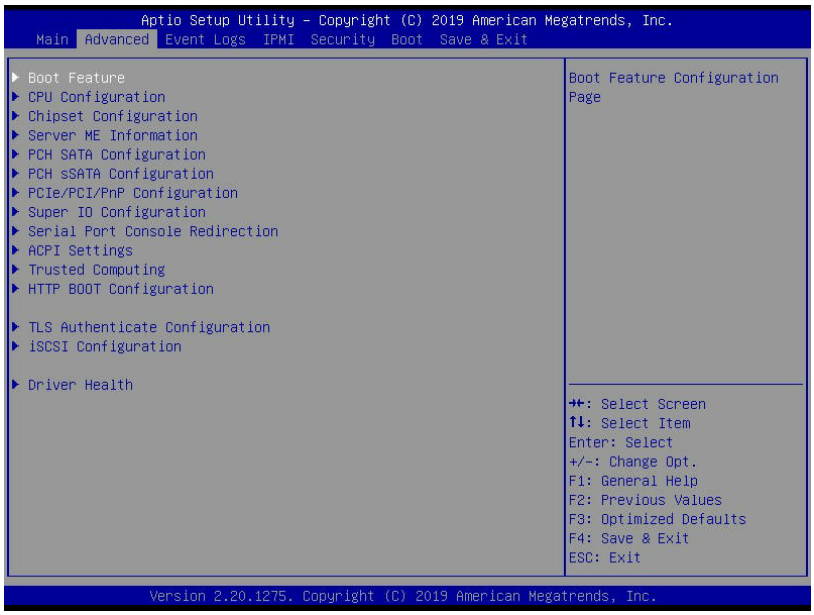
### Memory Information

#### Total Memory

This feature displays the total size of memory available 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 improper DRAM frequency, or a wrong BIOS timing setting may cause the system to malfunction. When this occurs, restore the setting to the manufacturer default setting.

## ▶Boot Feature

### 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 settings. 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 Num Lock 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 feature 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 feature is set to Postponed, the ROM BIOS of the host adaptors will not capture Interrupt 19 immediately to 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 (Extensible 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.

**Install Windows 7 USB Support**

Select Enabled to install Windows 7 and the XHCI drivers for USB keyboard/mouse support. After you've installed the Windows 7 and XHCI drivers, be sure to set this feature to "Disabled" (default). The options are **Disabled** and Enabled.

**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**.

## 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.**

**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**.

**Power Button Function**

This feature controls how the system shuts down when the power button is pressed. Select 4 Seconds Override 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.**

## ▶CPU Configuration

**Warning:** Setting the wrong values in the sections below 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 Enabled**

Use this feature to enable or disable CPU cores in the processor specified by the user. Use the <+> key and the <-> key on the keyboard to set the desired number of CPU cores you want to enable in a processor. Please note that the maximum of 16 CPU cores are currently available in each CPU package for this system. The default setting is **0**.

**Monitor/Mwait**

Select Enable to support Monitor and Mwait, which are two instructions in Streaming SIMD Extension 3 (SSE3), to improve synchronization between multiple threads for CPU performance enhancement. The options are **Auto**, Enable, and Disable.

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

Select Enable for Execute Disable Bit support which will allow the processor to designate areas in the system memory where an application code can execute and where it cannot, thus preventing a worm or a virus from flooding illegal codes to overwhelm the processor, damaging the system during a virus attack. The options are **Enable** and Disable. (Refer to Intel and Microsoft websites for more information.)

**Intel Virtualization Technology (Available when two processors are installed on the motherboard)**

Select Enable to use Intel Virtualization Technology which will allow multiple workloads to share the same set of common resources. On shared virtualized hardware, various workloads (or tasks) can co-exist, sharing the same resources, while functioning in full independence from each other, and migrating freely across multi-level infrastructures and scale as needed. 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 Lock/Disable.

