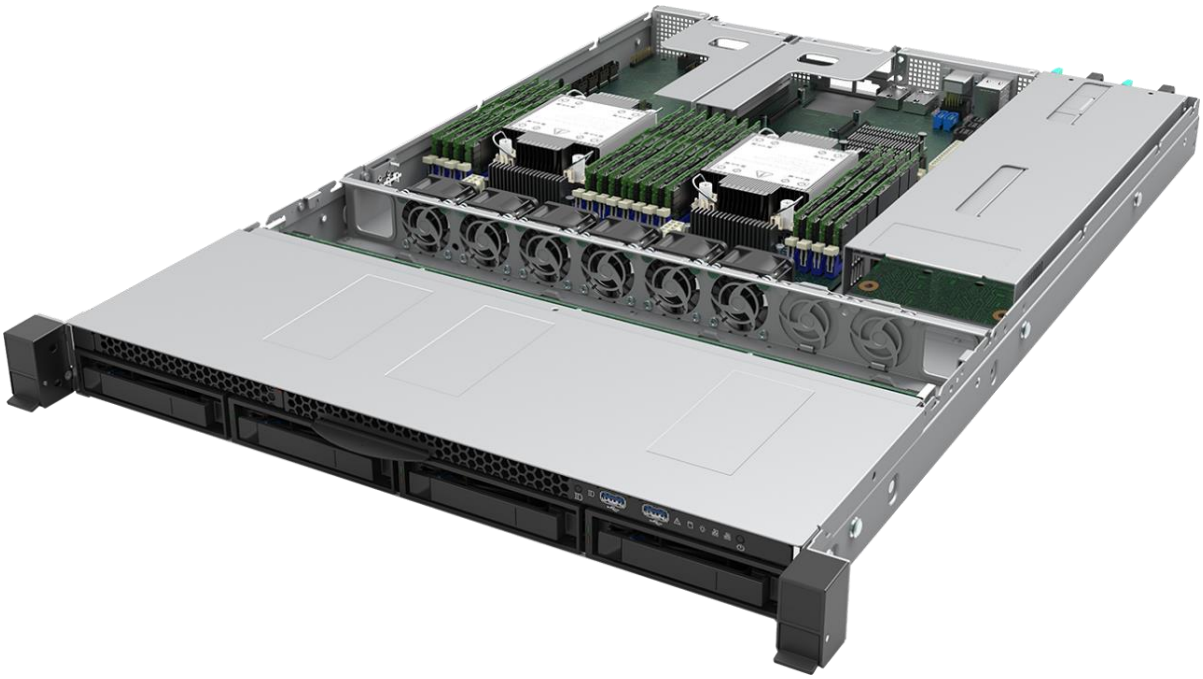
Intel® Server System M20NTP1UR

Technical Product Specification

An overview of product features, functions, architecture, and support specifications.

Rev. 1.2

August 2022



M20NTP1UR

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Document Revision History

Date	Revision	Changes
March 2022	1.0	First production release.
May 2022	1.1	• Correction made to Figure 8 – Architectural Block Diagram. • Correction made to Table 25 – Statement of Volatility Table for server board.
August 2022	1.2	Minor edits throughout the document for clarity.

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1. Introduction

This technical product specification (TPS) describes the features, functions, architecture, and support specifications of the Intel® Server System M20NTP1UR.

The Intel Server System M20NTP1UR is a purpose-built system that delivers power and performance at a peak efficiency in a 1U rack mount server form factor. It features the 3rd Gen Intel® Xeon® Scalable processor family in a dual socket configuration, delivering high core count and new hardware-enhanced security features. Previous generations of the Intel Xeon processor and the Intel Xeon Scalable processor families are not supported.

For a complete overview of system features and functions, both this document and the *Intel® Server Board M20NTP2SB Technical Product Specification* should be referenced.

Figure 1. Intel® Server System M20NTP1UR

1.1 Reference Documents and Support Collaterals

For additional information and other support collaterals related to this Intel server product, see Table 1. Listed documents and utilities can be downloaded from the following Intel websites or can be ordered through a local Intel support representative.

Note: Some of the Intel documents listed in Table 1 are classified as "Intel Confidential". These documents are only made available under a nondisclosure agreement (NDA) with Intel. All Intel product documentation and support collaterals can be downloaded from Intel's Resource & Documentation Center website: https://www.intel.com/content/www/us/en/documentation-resources/developer.html.

Table 1. Intel® Server M20NTP family Reference Documents and Support Collaterals

Topic	Document Title or Support Collateral	Document Classification
Server-board-level architectural and features overview	*Intel® Server Board M20NTP Technical Product Specification*	Public
System-level architectural and features overview	*Intel® Server System M20NTP1UR Technical Product Specification*	Public
System integration and service instructions	*Intel® Server System M20NTP1UR System Integration and Service Guide*	Public
Available product family options, spares, accessories.	*Intel® Server M20NTP Family Configuration Guide*	Public
BIOS setup utility overview	*Intel® Server M20NTP Family BIOS Setup User Guide*	Public
Integrated BMC Web Console	*Integrated Baseboard Management Controller Web Console (Integrated BMC Web Console) User Guide for Intel® Server Boards*	Public
Base specifications for the IPMI architecture and interfaces	*Intelligent Platform Management Interface Specification Second Generation*, version 2.0	Intel Confidential
Specifications for the PCIe* 3.0 architecture and interfaces	*PCIe Base Specification*, revision 3.0 http://www.pcisig.com/specifications	Public
Specifications for the PCIe* 4.0 architecture and interfaces	*PCIe Base Specification*, revision 4.0 http://www.pcisig.com/specifications	Public
Specification for OCP*	*Open Compute Project (OCP) Specification*	Intel Confidential
TPM for PC Client specifications	*TPM PC Client Specifications*, revision 2.0	Intel Confidential
Functional specifications of 3rd Gen Intel® Xeon® Scalable processor family	*3rd Generation Intel® Xeon® Scalable Processors, Codename Ice Lake-SP External Design Specification (EDS)* – Documents IDs: 574451, 574942, 575291	Intel Confidential
Processor thermal design specifications and recommendations	*3rd Generation Intel® Xeon® Scalable Processor, Codename Ice Lake-SP and Cooper Lake-SP – Thermal and Mechanical Specifications and Design Guide* (TMSDG) – Document ID 574080	Intel Confidential
Intel® Virtual RAID on CPU (Intel® VROC)	*Intel® Virtual RAID on CPU (VROC) Technical Product Specification (TPS)*	Intel Confidential
	Intel® Virtual RAID on CPU (VROC) User Guide	Public
BIOS and BMC security best practices	*Intel® Server Systems Baseboard Management Controller (BMC) and BIOS Security Best Practices White Paper* https://www.intel.com/content/www/us/en/support/articles/000055785/server-products.html	Public
Managing an Intel® server overview	*Managing an Intel® Server System 2020* https://www.intel.com/content/www/us/en/support/articles/000057741/server-products.html	Public

Topic	Document Title or Support Collateral	Document Classification
Latest system software updates: BIOS and firmware	*Intel® Server Update Package (SUP) for Intel® Server M20NTP Family*	Public
	Intel® Server Firmware Update Utility – Various operating system support	
	Intel® Server Firmware Update Utility User Guide	
To obtain full system information	*Intel® Server Information Utility*	Public
	Intel® Server Information Utility User Guide	
To configure, save, and restore various system options	*Intel® Server Configuration Utility* – Various operating system support	Public
	Intel® Server Configuration Utility User Guide	
Product warranty information	*Warranty Terms and Conditions* https://www.intel.com/content/www/us/en/support/services/000005886.html	Public
Intel® Data Center Manager (Intel® DCM) information	*Intel® Data Center Manager (Intel® DCM) Product Brief* https://software.intel.com/content/www/us/en/develop/download/dcm-product-brief.html	Public
	Intel® Data Center Manager (Intel® DCM) Console User Guide https://software.intel.com/content/www/us/en/develop/download/dcm-user-guide.html	Public

2. Server System Overview

This chapter provides a general overview of the Intel Server System M20NTP1UR. More in depth information can be found in subsequent chapters. Additional server board specific information can be found by referencing the *Intel® Server Board M20NTP2SB Technical Product Specification*.

Figure 2. Intel® Server System M20NTP1UR Overview System Views

2.1 Server System Feature Set

The following table provides a high-level overview of the features and available options supported by the Intel Server System M20NTP1UR.

Table 2. Intel® Server System M20NTP1UR Features

Feature	Details
Chassis Form Factor	1U rack mount
Chassis Dimensions	26” x 17.2” x 1.7” (661.3 mm x 438.5 mm x 43.4 mm)
Server Board	Intel Server Board M20NTP2SB
Available Integration Levels from Intel	• L6 – Semi-integrated system. The base configuration is not power-on ready out of the box. Integration of additional components is required for basic system functionality, including processor(s), memory, and available configuration options.

Processor Support	• Dual socket-P4 LGA4189
	• 3rd Gen Intel Xeon Scalable processor family:
	  ○ Intel® Xeon® Scalable Gold 5300 series processor
	  ○ Intel® Xeon® Scalable Silver 4300 series processor
	  Note: 3rd Gen Intel Xeon Scalable processor SKUs ending in (H), (L), (U), or (Q) are not supported.
	• Intel® UPI links: up to three (3) at 11.2 GT/s (Gold 5300 series) or up to two (2) at 10.4 GT/s (Silver 4300 series)
	Note: Previous generations of Intel Xeon processors are not supported.

Supported Processor Thermal Design Power (TDP)	• Maximum 185 W

Chipset PCH	• Intel® C621A chipset platform controller hub (PCH)
	• Embedded features supported on this server system:
	  ○ SATA
	  ○ USB
	  ○ PCIe*

Server Management Processor	• Aspeed* AST2500, advanced PCIe graphics and remote management processor
	• Embedded features supported on this server system:
	  ○ Baseboard management controller (BMC)
	  ○ 2D video graphics adapter

Memory Support	• Sixteen (16) memory slots
	  ○ Eight (8) memory slots per processor (2 CPUs)
	  ○ Eight (8) memory channels per processor
	  ○ One (1) slot per memory channel
	• Registered DDR4 (RDIMM), load reduced DDR4 (LRDIMM)
	  ○ All DDR4 DIMMs must support ECC
	  ○ 2933 MT/s – Intel® Xeon® Scalable Gold 5300 series processors
	  ○ 2666 MT/s – Intel® Xeon® Scalable Silver 4300 series processors
	  ○ Memory voltage = 1.2 V

Network Connectivity	• Onboard Intel® Ethernet Controller I210-AT ○ Two (2) RJ45 1000BASE-T ports (back panel I/O) • One (1) x16 PCIe OCP mezzanine 2.0 add-in card slot
PCIe* Add-in Card Support	• Two (2) PCIe 4.0 riser cards supporting two (2) total low profile PCIe add-in slots ○ One (1) x16 PCIe 4.0 add-in card slot per riser card

Feature	Details

Storage Options	**Front Drive Bay**
	• Four (4) hot-swap capable drive bays
	  ○ 3.5" HDD – SAS / SATA
	  ○ 2.5" SSD – SAS / SATA and NVMe
	Front Drive Bay Connectivity Options
	NVMe* support:
	• Four (4) onboard SFF-8654 SlimSAS* cable connectors. Each connector supports backplane connectivity for one (1) PCIe NVMe SSD
	• Intel® Volume Management Device (Intel® VMD) 2.0 for NVMe
	• Intel® Virtual RAID on CPU (Intel® VROC) for NVMe with installation of Intel® VROC for NVMe upgrade key.
	SATA support:
	• Three (3) onboard quad port SFF-8643 Mini-SAS HD cable connectors. Each connector supports backplane connectivity for four (4) SATA devices – Only one (1) connector is used in the 1U system
	• Intel® VROC for SATA – RAID 0, 1, 5, and 10
	M.2 SSD
	• Support for one (1) NVMe M.2 SSD
	• Supported M.2 SSD form factors: 2242 (42 mm), 2280 (80 mm), and 22110 (110 mm)
	USB 3.0
	• Support for one (1) internal mounted USB 3.0 device via onboard Type A USB connector

Video Support	• One (1) VGA DB-15 cable connector (back panel I/O) • Embedded 2D video controller • 128 MB of DDR4 video memory • Up to 1920 x 1200 resolution
USB	• Two (2) external USB 3.0 connectors (back panel I/O) • Two (2) external USB 3.0 connectors (front panel I/O) • One (1) USB 3.0 internal onboard type-A connector
Serial Ports	• One (1) DB-9 COM1 port cable connector (back panel I/O) • One (1) internal DH-10 COM2 port header for optional front or rear serial port support. The port follows DTK pinout specifications. (optional COM2 cable kit is not available from Intel)
Fan Support	• Six (6) system fans with fan redundancy • Fan speed control is managed by embedded BMC server management

Power Supply	• Support for up to two (2) slimline power supplies
	• Available options:
	  ○ 750 W (80 PLUS* Platinum power efficiency)
	• Supported operating modes:
	  ○ Single power supply (1 + 0) – No redundancy
	  ○ Dual power supplies (1 + 1) – Redundant power – Hot swap support – Supported when system power draw is less than 750 W
	  ○ Dual power supplies (2 + 0) – Combined power (no power redundancy) – Enabled when system power draw is greater than 750 W

Server Management	• Integrated Baseboard Management Controller (Integrated BMC) • Dedicated RJ45 1 GbE remote management port (back panel I/O) • CPU, memory, and system thermal monitoring • CPU, memory, chipset, and power supply voltage monitoring • Fan speed control • Onboard Intel® Light-Guided Diagnostics • Integrated BMC Web Console for Intel server systems • Compliant with the IPMI 2.0 • Support for Intel® Data Center Manager (DCM) • Support for Intel® Server Debug and Provisioning Tool (Intel® SDP Tool) • Redfish*-compliant

Feature	Details

Security	• Intel® Software Guard Extensions (Intel® SGX)
	• CBnT – Converged Intel® Boot Guard and Intel® Trusted Execution Technology (Intel® TXT)
	• Intel® Total Memory Encryption (Intel® TME)
	• Trusted platform module (TPM 2.0) support
	  ○ Accessory option: Standard – iPC **JNPTPM** (not supported in China)
	  ○ Accessory option: China compatible – iPC **JNPTPMCH**
	Note: Available TPM accessory options are not supported by Microsoft* Windows Server 2022.

Onboard Jumper Blocks and Buttons	• System buzzer configuration jumper • Serial port configuration jumpers • Intel ME recovery jumper • Clear CMOS button • System reset button • Power button

Rack Mount Kit Accessory Option (sold separately)	• iPC – **AXXFULLEXTRAILK**
	  ○ Full extension rails
	  ○ Tool-less installation
	  ○ 33 Kg (72.2 lbs.) maximum supported weight

Environment Limits	• Operating temperature: 10 °C – 35 °C (50 °F – 95 °F) • Non-operating temperature: -40 °C – 70 °C (-40 °F – 158 °F)

Note: For best system performance and support for fan redundancy, it may be necessary for some system configurations to operate at or below a lower maximum ambient temperature rating. See Appendix C.

2.2 System Feature Identification

This section provides server system views and identifies key system features for all supported system configurations of the Intel Server System M20NTP1UR.