**Hardware Prefetcher (Available when supported by the CPU)**

If this feature is set to Enable, the hardware prefetcher will prefectch data from the main system memory to Level 2 cache to help expedite data transaction for memory performance enhancement. 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**: Reboot the system for the changes you've made to take effect. Refer to Intel's website for detailed information.

**DCU 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 to enhance CPU performance. The options are Disable and **Enable**.

**DCU IP Prefetcher**

This feature allows the system to use the sequential load history, which is based on the instruction pointer of previous loads, to determine whether the system will prefetch additional lines. 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 Controls EPB to allow the system BIOS to configure the Power-Performance Tuning Bias setting. The options are BIOS Controls EPB and **OS Controls EPB**.

**ENERGY_PERF_BIAS_CFG mode (ENERGY PERFORMANCE BIAS CONFIGURATION Mode) (Available when "Power Performance Tuning" is set to BIOS Controls EPB)**

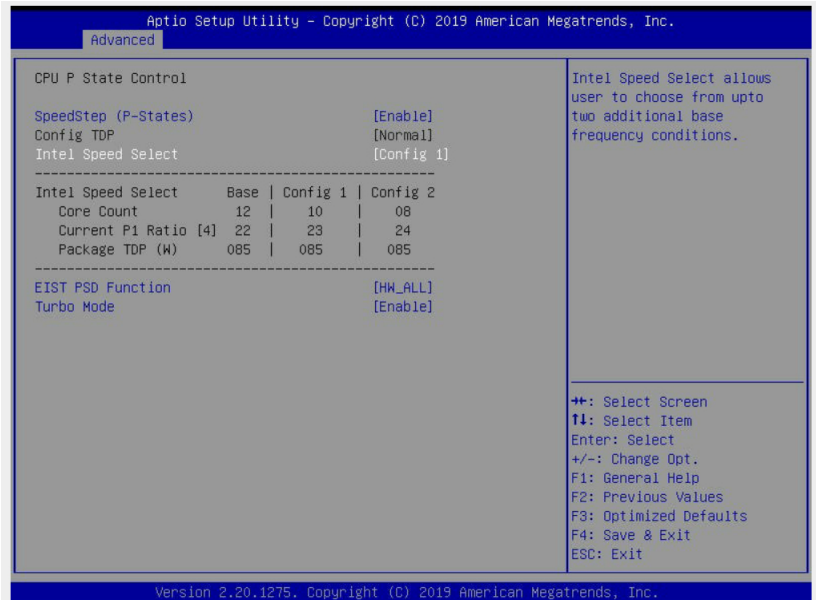
Use this feature to configure the optimal operation setting for your machine by achieving the desired system performance level and energy saving (efficiency) level at the same time. Select Maximum Performance to maximize system performance to its highest potential; however, this may consume maximal amount of power as energy is needed to fuel the processor frequency. Select Power to minimize power use; however, system performance will be impacted as the result of power saving. The options are Maximum Performance, Performance, **Balanced Performance**, Balanced Power, and Power.

## ▶CPU P State Control (Available when Power Technology is set to Custom)

**SpeedStep (P-States)**

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**.

***If SpeedStep is set to Enable and the 2nd Gen Intel Xeon Scalable-SP 8260Y/6240Y/4214Y Processors are Used, the following items will display:***




### Config (Configuring) TDP (Available when SpeedStep is set to Enable and when the 2nd Gen Intel Xeon Scalable-SP 8260Y/6240Y/4214Y Processors are Used)

This feature allows the user to configure the maximum CPU TDP (Thermal Design Power) level for the system. The TDP level is subject to chassis and heatsink cooling restrictions. For proper thermal management, please check the chassis and heatsink specifications for proper CPU TDP sizing. The options are **Normal**, Level 1 and Level 2.

### Intel Speed Select (Available when SpeedStep is set to Enable and when the 2nd Gen Intel Xeon Scalable-SP 8260Y/6240Y/4214Y Processors are Used)

This feature allows the user to configure up to two additional base frequency settings for the processors used in your system as shown in the display below. The options are **Base**, Config (Configuration) 1 and Config (Configuration) 2.

### Activate PBF (Available when SpeedStep is set to Enable and when the 2nd Gen Intel Xeon Scalable-SP 6252N/6230N/5218N Processors are Used)

Select Enable to support Prioritized Base Frequency (PBF), which will increase the base frequency on high-priority cores and decrease the base frequency on low-priority cores to improve CPU performance. The options are **Disable** and Enable.

### Configure PBF (Available when Activate PBF is set to Enable)

Select Enable to allow the BIOS to configure high priority CPU cores as Prioritized Base Frequency (PBF) so that software programs do not have to configure the PBF settings. This feature is available when it is supported by the CPUs used in the system. The options are **Enable** and Disable.

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

Use this feature 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 to allow the CPU to operate at the manufacturer-defined turbo speed by increasing CPU clock frequency. This feature is available when it is supported by the CPUs used in the system. The options are Disable and **Enable**.

## ▶Hardware PM (Power Management) State Control (Available when "Power Technology" is set to Custom)

**Hardware P-States**

If this feature is set to Disable, system 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 the OS guidance. If this feature is set to Native Mode with No Legacy Support, system 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 **Disable** and Enable.

**CPU C6 Report (Available when Autonomous Core C-State is set to Disable)**

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) (Available when Autonomous Core C-State is set to Disable)**

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 (Available when Power Technology is set to Custom)

**Package C State**

This feature is used to optimize and reduce CPU package power consumption in idle mode. Please note that the changes you've made in this setting will affect all CPU cores or the circuits of the entire system. The options are C0/C1 state, C2 state, C6 (non-Retention) state, C6 (Retention) state, No Limit, and **Auto**.

### ▶CPU T State Control (Available when Power Technology is set to Custom)

**Software Controlled T-States**

If this feature is set to Enable, CPU throttling settings will be supported by the software of the system. The options are **Enable** and Disable.

## ▶Chipset Configuration

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

## ▶North Bridge

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

### ▶UPI (Ultra Path Interconnect) Configuration

This section displays the following UPI General Configuration information:

- Number of CPU
- Number of Active UPI Link
- 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 (UPI) 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 for the system BIOS to enable Link L0p support which will allow the CPU to reduce the UPI links from full width to half width in the event when the CPU's workload is low in an attempt to save power. This feature is available for the system that uses Intel processors with UPI technology support. The options are Disable, Enable, and **Auto**.

**Note**: You can change the performance settings for non-standard applications by using this parameter. It is recommended that the default settings be used for standard applications.

**Link L1 Enable**

Select Enable for the BIOS to activate Link L1 support which will power down the UPI links to save power when the system is idle. This feature is available for the system that uses Intel processors with UPI technology support. The options are Disable, Enable, and **Auto**.

**Note**: Link L1 is an excellent feature for an idle system. L1 is used during Package C-States when its latency is hidden by other components during a wakeup.

**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 WCiLF.

**SNC**

Select Enable to use "Sub NUMA Clustering" (SNC), which supports full SNC (2-cluster) interleave and 1-way IMC interleave. Select Auto for 1-cluster or 2-cluster support depending on the status of IMC (Integrated Memory Controller) Interleaving. The options are **Disable**, Enable, and Auto.

**XPT Prefetch**

Select Enable for XPT (Extended Prediction Table) Prefetch support which will allow an LLC request to be duplicated and sent to an appropriate memory controller based on the recent LLC history to reduce latency. The options are Enable, and **Disable**.

**KTI Prefetch**

If this feature is set to Enable, the KTI prefetcher will preload the L1 cache with data deemed relevant to allow the memory read to start earlier on a DDR bus in an effort to reduce latency. The options are **Enable** and Disable.

**Local/Remote Threshold**

Use this feature to set the threshold for the Interrupt Request (IRQ) signals, which handle hardware interruptions. The options are Disable, **Auto**, Low, Medium, and High.