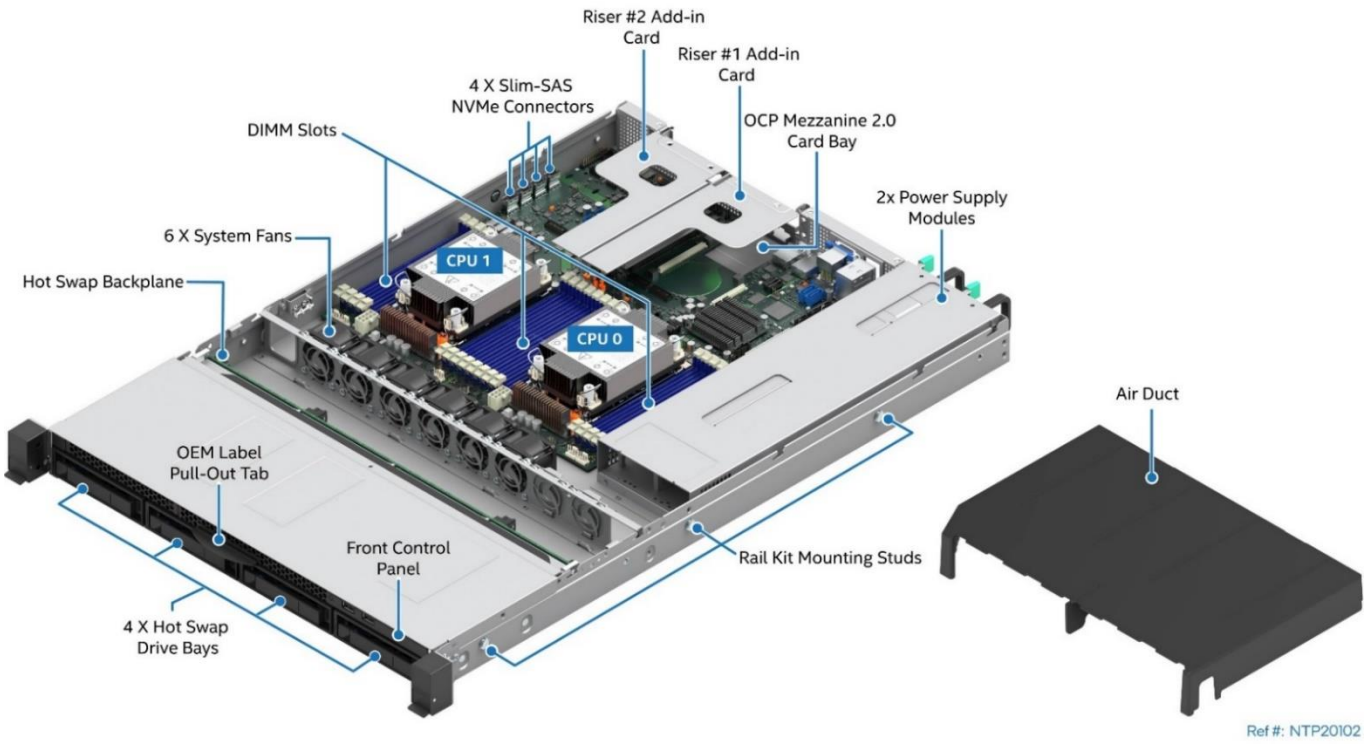

Figure 3. Server System Components Overview

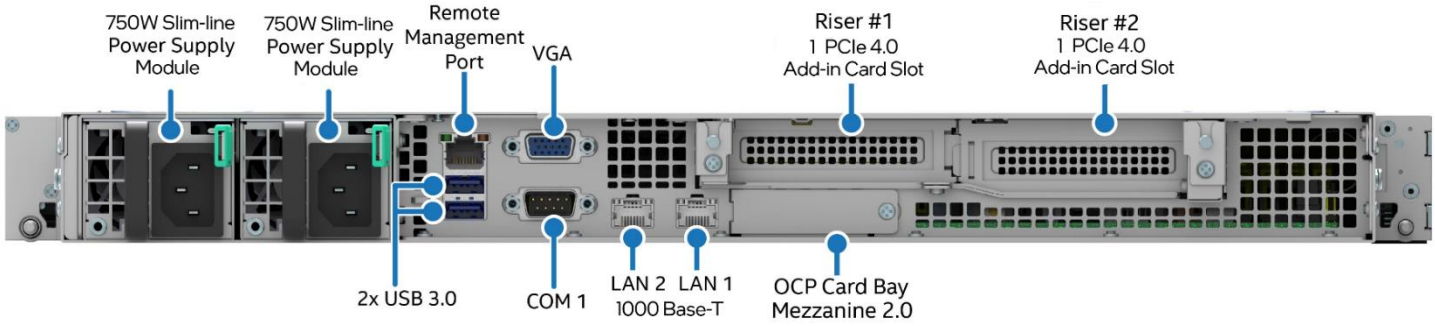

Figure 4. Back Panel Feature Identification

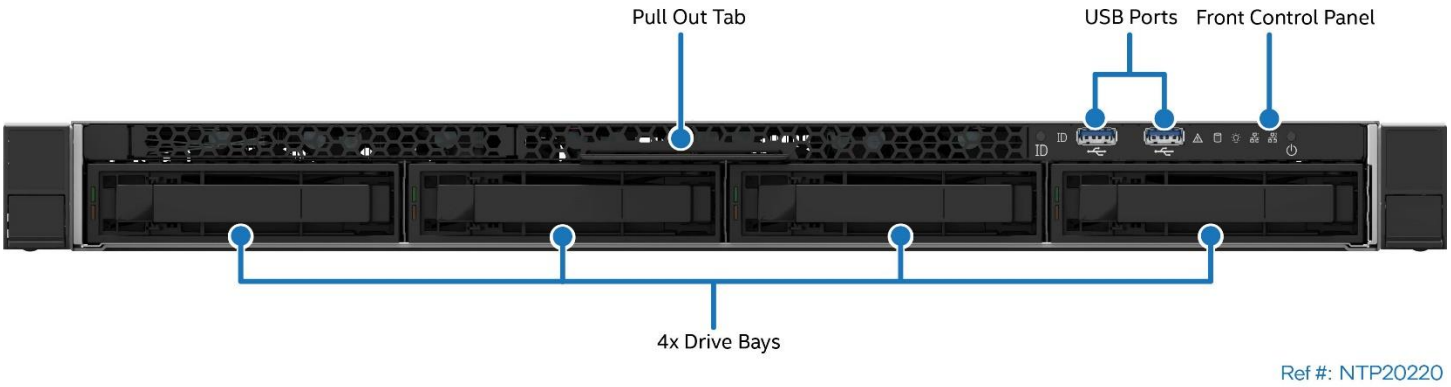

Figure 5. Front Panel Feature Identification

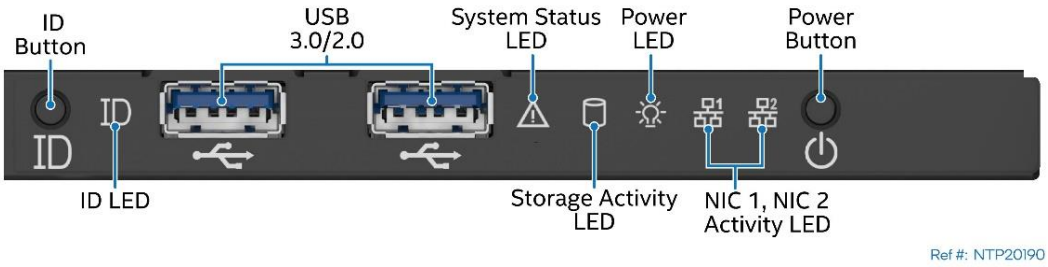

Figure 6. Control Panel Feature Identification

Figure 7. Intel® Server System M20NTP1UR with Optional Front Bezel

2.3 Server Board Features

Integrated within the Intel Server System M20NTP1UR is the Intel® Server Board M20NTP2SB, a monolithic printed circuit board assembly with features that are intended for high-density rack mount server systems. The architecture of this server board was developed around the integrated features and functions of the 3rd Gen Intel Xeon Scalable processor family, Intel® C621A chipset PCH, and the Aspeed* AST2500 Server Management Processor (SMP).

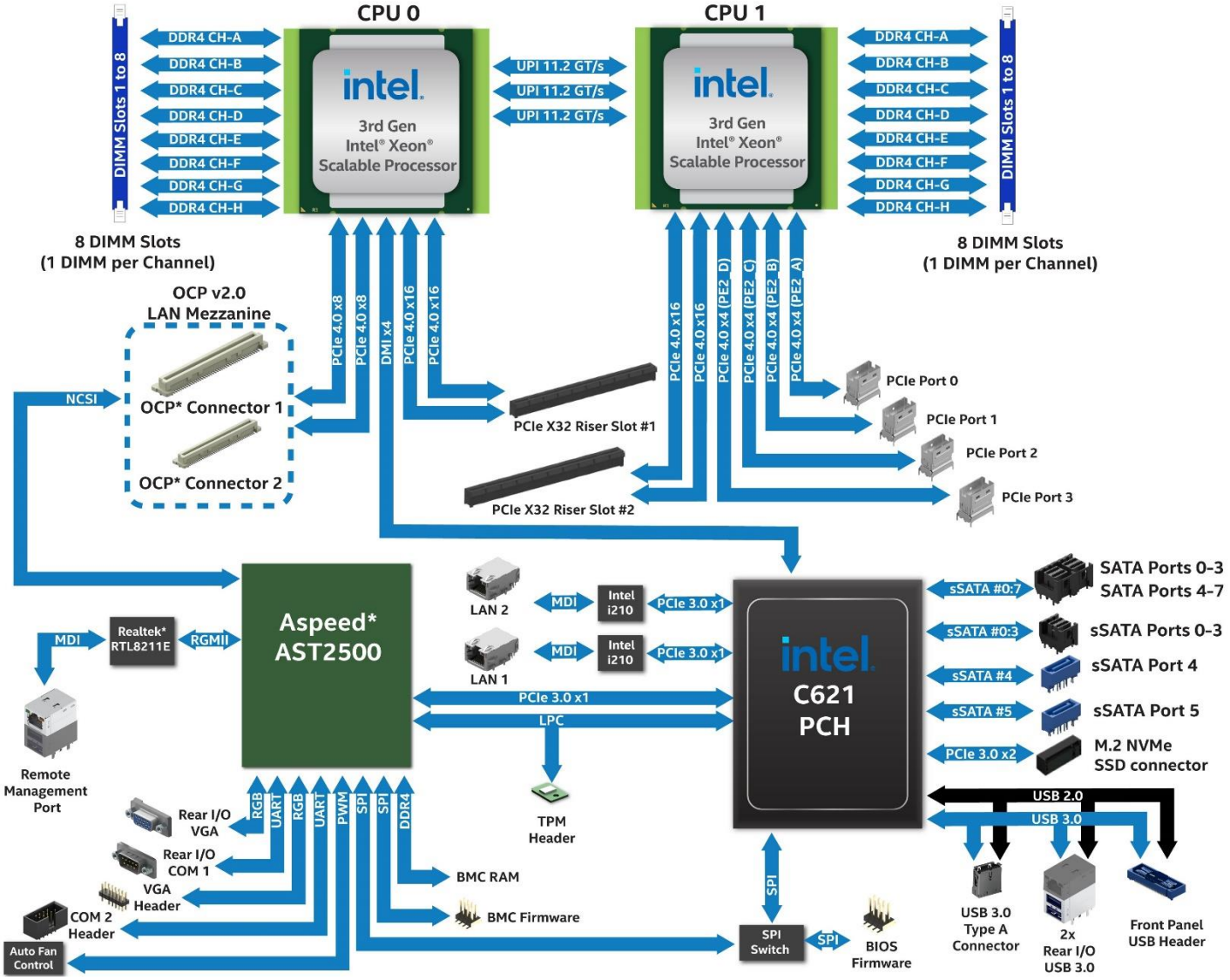

Figure 8. Intel® Server Board M20NTP2SB Architectural Block Diagram

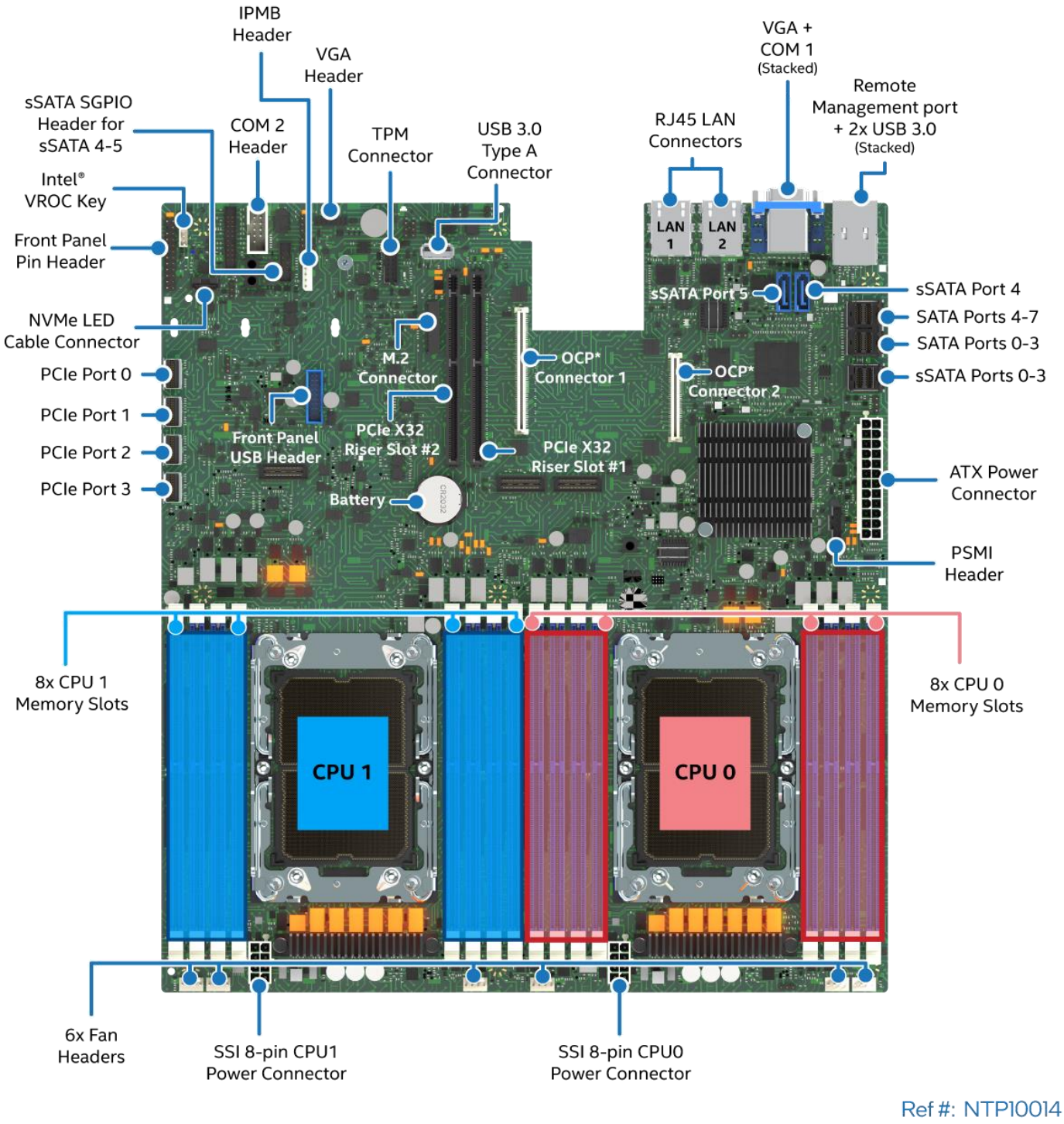

Figure 9. Intel® Server Board M20NTP2SB Component / Feature Identification

Note: Some of the server board features identified in the previous illustration may not be supported by the Intel Server System M20NTP1UR.

The server board includes LEDs to identify system status and/or indicate a component fault. See Figure 10. For additional information, reference the *Intel® Server Board M20NTP2SB Technical Product Specification*.