**Stale AtoS (A to S)**

The in-memory directory has three states: I, A, and S states. The I (-invalid) state indicates that the data is clean and does not exist in the cache of any other sockets. The A (-snoop All) state indicates that the data may exist in another socket in an exclusive or modified state. The S state (-Shared) indicates that the data is clean and may be shared in the caches across one or more sockets. When the system is performing "read" on the memory

and if the directory line is in A state, we must snoop all other sockets because another socket may have the line in a modified state. If this is the case, a "snoop" will return the modified data. However, it may be the case that a line "reads" in an A state, and all the snoops come back with a "miss". This can happen if another socket reads the line earlier and then has silently dropped it from its cache without modifying it. If the "Stale AtoS" feature is enabled, a line will transition to the S state when the line in the A state returns only snoop misses. That way, subsequent reads to the line will encounter it in the S state and will not have to snoop, saving the latency and snoop bandwidth. Stale "AtoS" may be beneficial in a workload where there are many cross-socket reads. The options are Disable, Enable, and **Auto**.

**LLC Dead Line Alloc**

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

**Isoc Mode**

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

## ▶Memory Configuration

**Integrated Memory Controller (IMC)**

**Enforce POR (Plan of Record)**

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

**PPR Type**

Post Package Repair (PPR) is a new feature available for the DDR4 Technology. PPR provides additional spare capacity within a DDR4 DRAM module that is used to replace faulty cell areas detected during system boot. PPR offers two types of memory repairs. Soft Post Package Repair (sPPR) provides a quick, temporary fix on a raw element in a bank group of a DDR4 DRAM device, while hard Post Package Repair (hPPR) will take a longer time to provide a permanent repair on a raw element. The options are **Auto**, Soft PPR, Hard PPR, and PPR Disabled.

**Memory Frequency**

Use this feature to set the maximum memory frequency for onboard memory modules. The options are **Auto**, 1866, 2000, 2133, 2400, 2666, and 2933. (**Note**: Support for 2933 MHz memory is dependent on the CPU SKU.)

**Data Scrambling for DDR4**

Select Enable to enable data scrambling for DDR4 memory to enhance system performance and security. Select Auto for the default setting of the Memory Reference Code (MRC) to set configure data scrambling for DDR4 setting. The options are **Auto**, Disable, and Enable.

**tCCD_L Relaxation**

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

**tRWSR (Read to Write turnaround time for Same Rank) Relaxation**

Select Enable to use the same tRWSR DDR timing setting among all memory channels, and in which case, the worst case value among all channels will be used. Select Disable to use different values for the tRWSR DDR timing settings for different channels as trained. The options are **Disable**, and Enable.

**2X Refresh**

Select Enable for memory 2X refresh support to enhance memory performance. The options are Enable, and **Auto**.

**Page Policy**

Use this feature to set the page policy for onboard memory support. The options are Closed, Adaptive, and **Auto**.

**Enable ADR**

Select Enable for ADR (Async DIMM Self-Refresh) support to enhance memory performance. The options are Disable and **Enable**.

**Data Scrambling for NVDIMM**

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

**Erase-Arm NVDIMMs**

If this feature is set to Enable, the function that arms the NVDIMMs for safe operations in the event of a power loss will be removed. The options are Enable and **Disable**.

**Restore NVDIMMs**

Select Enable to restore the functionality and the features of NVDIMMs. The options are **Enable** and Disable.

**Interleave NVDIMMs**

If this item is set to Enable, all onboard NVDIMM modules will be configured together as a group for the interleave mode. If this item is set to Disable, individual NVDIMM modules will be configured separately for the interleave mode. The options are Enable and **Disable**.