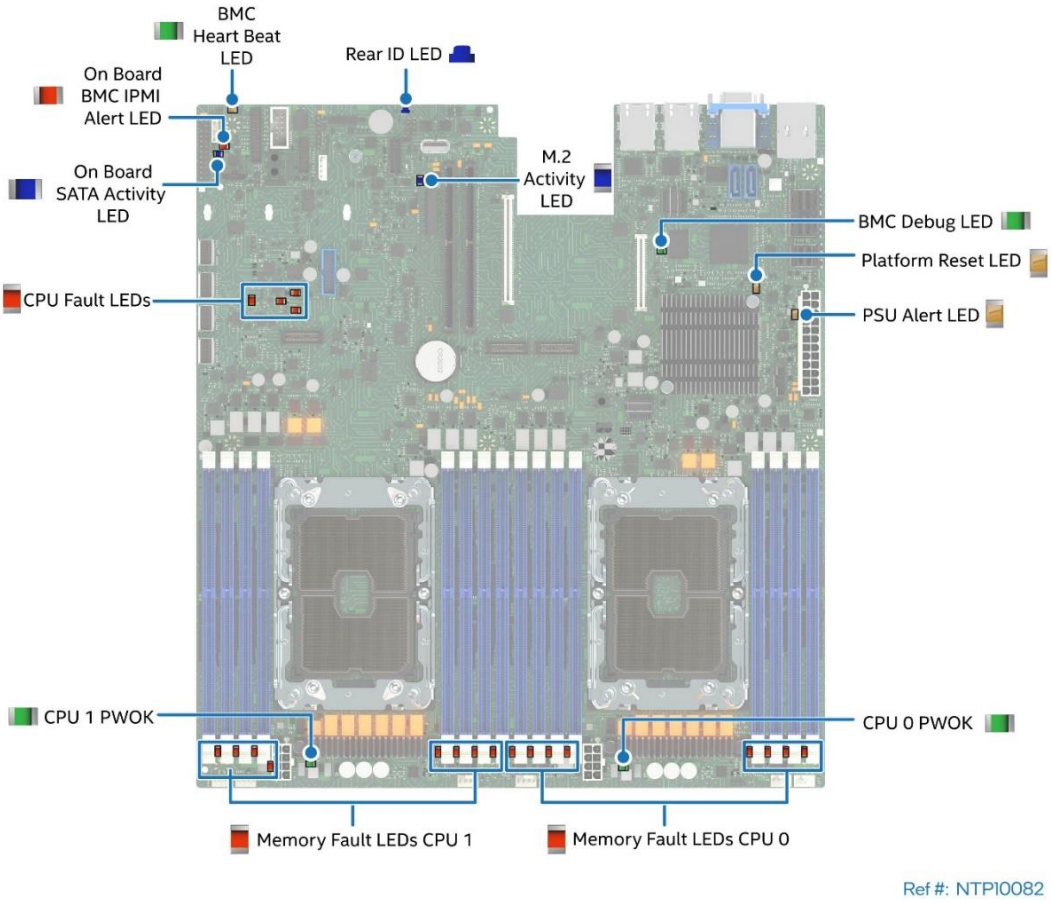

Figure 10. Intel® Light-Guided Diagnostics – LED Identification

The server board includes several jumper blocks and onboard buttons that can be used to configure, protect, or recover specific features of the server board. See Figure 11. For additional information, reference the *Intel® Server Board M20NTP2SB Technical Product Specification.*

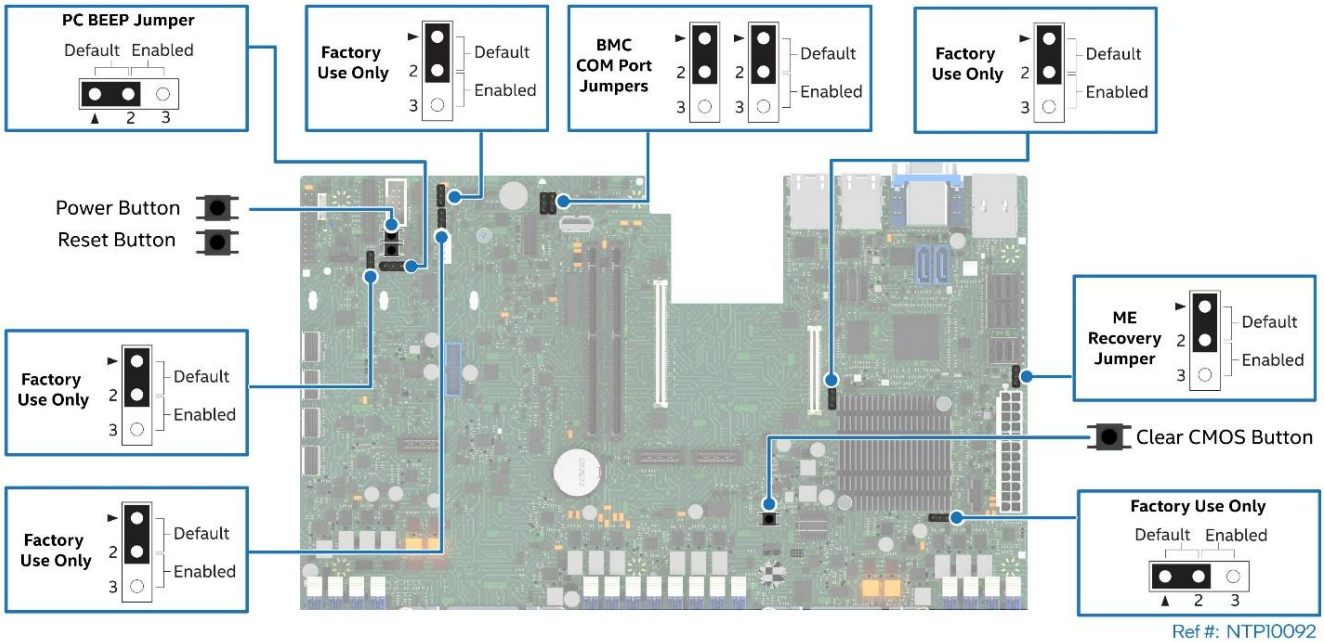

Figure 11. System Configuration and Recovery Jumpers

2.4 System Dimensional Data

The following illustrations provide chassis dimensional data for all supported system configurations within the Intel Server System M20NTP1UR.

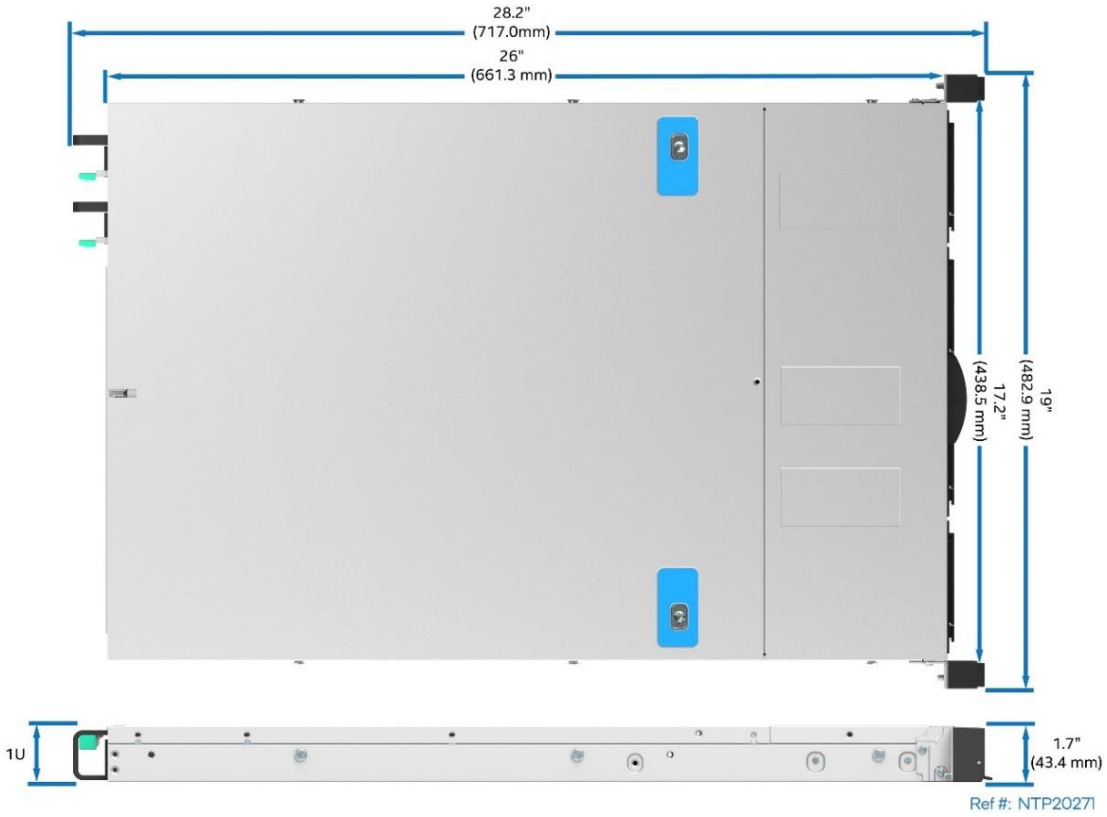

Figure 12. Chassis Dimensions

The chassis includes three embossed system label locations over the front drive bay. Labels that are placed within the emboss area are protected from being scratched as the system slides in or out of a system rack.

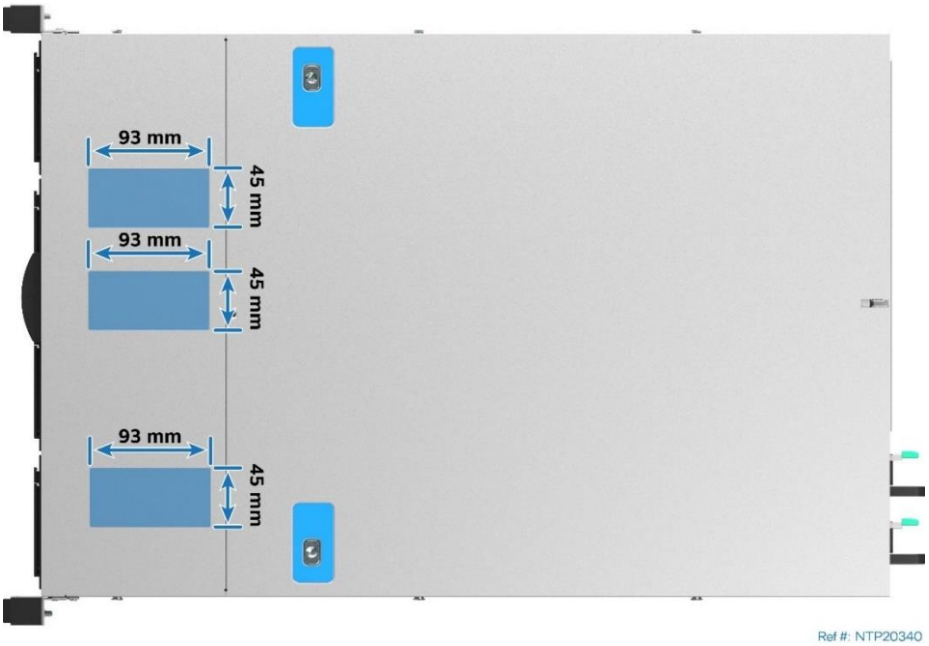

Figure 13. Label Emboss Dimensions

An additional system label can be placed on a mylar pull-out tab that extends out approximately 32 mm from the chassis front. The pull-out tab can be useful to obtain system information while the system is installed within a system rack.

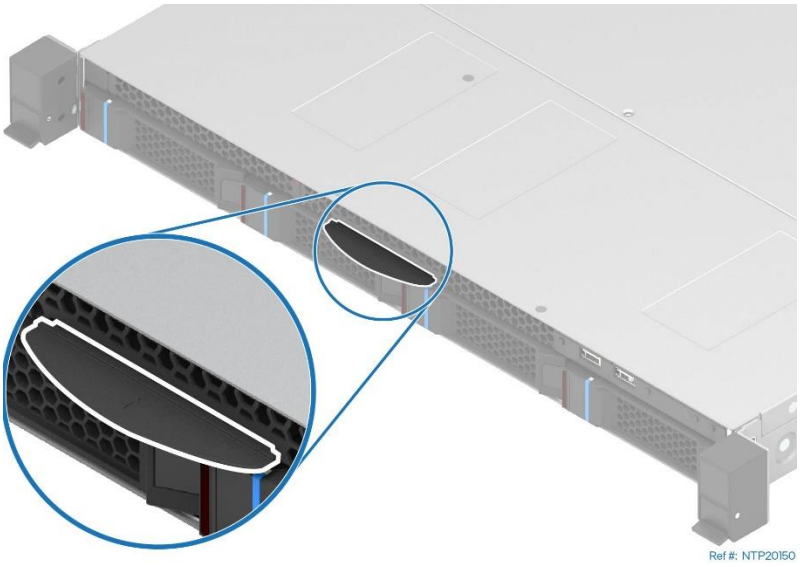

Figure 14. Pull-out Tab Location

The following figure shows pull-out tab label target dimensions.

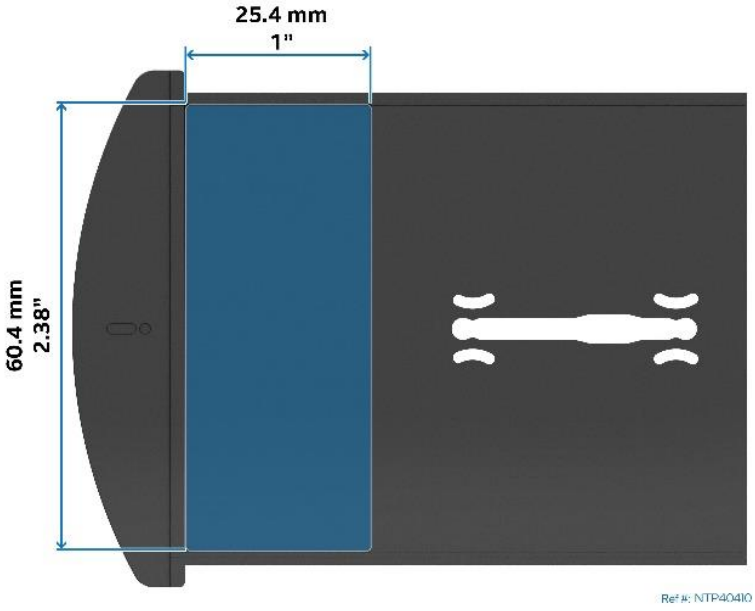

Figure 15. Pull-out Fab Label Emboss Dimensions

2.5 Available 4-Post Rack and Cabinet Mounting Kit

The Intel Server System M20NTP1UR is a 1U rack mount server system that requires a rail kit to install it within a 4-post server rack or cabinet. Rails are attached to the server by placing them over and sliding them onto a set of mounting studs located on each side of the server chassis.

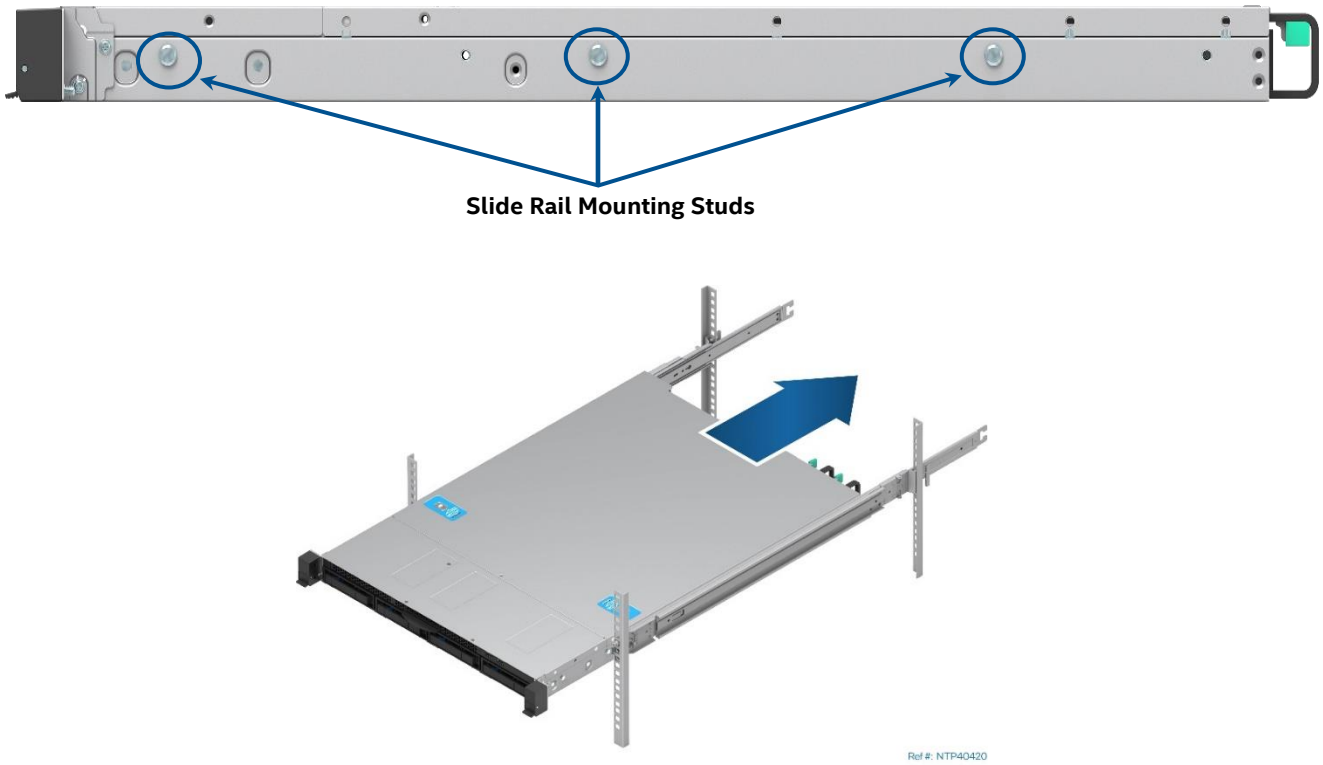

Figure 16. Slide Rail Mounting Option

Available rail kits are ordered separately from the server. Intel offers the following rail kit option for this product family.

- **Intel Product Code (iPC) – AXXFULLEXTRAILK**
  - 1U compatible
  - Tool-less chassis attachment
  - Tool-less installation to rack
  - Rack installation front and rear post distance adjustment from 547 mm to 850 mm
  - 704 mm travel distance
  - Full extension from rack
  - 33 kg (72.7 lbs.) maximum support weight
  - No support for cable management arm

Advisory Note: Available rack and cabinet mounting kits are not designed to support shipment of the server system while installed in a rack or cabinet. If choosing to do so, Intel strongly recommends that appropriate shock and vibration testing of the full shipping configuration be performed before shipment. Intel does not perform testing that exposes the racked system to the stresses of a transport environment using the complex combination of third-party racks, cabinets, and custom packaging options.

Caution: Exceeding the specified maximum weight limit of the rail kit or misalignment of the server in the rack may result in failure of the rack rails, causing damage to the system or can cause personal injury. Using two people or the use of a mechanical assist tool to install and align the server into the rack is highly recommended.

2.6 System Level Environmental Limits

The following table lists the system level operating and non-operating environmental limits.

Table 3. System Environmental Limits Summary

Parameter		Limits
Temperature	Operating	ASHRAE Class A2 – Continuous operation. 10–35 °C (50–95 °F) with the maximum rate of change not to exceed 10 °C per hour[1]
	Non-Operating	-40–70 °C (-40–158 °F)
Altitude	Operating	Support operation up to 3050 m (10,006 feet) with ASHRAE class de-ratings
Humidity	Shipping	50% to 90%, non-condensing with a maximum wet bulb of 28 °C (at temperatures within 25–35 °C)
Shock	Operating	Half sine, 2 g, 11 msec
	Unpackaged	Trapezoidal, 25 g, velocity change is based on packaged weight
	Packaged	ISTA Test Procedure 3A 2008
Vibration	Unpackaged	5–500 Hz, 2.20 g RMS random
	Packaged	ISTA Test Procedure 3A 2008
AC-DC	Voltage	90–140 V (rated 100–127 V) and 180–264 V (rated 200–240 V)
	Frequency	47–63 Hz (rated 50/60 Hz)
	Source Interrupt	No loss of data for power line drop-out of 12 msec
	Surge Non-Operating and Operating	Unidirectional
	Line to Earth Only	AC Leads L-N 2.0 kV; L-L 1.0 kV
ESD	Air Discharged	12.0 kV
	Contact Discharge	8.0 kV
Acoustics Sound Power Measured	Power	<300 W ≥300 W ≥600 W ≥1000 W
	Servers / Rack Mount Sound Power Level	7.0 dBA 7.0 dBA 7.0 dBA 7.0 dBA

Note: (1) For best system performance and support for fan redundancy, it may be necessary for some system configurations to operate at or below a lower maximum ambient temperature rating. See Appendix C.

Disclaimer: Intel server boards contain and support several high-density VLSI and power delivery components that need adequate airflow to cool and remain within their thermal operating limits. Through its own chassis development and testing, Intel ensures that when an Intel server board and an Intel server chassis are used together the fully integrated system meets the thermal requirements of these components. Intel cannot be held responsible if components fail or the server board does not operate correctly when published operating and non-operating limits are exceeded.

2.7 System Packaging

The original Intel packaging is designed to provide protection to a fully configured system and tested to meet International Safe Transit Association (ISTA) Test Procedure 3A (2008). The packaging is designed to be reused for further shipment after system integration has been completed.

The original packaging includes:

- Two layers of boxes – an inner packing box and an outer shipping box.
- Multiple foam packing inserts.
- Red foam EPE sheet and plastic sack – used to protect the system from scratches.

Figure 17. System Packaging

When reused, the original packaging material must be free of any damage sustained from previous use. In addition, all inner packaging components must be reinstalled in the proper location to ensure adequate protection of the system for subsequent shipment.

Note: The design of the inner packaging components does not prevent improper placement within the packaging assembly. Only one correct packaging assembly allows the package to meet the ISTA Test Procedure 3A (2008) limits. For complete re-packaging assembly instructions, see the *Intel® Server System M20NTP1UR System Integration and Service Guide*. Failure to follow the specified packaging assembly instructions may result in damage to the system during shipment.

The 1U shipping box dimensions are:

- Outer shipping box external dimensions
  - Length: 994 mm
  - Width: 592 mm
  - Height: 300 mm

Note: See the *Intel® Server M20NTP Family Configuration Guide* for product weight information associated with each supported system configuration.

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3. System Power

The Intel Server System M20NTP1UR supports up to two AC 750 W hot-swap capable power supply modules. Power supply modules are installed from outside of the chassis into a single bay on the system back panel.

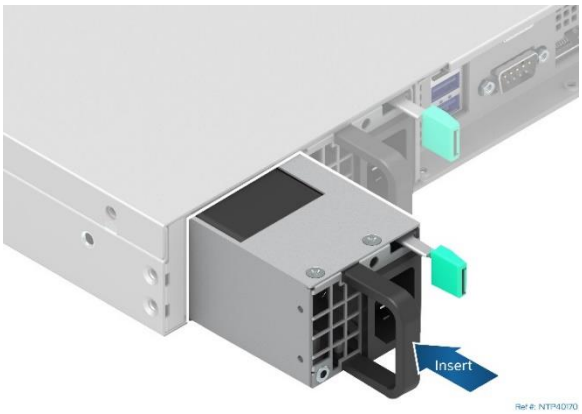


Figure 18. Power Supply Module Bay

Figure 19. Power Supply Module

When installing a power supply module, its card edge interface connector is blind mated with a matching slot connector on a power distribution board (PDB) mounted within the power supply bay. When fully installed, the module is locked in place.

Three power cables from the back side of the power distribution board (PDB) are routed to the following power connectors on the server board:

- 24-pin main power
- 8-pin CPU 0 power
- 8-pin CPU 1 power

All three power cables must be connected to the server board to support all onboard features. See Figure 20.

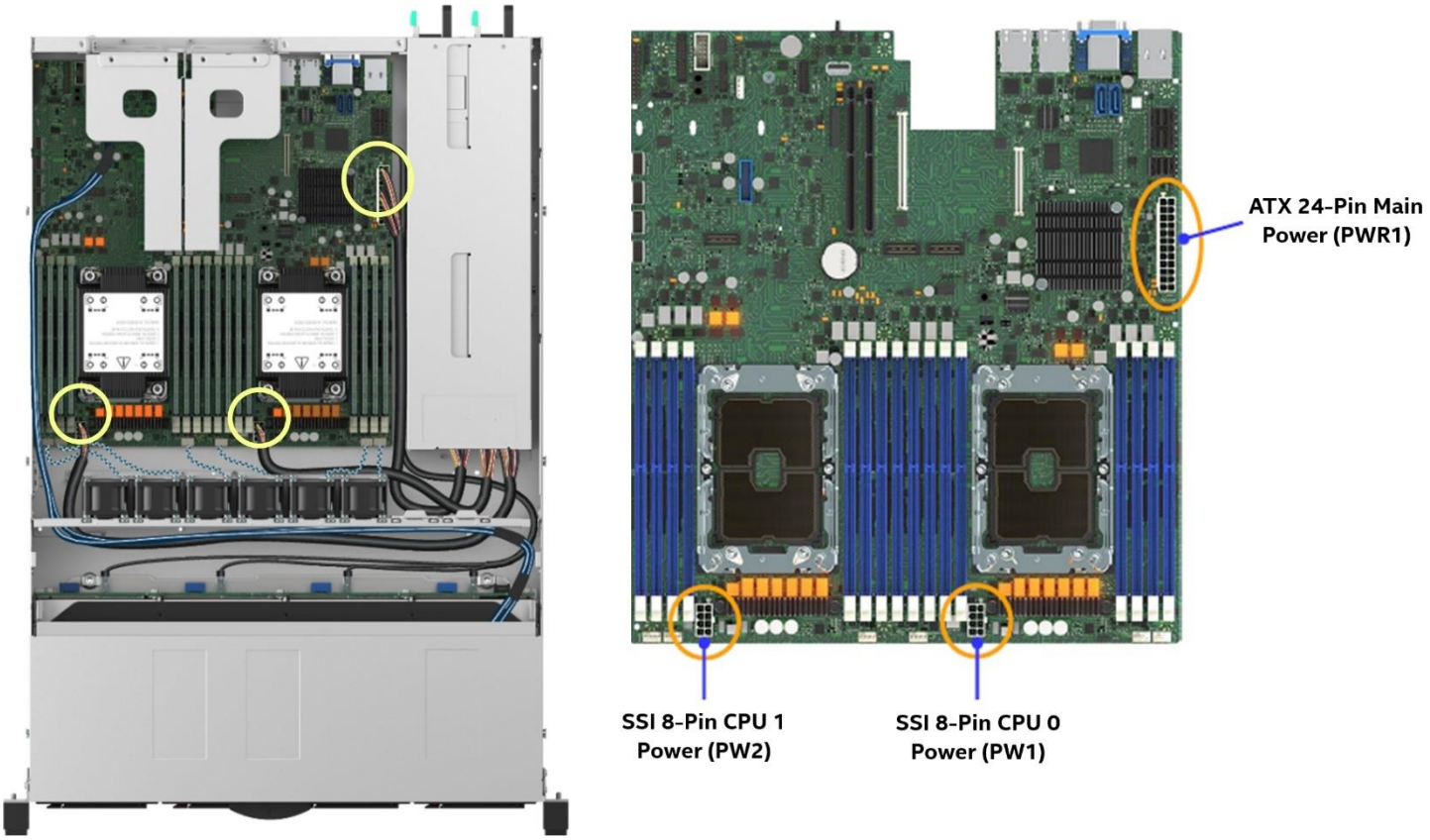


Figure 20. Server Board Power Connectors

An additional power cable from the PDB is routed behind the front drive bay to provide power to the backplane.

3.1 Power Supply Configurations

Embedded platform management automatically determines and configures the power supply configuration based on the number of functional power supplies installed and the total power draw of the system.

The system supports the following power configurations:

- **1+0** – One functional power supply installed – no power redundancy. Configured if the power requirement of the system stays below the maximum power limit of the one functional power supply.
- **1+1** – Two power supplies installed – redundant power with hot swap support. Configured if the power requirement of the system stays below the maximum power limit of one power supply.
- **2+0** – Two power supplies installed – combined power, no hot-swap support. Configured if the power requirement of the system is greater than the maximum power limit of a single power supply.

3.1.1 Single Power Supply (1+0) Configuration

Platform management will set the system power configuration to 1 + 0 (non-Redundant) when it detects that the system has only one power supply installed, or when only one of two power supplies is functional.

With a single functional power supply, the system has no power redundancy and the total available power to the system is limited to the maximum power capacity of the power supply. If the power requirements of the given system configuration exceed the limits of the power supply, then the power supply shuts down.

A power supply event that shuts down the system generates multiple events and errors that are registered into the system event log (SEL) and changes the state of the System Status LED on the front panel to solid amber, which denotes that a critical system event has occurred.

3.1.2 Dual Power Supply (1+1) Configuration

Platform management will set the system power configuration to 1 + 1 (Redundant Power) if it detects two functional power supplies and the total power draw of the given system configuration is less than or equal to the power limit of a single power supply. In a redundant power configuration, if one power supply fails, the backup or secondary power supply will automatically engage and provide the necessary power to maintain optimal system operation.

With a power supply failure, the BMC generates several events that are registered to the system event log and changes the system power configuration to 1 + 0 (non-redundant) (see section 3.1.1) until the failed power supply is replaced. In addition, the System Status LED on the front panel will change to Blinking Green, denoting a degraded but operational system state.

When the system is in a 1 + 1 power configuration, the power supplies are hot-swappable, allowing a failed power supply to be replaced without having to first power down the system. After replacing a failed power supply, platform management automatically restores the power to its original 1 + 1 redundant power configuration; and the System Status LED state changes back to solid green, denoting the system is operating in a fault free normal state.

3.1.3 Dual Power Supply (2+0) Configuration

Platform management will set the system power configuration to 2 + 0 (Combined Power) if it detects two functional power supplies and the total power draw of the given system configuration exceeds the limits of one power supply. In this configuration, power from both power supplies will be used to supply the system with power to support an optimal system operation.

Combined power does not mean that twice as much power is available to the system. Enough power will be pulled from both power supplies to support an optimal system operation.

In a 2 + 0 power configuration, there is no power redundancy. If a power supply fails, then the system shuts down because the remaining power supply cannot support the power load of the system. A power supply event that shuts down the system generates multiple events and errors, and registers them to the SEL. The state of the System Status LED on the front panel changes to solid amber, denoting that a critical error has occurred and the system is no longer functional. The failed power supply must be replaced before the system can become operational again.

3.2 Intel® Power Calculator

For system integrators that would like to determine the system power draw and heat dissipation for a specific system configuration, Intel makes available an online power calculator tool accessible at the following Intel web site:

https://servertools.intel.com/tools/power-calculator/

3.3 AC 750 Watt Power Supply Specification Overview

The Intel Server System M20NTP1UR supports the following power supply option:

- AC 750 W (80 PLUS* Platinum)
- Available Intel Spare AC 750 W Power Supply Module Kit – Intel Product Code (iPC) **AXXBFP750SLPS**

The supported AC power supply is auto-ranging and power factor corrected.

The following sections provide an overview of select power supply features and functions.

Note: Full power supply specification documents are available upon request. Power supply specification documents are classified as Intel Confidential and require a signed NDA with Intel before being made available.

3.3.1 AC Power Cord Specifications

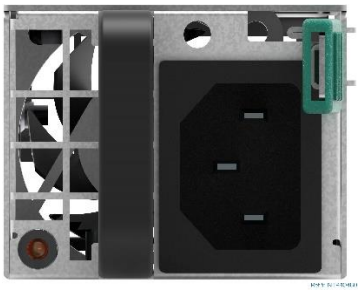


Figure 21. AC Power Cable Connector

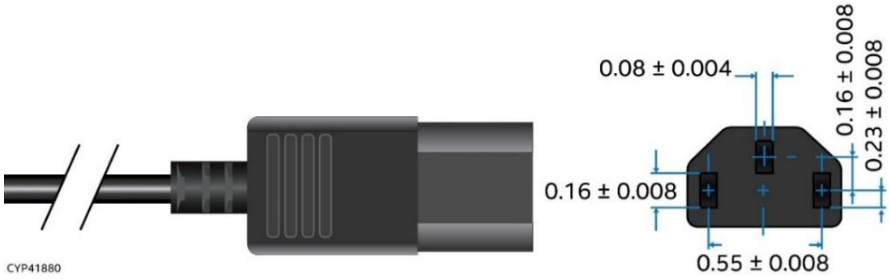


Figure 22. AC Power Cord Specification

The AC power cord used must meet the specification requirements listed in the following table.