**Reset Trigger ADR (Async DIMM Self-Refresh)**

Upon system power loss, an ADR sequence will be triggered to allow ADR to flush the write-protected data buffers in the memory controller and place the DRAM memory in self-refresh mode. When this process is complete, the NVDIMM will then take control of the DRAM memory and transfer the contents to the onboard Flash memory. After the transfer is complete, the NVDIMM goes into a zero power state. The data transferred will be retained for the duration specified by the flash memory. The options are Enable and **Disable**.

**S5 Trigger ADR**

Select Enabled to support S5-Triggered ADR to enhance system performance and data integrity. The options are **Disabled** and Enabled.

**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 Interleave, 2-way Interleave, and **Auto**.

## ▶Memory Topology

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

- P1 DIMMA1/DIMMB1/DIMMC1/DIMMD1/DIMME1/DIMMF1
- P2 DIMMA1/DIMMB1/DIMMC1/DIMMD1/DIMME1/DIMMF1

## ▶Memory RAS (Reliability_Availability_Serviceability) Configuration

Use this submenu to configure the following Memory RAS settings.

**Static Virtual Lockstep Mode**

Select Enable to support Static Virtual Lockstep mode to enhance memory performance. The options are Enable and **Disable**.

**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 set to Mirror Mode 1LM or an AEP device is plugged in.

**Correctable Error Threshold**

Use this feature to enter the threshold value for correctable memory errors. The default setting is **512**.

**Intel Run Sure**

Select Enable to use Intel Run Sure Technology which will enhance critical data protection and increase system uptime and resiliency. The options are Enable and **Disable**.

**SDDC Plus One**

SDDC (Single Device Data Correction) checks and corrects single-bit or multiple-bit (4-bit max.) memory faults that affect an entire single x4 DRAM device. SDDC Plus One, an enhanced feature to SDDC, copies data stored in a faulty DRAM device to a spare device when an SDDC event has occurred. After the event, the SDDC+1 ECC mode is activated to protect against any additional memory failure caused by a 'single-bit' error in the same memory rank. The options are Enable and **Disable**. (**Note**: SDDC or SDDC Plus One is available when it is supported by the processors installed on the motherboard.)

**ADDDC (Adaptive Double Device Data Correction) Sparing (Available when Intel Run Sure is set to Enable)**

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 feature 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 (Available when Patrol Scrub is set to Enable)**

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**.

## ▶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)

Use this feature to configure the PCI-E Bifurcation setting for a PCI-E port specified by the user. The options are x4x4x4x4, x4x4x8, x8x4x4, x8x8, x16, and **Auto**.

### IOU1 (IIO PCIe Br2)

Use this feature to configure the PCI-E Bifurcation setting for a PCI-E port specified by the user. The options are x4x4x4x4, x4x4x8, x8x4x4, x8x8, x16, and **Auto**.

### IOU2 (IIO PCIe Br3)

Use this feature to configure the PCI-E Bifurcation setting for a PCI-E port specified by the user. The options are x4x4x4x4, x4x4x8, x8x4x4, x8x8, x16, and **Auto**.

## ▶CPU1 PcieBr0D00F0 - Port 0/DMI (Available for CPU 1 Configuration only)

### Link Speed

Use this feature to configure 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:

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

## ▶IOAT Configuration

**Disable TPH**

TPH (TLP Processing Hint) 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.

**ACS (Access Control Services) Control**

Select Enable to program Access Control Services to Chipset PCI-E Root Port Bridges. Select Disable to program Access Control Services to all PCI-E Root Port Bridges. The options are **Enable** and Disable.

**Interrupt Remapping**

If this feature is set to Enable, I/O DMA transfer remapping and device-generated interrupts will be supported. The options are **Enable** and Disable.

**PassThrough DMA**

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

## ▶Intel® VMD Technology

This section describes the configuration settings for the Intel Volume Management Device (VMD) Technology.

**Notes**: **1.** After you've enabled VMD in the BIOS on a PCI-E slot of your choice, this PCI-E slot will be dedicated for VMD use only, and it will no longer support any PCI-E device. To re-activate this slot for PCI-E use, please disable VMD in the BIOS. **2.** PCI-E slots and naming differ depending on the PCI-E devices installed on your motherboard.