Table 4. AC Power Cord Specifications

Item	Description
Cable Type	SJT
Wire Size	14 AWG
Temperature Rating	105 °C
Amperage Rating	10 A at 240 V
Voltage Rating	240 VAC

3.3.2 Power Supply Status LED

A single bi-color LED on the back side of the power supply indicates power supply status.

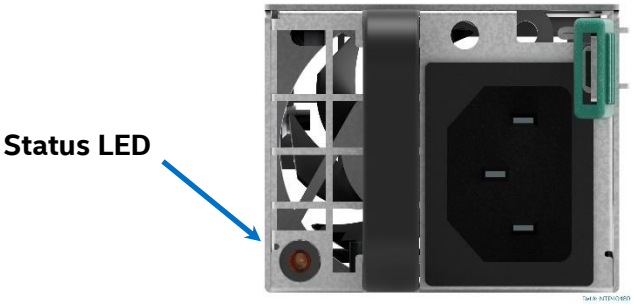


Figure 23. Power Supply Status LED

The operational states of the status LED are defined in the following table.

Table 5. Power Supply Status LED Operating States

LED State		Power Supply Condition
Off		No source power to all power supplies.
Green	Solid Green	Output on and OK.
	1 Hz Blinking Green	Source AC power present / only 12 VSB on (power supply off) or power supply in cold redundant state.
Amber	Solid Amber	Source power cord unplugged or source power lost; with a second power supply in parallel still with AC input power. Or power supply critical event causing a shutdown; failure, over current protection, over voltage protection, fan fail.
	1 Hz Blinking Amber	Power supply warning events where the power supply continues to operate; high temperature, high power, high current, slow fan.

3.3.3 Efficiency

The AC 750 W power supply module is rated to meet specific power efficiency limits based on its 80 PLUS Platinum power efficiency rating. The following table defines the required minimum power efficiency levels based on their 80 PLUS efficiency rating at specified power load conditions: 100%, 50%, 20%, and 10%.

The AC power supply efficiency is tested over an AC input at 230 VAC.

Table 6. 750 W AC Power Supply Option Efficiency (80 PLUS* Platinum)

	Loading	100% of Maximum	50% of Maximum	20% of Maximum	10% of Maximum
	Minimum efficiency	91%	94%	90%	80%

3.3.4 Protection Circuits

Protection circuits shall cause only the power supply's main outputs to shut down (latch off). If the power supply latches off due to a protection circuit tripping, an AC cycle off for 15 seconds is needed to be able to reset the power supply. The auxiliary output shall not be affected by any protection circuit unless the auxiliary output itself is affected.

3.3.4.1 Overcurrent Protection (OCP)

Each installed power supply is protected against excess current. The power supply shall prevent the main and auxiliary outputs from exceeding the values shown in the following table. If the main current limits are exceeded, the power supply shuts down and latches off.

Table 7. Over Current Protection

Voltage	Over Current Limit (IOUT Limit)
+12 V	74 A maximum (delay 10 msec)
+5 VSB (auxiliary) AR	6 A maximum

3.3.4.2 Over-Voltage Protection (OVP)

The power supply shall shut down and latch off after an over-voltage condition occurs on the main outputs.

A shutdown caused by an over-voltage in one power supply does not cause the other (redundant) power supply to shut down.

The supply resumes operation when the AC input is cycled on / off with a minimum required off time for 3 seconds to reset the latch.

The over-voltage threshold is defined in the following table.

Table 8. Over Voltage Protection

Output Voltage	MIN (V)	MAX (V)
+12 V	13.8	14.5
+5 VSB (auxiliary) AR	5.75	6

3.3.4.3 Over-Temperature Protection (OTP)

The power supply shall be protected against over-temperature conditions caused by loss of fan cooling or excessive ambient temperature, which could cause internal part failures. With an over-temperature condition, the power supply shall shut down. It recovers when the temperature falls back within normal operating limits. The 5 VSB shall not shut down during an OTP condition on the main outputs.

The temperature warning setting point is shown in the following table:

Table 9. Over-Temperature Protection (OTP)

Condition	Warning in °C	Critical in °C	Timing for `SMBAlert#`
T READ	55	65	1 second

4. Thermal Management Overview

The embedded platform management subsystem is responsible for keeping the system operating reliably and with best performance. The integrated baseboard management controller (BMC) embedded within the Aspeed* AST2500 Advanced PCIe Graphics and Remote Management processor is the component most responsible for determining and implementing system actions under varying environmental and operational conditions.

Thermal management is critical to system performance and long-term reliability. The system is designed to operate at external ambient air temperatures ranging from 10 °C through 35 °C. The system must maintain a steady airflow through the system to expel all hot air generated within it.

Note: It may be necessary for some system configurations to operate at or below a lower maximum ambient temperature rating to support best performance.

Using six system fans, an embedded fan within each installed power supply, and other system components, the system pulls cool air in from the front, channels it over and through several high heat generating components and areas within the chassis, and then pushes the hot air out the back.

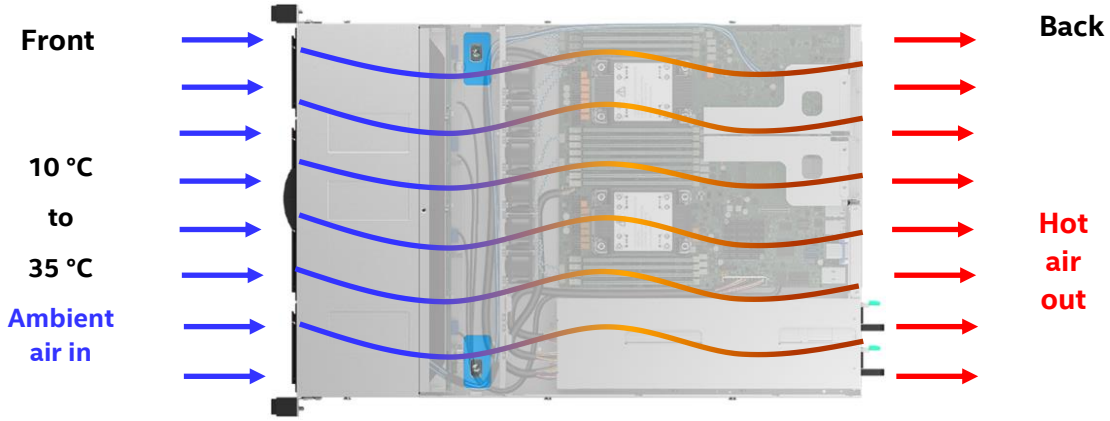


Figure 24. System Airflow

4.1 Support Requirements for Thermal Management

To ensure that enough cool air is pulled in and directed to the high heat areas within the system, the following requirements must be adhered to while the system is operational.

- External ambient air in front of the system is from 10 °C through 35 °C [1].
- The system top cover must be installed.
- The system air duct must be installed.
- All front drive bays must be populated with an SSD / HDD or supplied drive blank.
- All memory slots must be populated with a DIMM or supplied DIMM blank. A DIMM blank should only be removed from the memory slot when replacing it with a DIMM.

Figure 25. DIMM Blank

- Minimize airflow blockage within the chassis by routing internal cables along the left chassis side wall and the base of the power supply cage. Other than the system fan cables and CPU power cables, no other cables should be routed in front of the system fan assembly.

4.2 System Fans

Six managed system fans are used to drive air through the system. Each system fan is cabled to a 4-pin connector on the server board.

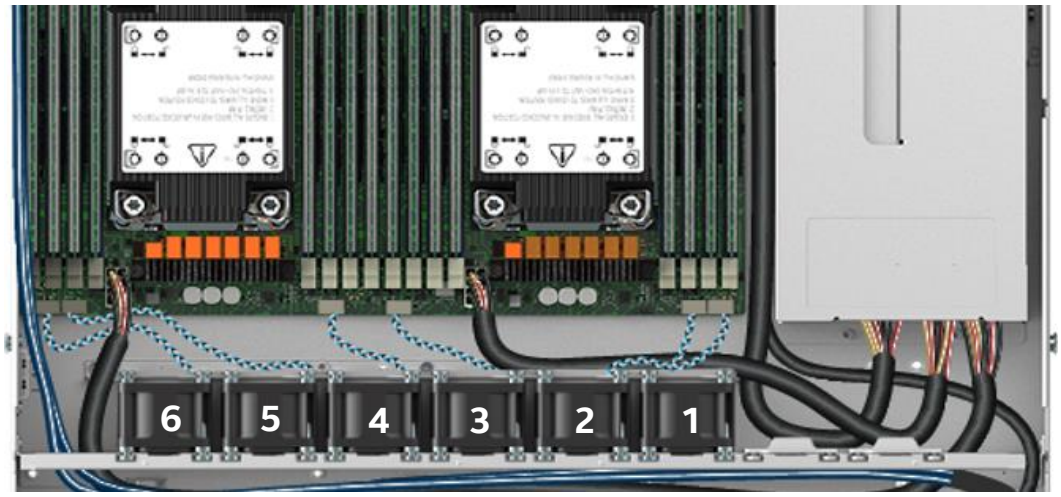


Figure 26. System Fan Identification

System fans are not hot-swappable. The system must be powered off before a faulty system fan can be replaced.

- Available Intel 1U Fan Spare Kit – Intel Product Code (iPC) **BFP1UFANK**

4.3 Power Supply Module Fans

Each installed power supply module includes an embedded (non-removable) 38-mm fan. This fan is responsible for airflow through the power supply module and is managed by the fan speed control system. If the power supply fan fails, an over temperature protection (OTP) circuit within the module shuts down the power supply when an upper critical temperature limit is reached.

The fan within the power supply module cannot be replaced. If a power supply fan fails, then the entire power supply module needs to be replaced.

- Available Intel Spare AC 750 W Power Supply Module Kit – Intel Product Code (iPC) **AXXBFP750SLPS**

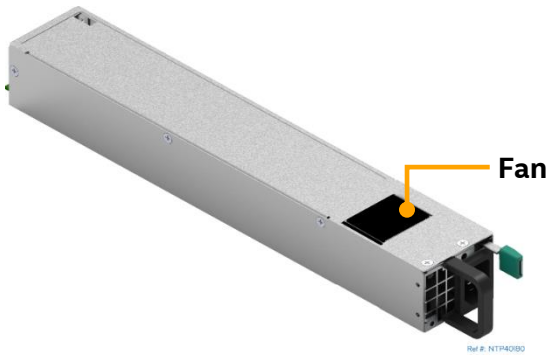


Figure 27. Power Supply Fan

4.4 Fan Speed Control

The BMC manages fan speed control by monitoring several thermal sensors embedded throughout the system and embedded within some installed components. Each thermal sensor has pre-programmed operating temperature limits assigned to it, which the BMC uses to determine fan speed and other system actions.

As monitored temperatures fluctuate high and low, the BMC raises and lowers fan speeds to one or more system fans as appropriate.

If the BMC detects that a temperature reading from one or more thermal sensors has crossed its fixed upper non-critical temperature limit, the BMC logs the event to the system event log (SEL) and the system may initiate processor and/or memory throttling, impacting the system performance.

In addition, the System Status LED begins to blink green, indicating the system is still fully operational but in a degraded and/or cautionary state. The Status LED remains in this state until the non-critical thermal condition is no longer present.

If the BMC detects that a temperature reading from one or more thermal sensors has crossed its fixed upper critical temperature limit, the BMC logs the event to the SEL and the processor and memory subsystems are throttled, impacting the system performance. In addition, the system status LED begins to blink amber, indicating the system is still operational but in a degraded state and is at high risk of failure. The status LED remains in this state until the critical thermal condition is no longer present.

If the temperature of a processor thermal sensor crosses its upper critical limit, it flags to the BMC a *processor therm-trip* event, and the system shuts down. An error message is logged to the SEL and the System Status LED will change to solid amber, denoting that a critical system event has occurred.

The system is designed to support fan redundancy. Fan redundancy is only supported in systems configured with dual power supplies. For most system configurations, with an external ambient air temperature from 10 °C through 35 °C, the system remains operational with a single system fan failure. When the BMC detects a fan failure, it increases the fan speed to all remaining system fans to 100% of their design limit until the faulty fan is replaced.

Note: For best performance and support for fan redundancy, it may be necessary for some system configurations to operate at or below a lower maximum ambient temperature rating. See Appendix C.

4.5 Processor and Memory Throttling

When the temperature of a monitored thermal sensor reaches its upper non-critical or upper critical limit, the system initiates power throttling to the processor and memory subsystems. Power throttling reduces the heat generated by these devices by limiting their power usage.

System performance is impacted when processor and/or memory throttling is initiated. Throttling continues until the temperature reading of all thermal sensors fall back to within normal operating limits.

5. PCIe* Add-in Card Support

The Intel Server System M20NTP1UR has support for up to two PCIe add-in cards and one add-in card compliant with OCP* Mezzanine Card 2.0.

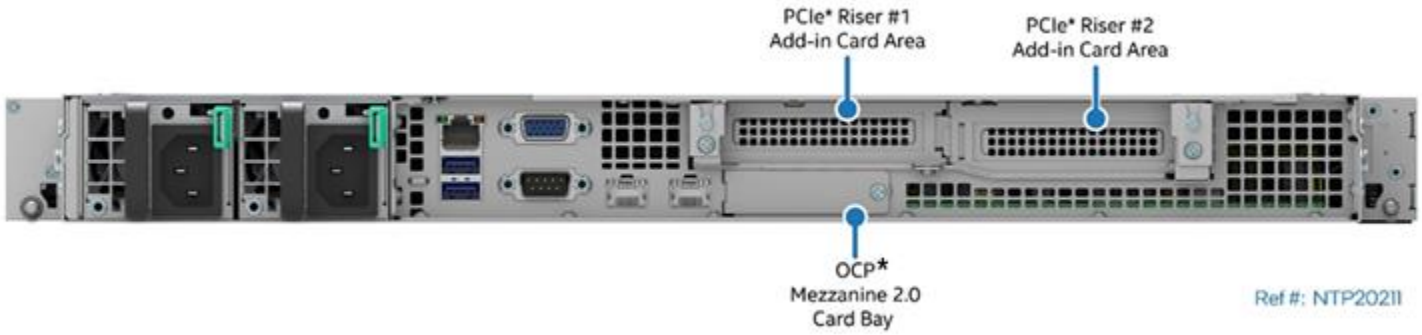


Figure 28. Back Panel PCIe* Add-in Card Support

The PCIe architecture of this system is supported by two 3rd Gen Intel Xeon Scalable processors that provide up to 48 PCIe 4.0 bus lanes each to the host system. PCIe bus lanes from each processor are used to support various system features as shown in the following diagram. The system must be configured with two processors to support all possible PCIe functionality of the server board.

The PCIe bus lanes from each processor are fully compliant with the *PCIe Base Specification* (revision 4.0) and support the following PCIe bit rates: 4.0 (16 GT/s), 3.0 (8.0 GT/s), 2.0 (5.0 GT/s), and 1.0 (2.5 GT/s).

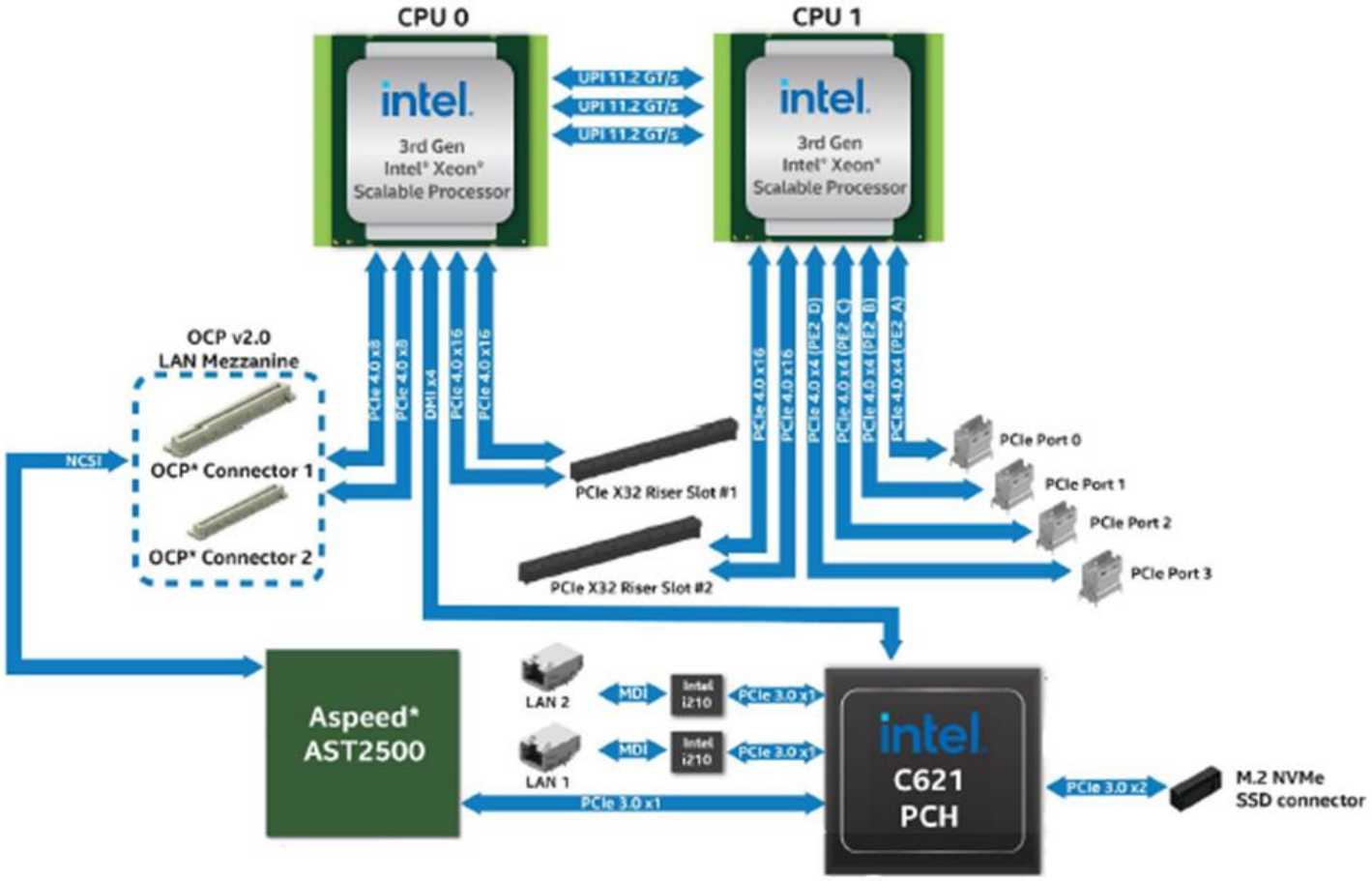


Figure 29. Server System PCIe* Architecture Block Diagram

5.1 Riser Card Support

Located on the server board are two X32 PCIe riser card slots identified as: Riser Slot #1 and Riser Slot #2. The PCIe bus lanes for Riser Slot #1 are supported by CPU 0. The PCIe bus lanes for Riser Slot #2 are supported by CPU 1. A dual processor configuration is required to enable support for Riser Slot #2.

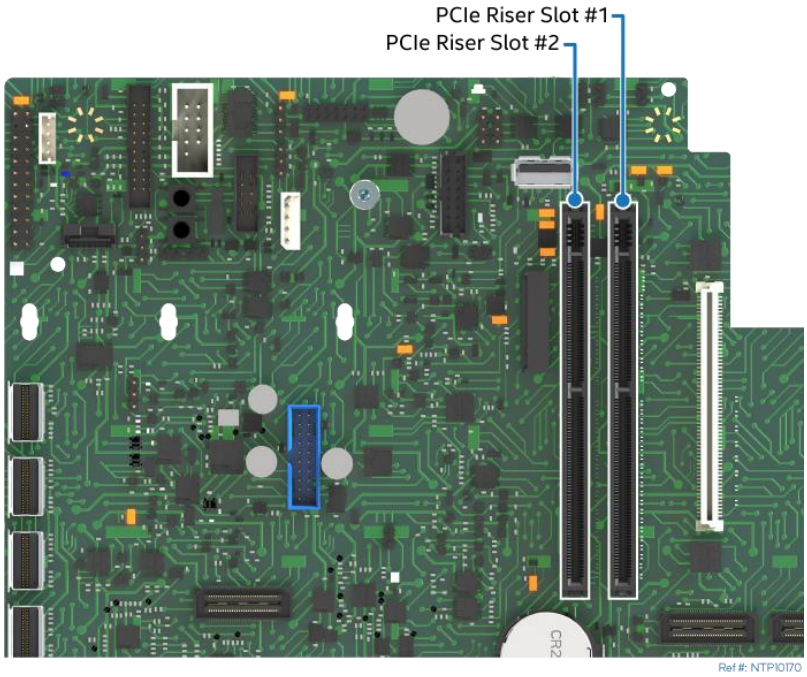


Figure 30. PCIe* Riser Slots

The Intel Server System M20NTP1UR supports two riser cards. Each riser card includes one X16 PCIe mechanical, X16 PCIe electrical add-in card slot.

Riser cards developed for this server system are not interchangeable between the two riser card slots. Riser cards are specifically designed to be supported by Riser Slot #1 or Riser Slot #2.

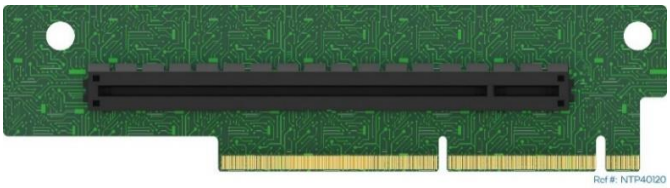


Figure 31. 1U PCIe* Riser Card (Riser Slot 1)

Figure 32. 1U PCIe* Riser Card (Riser Slot 2)

Both riser cards are mounted to a single riser bracket assembly as shown in the following figure. A screwdriver is required to secure an add-in card to the riser bracket assembly. However, no tools are required to install or remove the riser bracket assembly from the chassis.

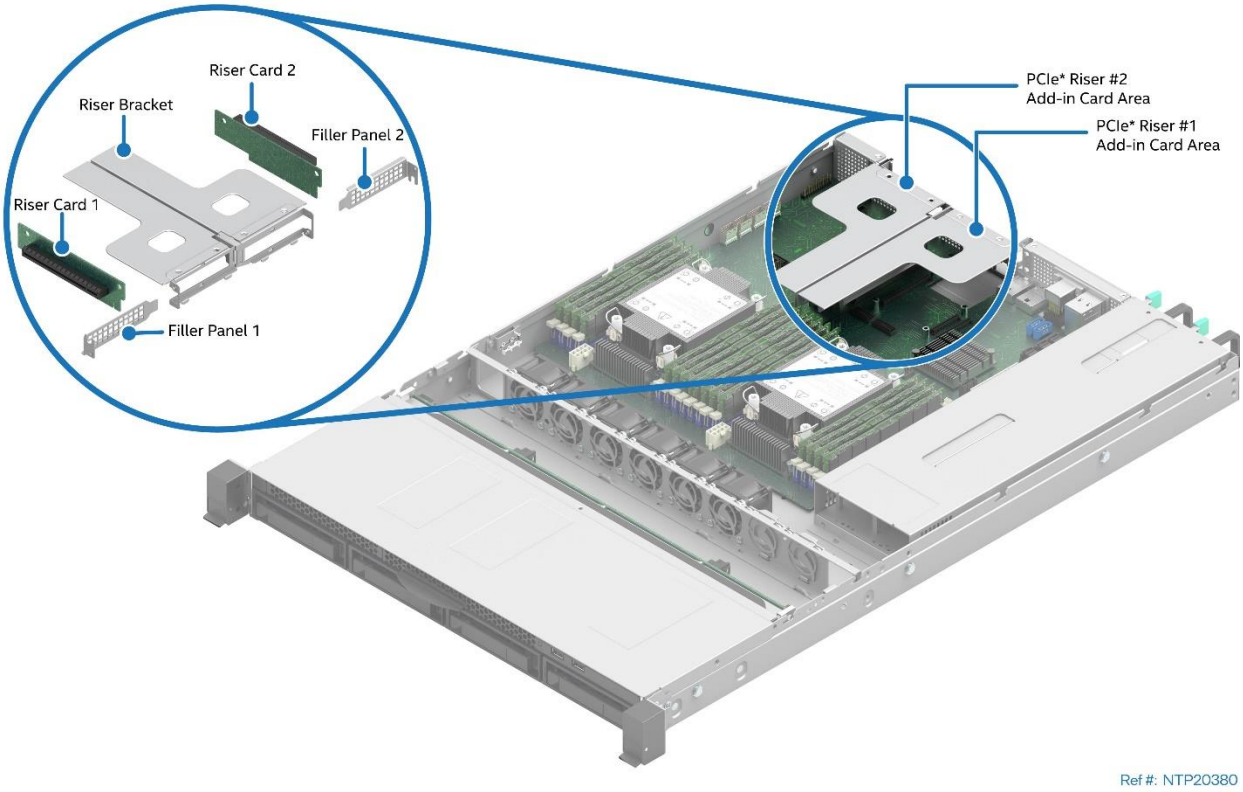


Figure 33. Riser Card Bracket Assembly

5.1.1 PCIe* Add-in Card Support

Each riser card has support for one half-height (low profile), half-length PCIe add-in card on each riser card.

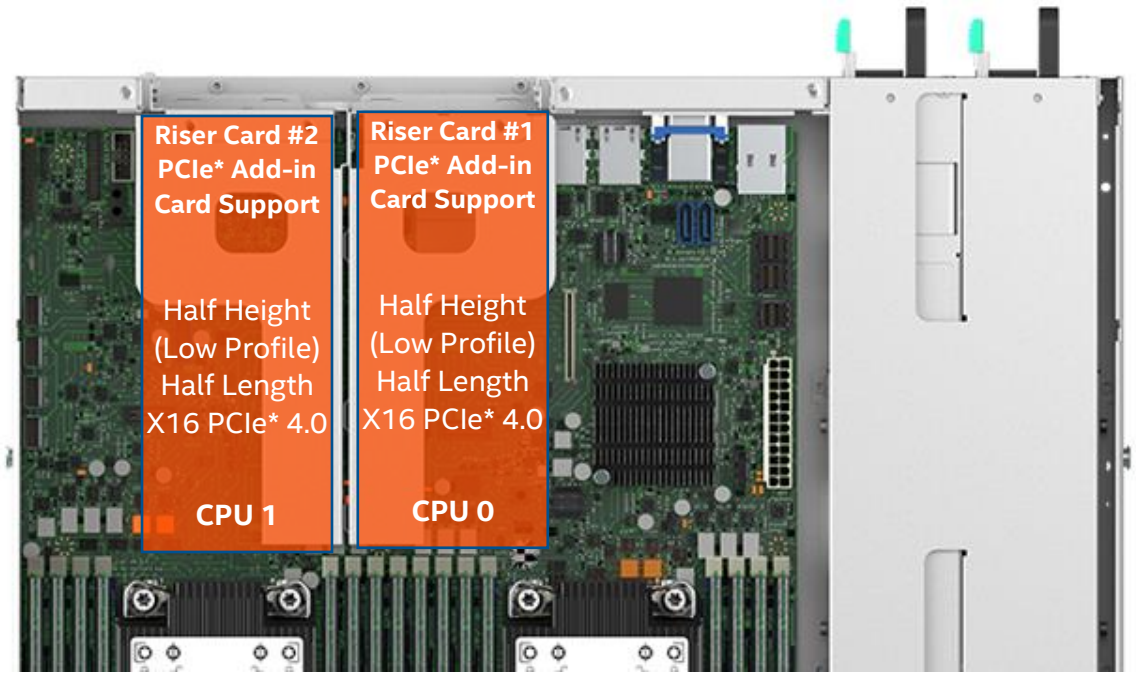


Figure 34. Add-in Card Support

Maximum airflow to the PCIe add-in card zones is dependent on the type of drives that are populated in the front drive bay.

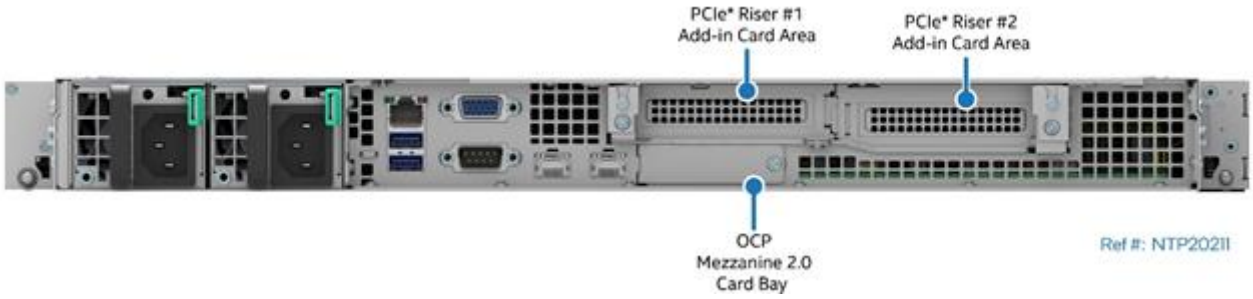
Table 10. Maximum Airflow to Riser Cards

Drive Form Factor	Max Airflow to Riser Card 1	Max Airflow to Riser Card 2
3.5” HDD or Drive Blank	300 LFM	300 LFM
2.5” SSD	200 LFM	200 LFM

Check PCIe add-in card specifications for airflow requirements.

5.2 OCP* Mezzanine Card 2.0 Support

The system supports one add-in card compliant with OCP Mezzanine Card 2.0. Refer to the *Intel® Server M20NTP Family Configuration Guide* for a list of validated cards.



Supported OCP 2.0 mezzanine cards may include one or two interface connectors that install to matching connectors on the server board.

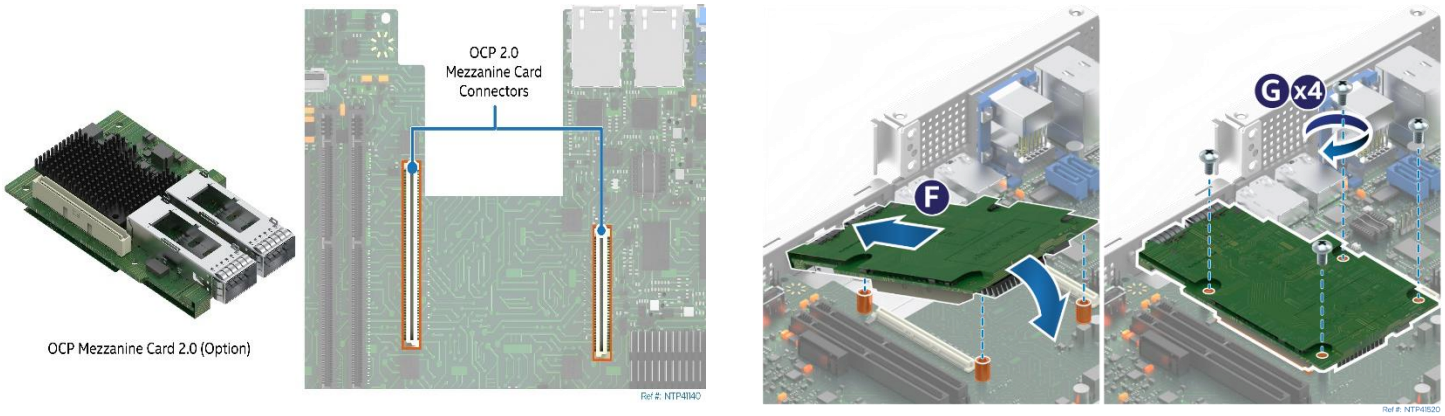


Figure 35. OCP* Mezzanine 2.0 Add-in Card Support

To ensure compliance with the regulatory emission requirements and help secure the OCP card, a mounting bracket must be installed to the chassis back panel.