### ▶Intel® VMD for Volume Management Device on CPU1

#### VMD Configuration for PStack0/VMD Configuration for PStack1

#### Intel® VMD for Volume Management Device for PStack0

Select Enable to enable Intel Volume Management Device Technology support for the root port specified by the user. The options are Enable and **Disable**.

***If Intel® VMD for Volume Management Device for PStack0 is set to Enable, the following item will display.***

#### VMD Port 1A/VMD Port 1B/VMD Port 1C/VMD Port 1D

Select Enable to enable Intel Volume Management Device Technology support for the PCI-E slot specified by the user. The options are Enable and the **Disable**.

#### Hot Plug Capable

Select Enable to enable Hot Plug support for the root ports specified by the user, which will allow the user to change the devices on those root ports without shutting down the system. The options are **Disable** and Enable.

***If Intel® VMD for Volume Management Device for PStack1 is set to Enable, the following item will display.***

#### VMD Port 2A/VMD Port 2B/VMD Port 2C/VMD Port 2D

Select Enable to enable Intel Volume Management Device Technology support for the PCI-E slot specified by the user. The options are Enable and the **Disable**.

#### Hot Plug Capable

Select Enable to enable Hot Plug support for the root ports specified by the user, which will allow the user to change the devices on those root ports without shutting down the system. The options are **Disable** and Enable.

## ▶Intel® VMD for Volume Management Device on CPU2

### VMD Configuration for PStack1

### Intel® VMD for Volume Management Device for PStack1

Select Enable to enable Intel Volume Management Device Technology support for the root port specified by the user. The options are Enable and **Disable**.

***If Intel® VMD for Volume Management Device for PStack1 is set to Enable, the following item will display.***

### VMD Port 2A/VMD Port 2B/VMD Port 2C/VMD Port 2D

Select Enable to enable Intel Volume Management Device Technology support for the PCI-E slot specified by the user. The options are Enable and the **Disable**.

### Hot Plug Capable

Select Enable to enable Hot Plug support for the root ports specified by the user, which will allow the user to change the devices on those root ports without shutting down the system. The options are **Disable** and Enable.

## ▶IIO-PCIE Express Global Options

### IIO-PCIE Express Global Options

The section allows the user to configure the following PCI-E global options:

### PCI-E Completion Timeout (Global) Disable

Use this feature to select 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 Disabled and **Enabled**.

**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.

**PCIe PLL SSC**

Select Enabled for PCH PCI-E Spread Spectrum Clocking support, which will allow the BIOS to monitor and attempt to reduce the level of Electromagnetic Interference caused by the components whenever needed. The options are Enabled and **Disabled**.

## ▶Server ME (Management Engine) Information

This feature displays the following system ME configuration settings.

- General ME Configuration
- Oper. (Operational) Firmware Version
- Backup Firmware Version
- Recovery Firmware Version
- ME Firmware Status #1/ME Firmware Status #2
  - Current State
  - Error Code

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

**Configure SATA as (Available when SATA Controller is set to Enable)**

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 (Available when SATA Controller is set to Enable)**

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

**SATA RSTe Boot Info (Available when Configure SATA as is set to RAID)**

Select Enable for full int13h support which will allow the system to boot using a device attached to the SATA controller. The options are Disable and **Enable**.

**Aggressive Link Power Management**

When this feature is set to Enable, 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 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**.

**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**

When this feature is set to Enable, the SATA device installed on the SATA port specified by the user will start a COMRESET initialization when an edge is detected from 0 to 1. The options are Enable and **Disable**.

**SATA Device Type**

Use this feature to specify if the device installed on the SATA 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.

## ▶PCH sSATA Configuration

When this submenu is selected, the AMI BIOS automatically detects the presence of the sSATA devices that are supported by the PCH 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 (Available when sSATA Controller is set to Enable)**

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 feature is hidden when the sSATA Controller item is set to Disabled.)