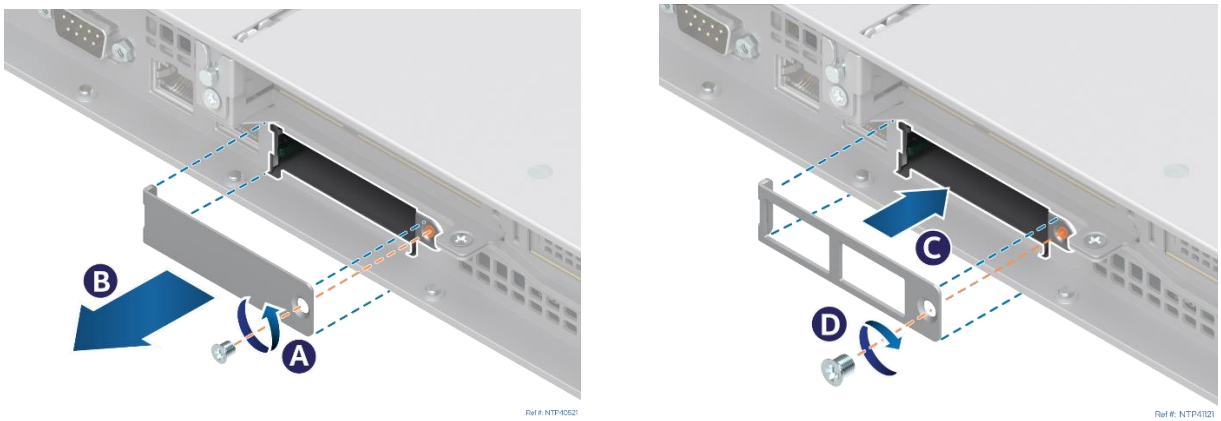


Figure 36. OCP Mounting Bracket

Note: The supported OCP Mezzanine add-in cards do not include the required mounting bracket. A set of brackets is included with the system. The system integrator must choose the appropriate bracket to match the external connectors of the chosen OCP card.

See the *Intel® Server M20NTP Family Configuration Guide* for a list of supported Intel OCP networking cards.

6. Data Storage Options

The Intel Server System M20NTP1UR has support for many data storage configuration options, including hot swap capable front drive bays with support for SATA, SAS, and NVMe drives, an internal M.2 NVMe connector, an internal USB 3.0 Type A connector, and built-in support for both SATA and NVMe storage interfaces. This chapter provides an overview for each.

6.1 Front Drive Bay Overview

The Intel Server System M20NTP1UR includes four hot-swap capable front drive bays. Each drive bay can support a 3.5” hard disk drive (HDD) or U.2 (2.5” solid state drive (SSD)). All drive bays have support for SATA, SAS, or NVMe drives.

Figure 37. Front Drive Bays

Drives are mounted to a tool-less drive carrier allowing for easy installation, extraction, and replacement.

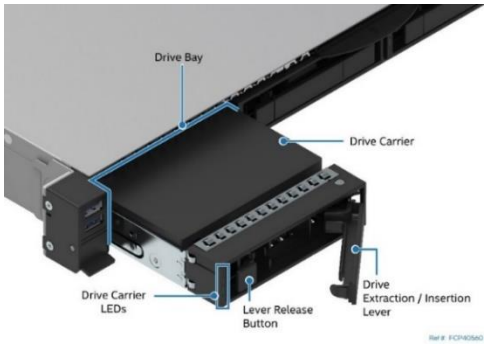


Figure 38. Drive Bay Components

To ensure the proper amount of airflow through the system, all drive carriers must be populated with a drive (HDD or SSD) or supplied drive blank. The drive blank should only be removed when installing a 3.5” HDD.

For system configurations that require 2.5” SSDs, the drive blank is converted into a mounting bracket, allowing the SSD to be mounted within the 3.5” drive carrier.

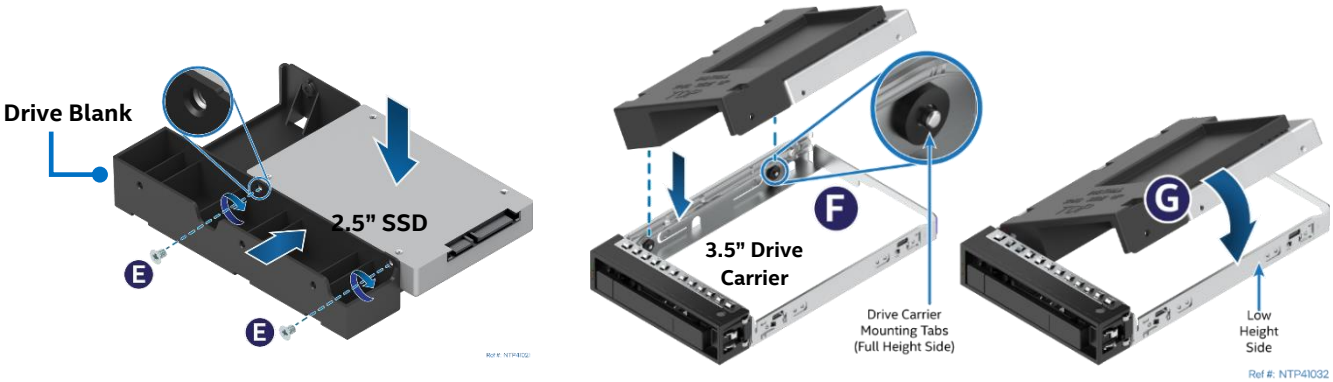


Figure 39. Mounting 2.5" Drive to 3.5" Carrier

See the *Intel® Server System M20NTP1UR Integration and Service Guide* for complete drive assembly instructions.

Note: Intel does not support the use of 2.5" HDDs when mounted within the mounting bracket. The drive blank was designed to support 2.5" SSDs only. Using the drive blank to mount a 2.5" HDD may result in degraded drive performance and may impact long term drive reliability.

Each drive carrier includes separate LED indicators for drive activity and drive status. Light pipes integrated into the drive carrier assembly direct light emitted from LEDs mounted next to each drive connector on the backplane to the drive carrier faceplate, making them visible from the front of the system.

Figure 40. Drive Carrier LED Identification

Table 11. Drive Activity LED states

	Condition	Drive Type	LED Behavior
Green	Power on with no drive activity	SAS / NVMe	LED stays on
		SATA	LED stays off
	Power on with drive activity	SAS / NVMe	LED blinks off when processing a command
		SATA	LED blinks on when processing a command
	Power on and drive spun down	SAS / NVMe	LED stays off
		SATA	LED stays off
	Power on and drive spinning up	SAS / NVMe	LED blinks
		SATA	LED stays off

Table 12. SATA / SAS Drive Status LED states

	LED State	Drive Status
Amber	Off	No access and no fault
	Solid on	Hard drive fault has occurred
	1 Hz blinking	RAID rebuild in progress
	2 Hz blinking	Locate (identify)

Table 13. PCIe* SSD Drive Status LED states

	LED State	Drive Status
Amber	Off	No fault, OK
	4 Hz blinking	Locate (identify)
	Solid on	Fault / fail
	1 Hz blinking	Rebuild

Note: The drive activity LED is driven by signals coming from the drive itself. Drive vendors may choose to operate the activity LED different from what is described in the previous table. If the activity LED on a given drive type behaves differently than what is described, customers should reference the drive vendor specifications for the specific drive model to determine the expected drive activity LED operation.

6.2 Front Drive Bay Backplane Overview

When a drive assembly (drive carrier and drive) is installed into the front drive bay, the drive is blind mated to an SFF-8639 drive interface connector on a backplane mounted within the server chassis.

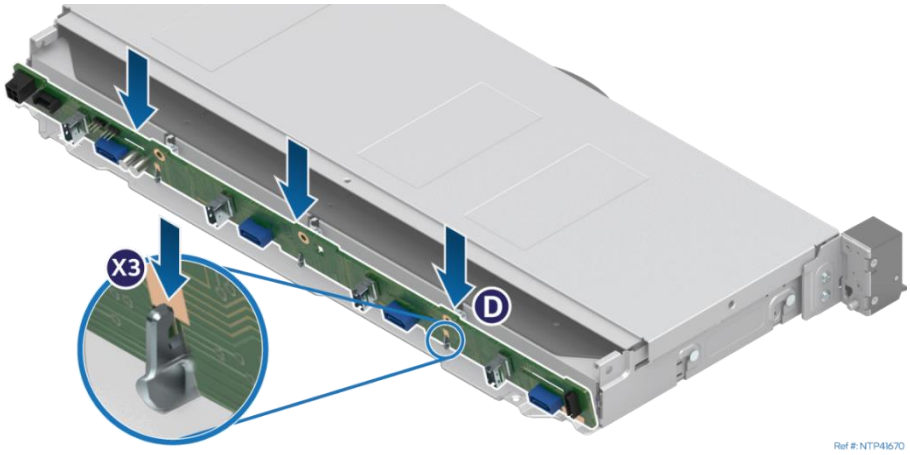


Figure 41. Front Drive Bay Backplane

The backplane supports the following:

- Supported drive interface technologies
  - 6 Gb/s SATA
  - 12 Gb/s SAS
  - 64 Gb/s PCIe NVMe
- Hot-swap drive support
- Four (4) 68-pin SFF-8639 drive interface connectors – SATA / SAS / NVMe
- HSBP microcontroller – Cypress* CY8C22545-24AXI Programmable System-on-Chip* (PSoC*) device
- LEDs to indicate drive activity and status for each attached device
- 5 V voltage regulator for devices
- 3.3 V voltage regulator for microcontroller
- Microcontroller firmware updateable over the I^2C interface
- FRU EEPROM support
- Temperature sensor using a TMP75 (or equivalent) thermistor implementation with the microcontroller

6.2.1 Backplane Features

On the front-side of the backplane are four 68-pin SFF-8639 drive interface connectors.

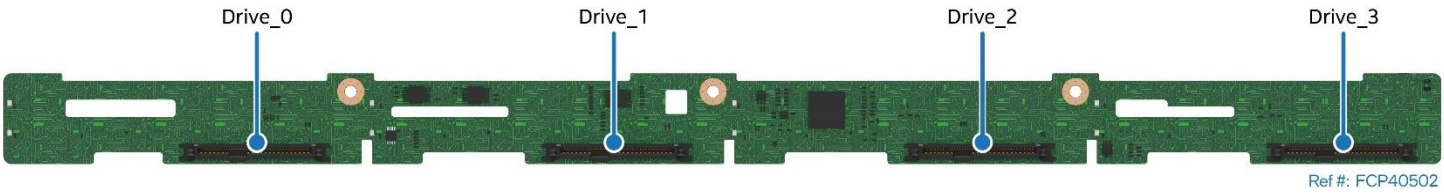


Figure 42. Backplane Feature Identification – Front Side

Each connector is hot-swap capable and can support any of the following drive technologies:

- 6 Gb/s SATA
- 12 Gb/s SAS
- 64 Gb/s PCIe NVMe

On the backside of the backplane are the following cable connectors:

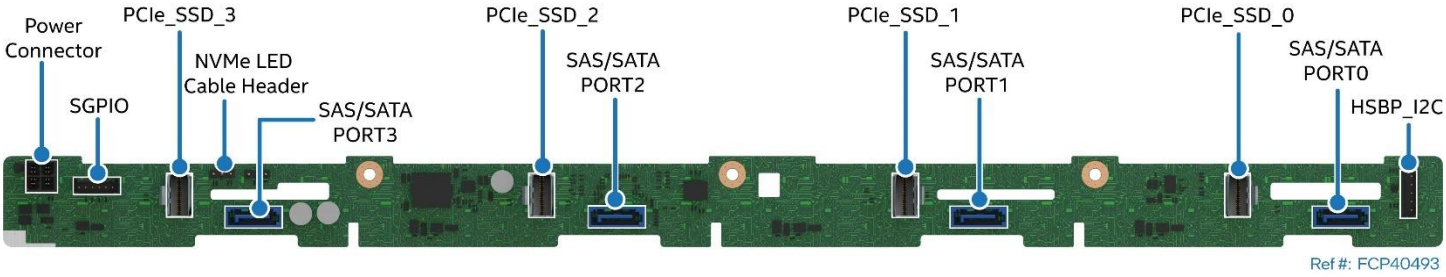


Figure 43. Backplane Connector Identification – Backside

6.2.1.1 Single Port SAS / SATA Cable Connectors

The backplane includes four 7-pin single port SAS / SATA cable connectors (labeled “SAS / SATA PORT 0” through “SAS / SATA PORT 3”). See Figure 43. Each connector provides I/O signals to the corresponding SAS / SATA drive interface connector on the front side of the backplane.

Using the included multiport Mini-SAS HD to four single-port SAS / SATA cable (see Figure 44), SATA and SATA SGPIO or SAS interface signals can be routed to the backplane from any of the following system sources:

- Onboard SATA ports 0–3 Mini-SAS HD connector
- Onboard SATA ports 4–7 Mini-SAS HD connector
- Onboard sSATA ports 0–3 Mini-SAS HD connector
- PCIe SAS / SATA storage / RAID adapter add-in card – Supported when installed to riser 1 only

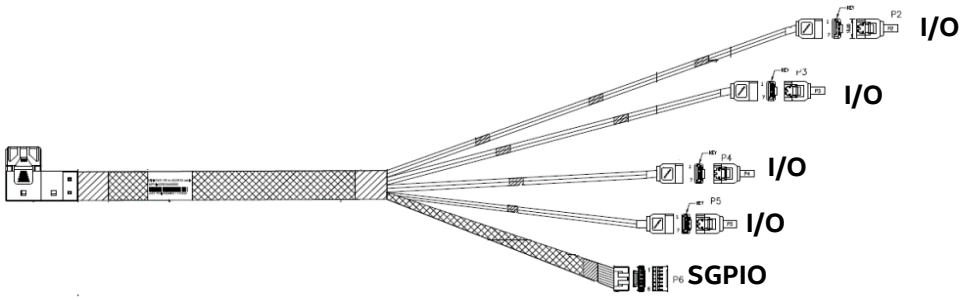


Figure 44. Server Board to Backplane: Mini-SAS-HD – 4 x SATA / SGPIO Cable

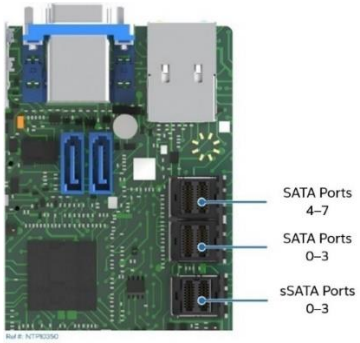


Figure 45. Server Board Multiport Mini-SAS-HD SATA Port Cable Connectors

6.2.1.2 NVMe* PCIe* SlimSAS* Connectors (PCIe_SSD_0 through PCIe_SSD_3)

The backside of the backplane includes four SlimSAS cable connectors (labeled “PCIe_SSD-0” through “PCIe_SSD-3”). Each connector provides the PCIe interface to one NVMe drive connector on the front side of the backplane. See Figure 43. PCIe signals for up to four NVMe drives are routed from PCIe X4 SlimSAS cable connectors on the server board labeled “PCIe Port 0–3”.