**SATA HDD Unlock (Available when sSATA Controller is set to Enable)**

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

**sSATA RSTe Boot Info (Available when Configure sSATA as is set to RAID)**

Select Enable for full int13h support which will allow the system to boot using a device attached to the SATA controller. The options are Disable and **Enable**.

**Aggressive Link Power Management**

When this feature is set to Enable, the sSATA AHCI controller manages the power use of the sSATA 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 Configure sSATA 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 - sSATA Port 5**

**Hot Plug**

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

**Spin Up Device**

This setting allows the SATA device installed on the SATA port specified by the user to start a COMRESET initialization when an edge is detected from 0 to 1. The options are Enable and **Disable**.

**sSATA Device Type**

Use this feature 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 options are **56T**, 40T, 24T, 16T, 4T, 2T, 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.

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

**NVMe Firmware Source**

This feature determines which type of the NVMe firmware should be used in your system. The options are **Vendor Defined Firmware**, and AMI Native Support.

**VGA Priority**

Use this feature to select the graphics device to be used as the primary video display for system boot. The options are **Onboard** and Offboard.

**M.2 Port 0 OPROM/M.2 Port 1 OPROM**

Use this feature to select the firmware type to be used for the onboard M.2 ports. If this feature is set to EFI (Extensible Firmware Interface), the device installed on the M.2 port specified by the user will be configured as an EFI device. Select Legacy to configure the device installed in the M.2 slot specified by the user to be a Legacy device. The options are Disabled, **Legacy** and EFI.

**RSC-R1UF-E16 PCIe 3.0 X16 OPROM/RSC-P-6 PCIe 3.0 X8 OPROM/SIOM CPU1 PCIe 3.0 X16 OPROM**

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

**Onboard SAS Option ROM**

Select EFI to allow the user to boot the computer using an EFI (Extensible Firmware Interface) device installed on the SAS connector. Select Legacy to boot the computer using a legacy device installed on the SAS connector. The options are Disabled, **Legacy** and EFI.

**Bus Master Enable**

Select Enabled for the PCI Bus Driver to enable the Bus Master Attribute support for DMA transactions. If this setting is set to Disabled, the PCI Bus Driver will disable the Bus Master Attribute support for Pre-Boot DMA protection. The options are Disabled and **Enabled**.

**Onboard NVMe1 Option ROM/Onboard NVMe2 Option ROM/Onboard NVMe3 Option ROM/ Onboard NVMe4 Option ROM**

Select EFI to allow the user to boot the computer using an EFI (Extensible 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 PCI-E slot specified by the user. The options are Disabled, Legacy and **EFI**. (**Note:** NVMe device names may differ in each system.)

**Onboard Video Option ROM**

Select EFI to allow the user to boot the computer using the EFI (Extensible Firmware Interface) device installed on the onboard video port. Select Legacy to allow the user to boot the computer using a legacy device installed on the onboard video port. The options are Disabled, **Legacy** and EFI.

## ▶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 set the wait time (in seconds) upon which the system BIOS will wait for user to press the <ESC> key to abort PXE boot instead of proceeding with PXE boot by connecting to a network server immediately. The default is **0**.

**Media detect count**

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 Serial Port 1. The options are **Enabled** and Disabled.

**Device Settings (Available when Serial Port 1 is set to Enabled)**

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

**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=2F8h; IRQ=4), (IO=3E8h; IRQ=4), and (IO=2E8h; IRQ=4).

## ▶Serial Port 2 Configuration

**Serial Port 2**

Select Enabled to enable Serial Port 2. The options are **Enabled** and Disabled.

**Device Settings (Available when Serial Port 2 is set to Enabled)**

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

**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), (IO=3E8h; IRQ=3); and (IO=2E8h; IRQ=3).

**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 be available for configuration:***

## ▶Console Redirection Settings (for COM 1)

### 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.