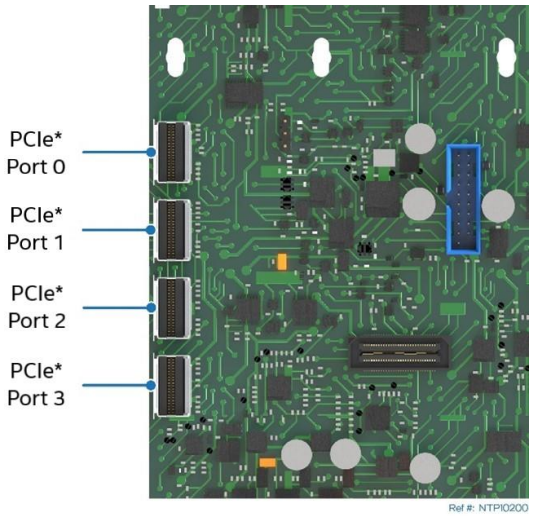


Figure 46. Server Board PCIe* SlimSAS* Cable Connectors

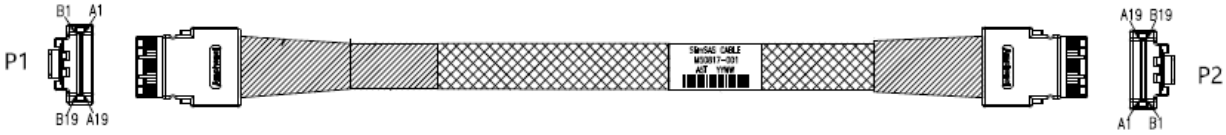


Figure 47. Server Board to Backplane: PCIe* SlimSAS* – SlimSAS* Cable

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Note: To support LED management for PCIe-attached storage using the onboard PCIe SlimSAS cable connectors requires a communication cable be installed from a 7-pin cable connector on the server board to the backplane. See Figure 53.

NVMe support on the Intel Server System M20NTP1UR is optional. An Intel NVMe accessory cable kit must be ordered to obtain the necessary NVMe interface cables: **iPN – NTPCBLSL104K**.

6.2.1.3 I²C Cable Connector

The back side of the backplane includes one 1x5 pin cable connector (labeled “HSBP_I2C”) that is used as a management interface between the backplane and server board.

Table 14. I²C Cable Connector Pinout

Pin #	Signal Name
1	SMB_3V3_DAT
2	GND
3	SMB_3V3_CLK
4	NC
5	NC

6.2.1.4 Power Connector

The backplane includes one 2x2 pin connector supplying power to the backplane. Power is routed to the backplane using the designated power lead from the power distribution board mounted to the backside of the power supply bay.

Table 15. Power Connector Pinout

Pin #	Signal Name
1	GND
2	GND
3	P12V
4	P12V

6.3 SATA Support

The Intel® C621 chipset platform controller hub (PCH) includes two embedded AHCI SATA controllers, identified as “SATA” and “sSATA”, which provide the server board support for up to fourteen 6 GB/s SATA 3.0 devices.

SATA interface cable connectors on the server board are as follows:

- Four (4) SATA ports from the Mini-SAS HD (SFF-8643) cable connector labeled “SATA_0–3”
- Four (4) SATA ports from the Mini-SAS HD (SFF-8643) cable connector labeled “SATA_4–7”
- Four (4) SATA ports from the Mini-SAS HD (SFF-8643) cable connector labeled “sSATA_0-3”
- One (1) SATA port from the 7-pin SATA cable connector labeled “sSATA_4” (not used in 1U system)
- One (1) SATA port from the 7-pin SATA cable connector labeled “sSATA_5” (not used in 1U system)

Any one of the three multiport Mini-SAS HD SATA connectors can be used to connect to the backplane.

Note: The Intel Server M20NTP1UR’s feature set only requires support of one multiport SATA Mini-SAS HD connector for connection to the backplane. All other SATA port interfaces found on the server board are not used in this 1U server product.

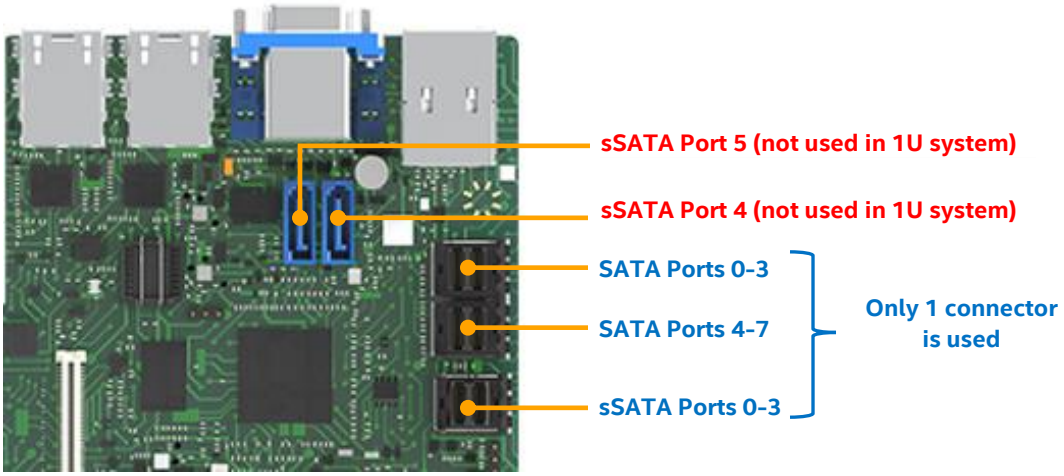


Figure 48. SATA Interface Cable Connectors

Both embedded SATA controllers can be independently enabled or disabled and can be configured to support the following operating modes: AHCI mode or RAID mode. The SATA controllers can be configured using the <F2> BIOS setup utility, under the **Platform Configuration > PCH Configuration > Mass Storage Controller Configuration** menu screen.

The following table describes the features supported by both embedded SATA controllers.

Table 16. SATA and sSATA Controller Feature Support

Feature	Description	AHCI Mode	RAID Mode Intel® VROC (SATA RAID)
Native Command Queuing (NCQ)	Allows the device to reorder commands for more efficient data transfers	Supported	Supported
Auto Activate for Direct Memory Access (DMA)	Collapses a DMA Setup, then DMA Activate sequence into a DMA Setup only	Supported	Supported
Hot Plug Support (U.2 Drives Only)	Allows for device detection without power being applied and ability to connect and disconnect devices without prior notification to the system	Supported	Supported
Asynchronous Signal Recovery	Provides a recovery from a loss of signal or establishing communication after hot plug	Supported	Supported
6 Gb/s Transfer Rate	Capable of data transfers up to 6 Gb/s	Supported	Supported
ATAPI Asynchronous Notification	A mechanism for a device to send a notification to the host that the device requires attention	Supported	Supported
Host and Link Initiated Power Management	Capability for the host controller or device to request Partial and Slumber interface power states	Supported	Supported
Staggered Spin-Up	Enables the host the ability to spin up hard drives sequentially to prevent power load problems on boot	Supported	Supported
Command Completion Coalescing	Reduces interrupt and completion overhead by allowing a specified number of commands to complete and then generating an interrupt to process the commands	Supported	N/A

6.3.1 Intel® Virtual RAID on CPU (Intel® VROC) for SATA

Intel VROC (SATA RAID) provides an enterprise RAID solution for SATA devices connected to the embedded SATA controllers of the PCH.

By default, onboard RAID options are disabled in the BIOS setup utility. To enable onboard RAID support, access the BIOS setup utility by pressing **<F2>** key during POST. Navigate to the onboard RAID configuration menu: **Platform Configuration > PCH Configuration > Mass Storage Controller Configuration > sSATA Controller** or **SATA Controller**. From the options available in the menu, select the **RAID Mode** to enable the RAID support.

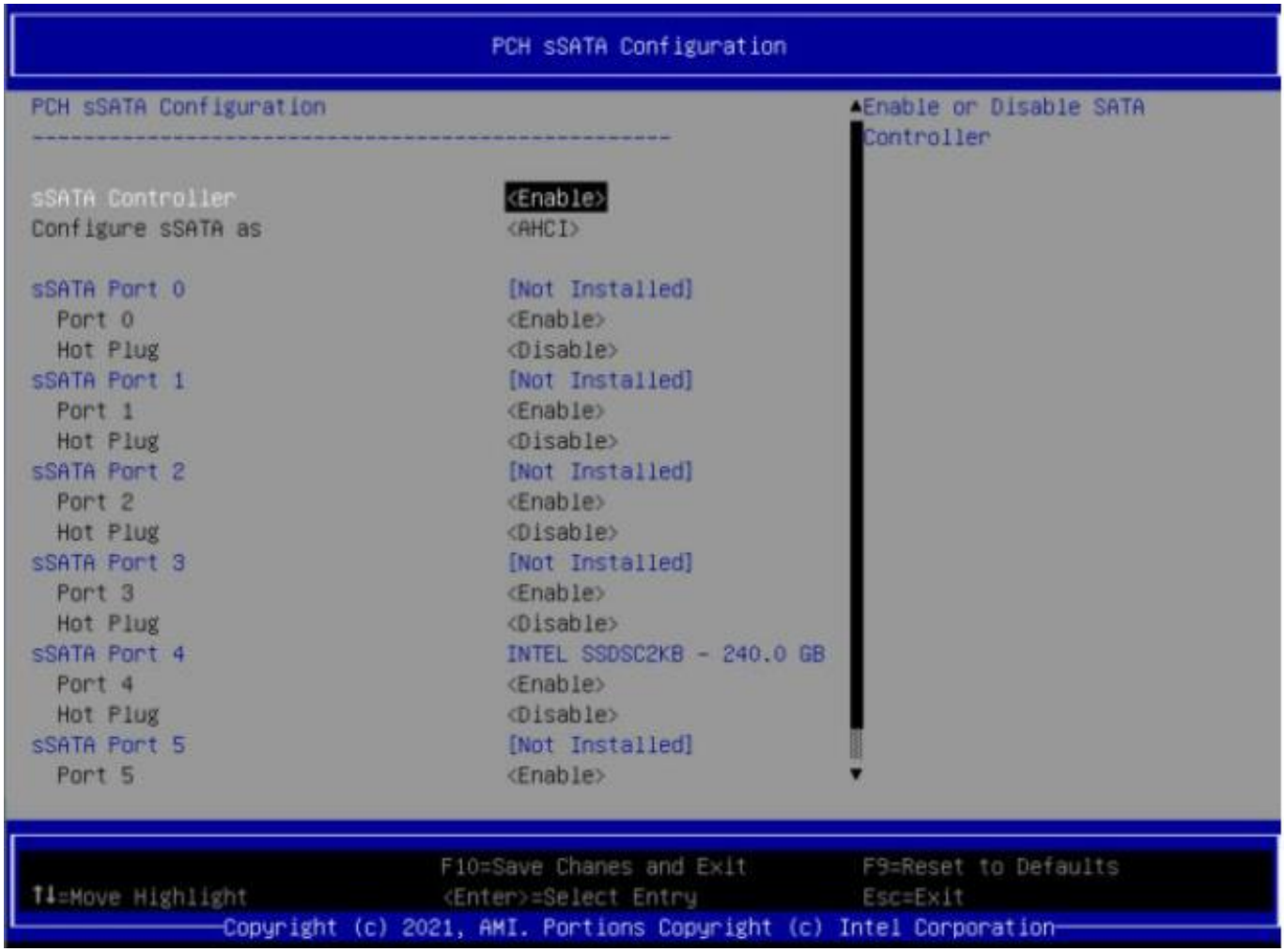


Figure 49. BIOS Setup Utility's Mass Storage Controller Configuration Screen

Note: RAID partitions created using Intel VROC 7.5 cannot span across the two embedded SATA controllers. Only drives attached to a common SATA controller can be included in a RAID partition.

Supported SATA RAID levels include RAID 0, RAID 1, RAID 5, and RAID 10.

- **RAID 0 (striping)** – RAID level 0 combines at least two (up to the maximum number) drives supported by the embedded SATA and sSATA controllers, so that all data is divided into manageable blocks called strips. The strips are distributed across the array members on which the RAID 0 volume resides. Data stored in a RAID 0 volume is not redundant. Therefore, if one drive fails, all data on the volume is lost.
- **RAID 1 (mirroring)** – Data is concurrently written to two drives creating real-time redundancy of all data written to the first drive. This condition is good for small databases or other applications that require small capacity but complete data redundancy. The maximum number of drives supported in a RAID 1 volume is two drives. The RAID 1 volume appears as a single physical drive with a capacity equal to that of the smaller drive.
- **RAID 5 (striping with parity)** – A RAID 5 volume provides the capacity of (N – 1) x smallest size of the drives, where N ≥ 3 and ≤ maximum number of drives supported by the SATA or sSATA controller. All data is divided into manageable blocks called strips. RAID 5 also stores parity, a mathematical method for recreating lost data on a single drive. The data and parity are striped across array members. Because of parity, it is possible to rebuild the data after replacing a failed drive with a new one. The maximum number of drives supported in a RAID 5 is the maximum number of drives supported by the platform.

- **RAID 10 (striping and mirroring)** – RAID level 10 uses four drives to create a combination of RAID levels 0 and 1. The data is striped across a two-disk array forming a RAID 0 component. Each of the drives in the RAID 0 array is mirrored to form a RAID 1 component. This condition provides the performance benefits of RAID 0 and the redundancy of RAID 1. The RAID 10 volume appears as a single physical drive with a capacity equal to the two smallest drives of the four-drive configuration. The space on the remaining two drives is used for mirroring. The maximum number of drives supported in a RAID 10 is four.

Intel VROC 7.5 for SATA functionality requires the following:

- The embedded RAID option must be enabled in the BIOS setup utility.
- Intel VROC 7.5 drivers must be loaded for the installed operating system.
- At least two (2) SATA drives are needed to support RAID 0 or RAID 1.
- At least three (3) SATA drives are needed to support RAID 5.
- Four (4) SATA drives are needed to support RAID 10.

With Intel VROC 7.5 software RAID enabled, the following features are made available:

- A boot-time, pre-operating-system environment, text-mode user interface that allows the user to manage the RAID configuration on the system. Its feature set is kept simple to keep size to a minimum but allows the user to create and delete RAID volumes and select recovery options when problems occur. To access the user interface, press **<CTRL-I>** during system POST.
- Boot support when using a RAID volume as a boot disk. It does this by providing Int13 services when a RAID volume needs to be accessed by MS-DOS applications (such as NT loader: NTLDR) and by exporting the RAID volumes to the system BIOS for selection in the boot order.
- At each boot, a status of the RAID volumes is provided to the user.

6.4 NVMe* Support

X16 PCIe lanes from CPU 1 are used to provide NVMe support. The PCIe lanes are bifurcated and routed to four X4 PCIe SlimSAS cable connectors on the server board, each capable of supporting one NVMe device. See Figure 50.

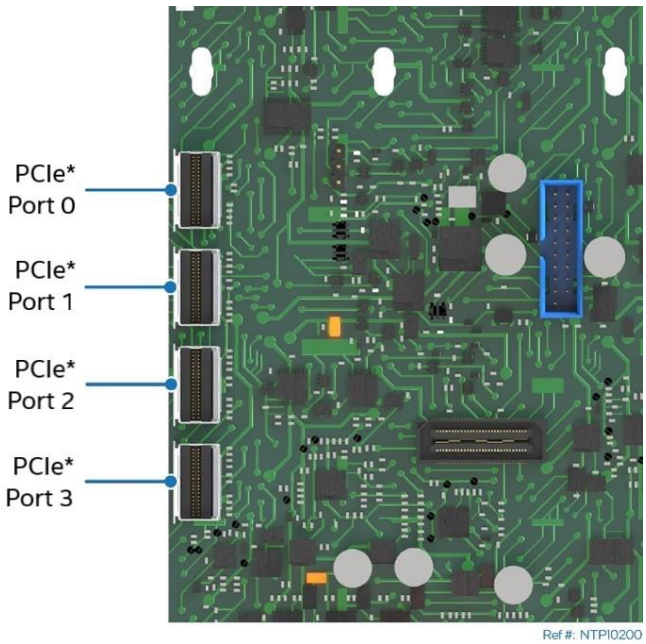


Figure 50. PCIe* SlimSAS* Connectors

6.4.1 Intel® Volume Management Device (Intel® VMD) 2.0 for NVMe*

Intel VMD is hardware logic inside the processor root complex to help manage PCIe NVMe SSDs. Intel VMD provides robust hot plug support and status LED management. This allows servicing of storage system NVMe SSD media without system crashes or hangs when ejecting or inserting NVMe SSD devices on the PCIe bus.

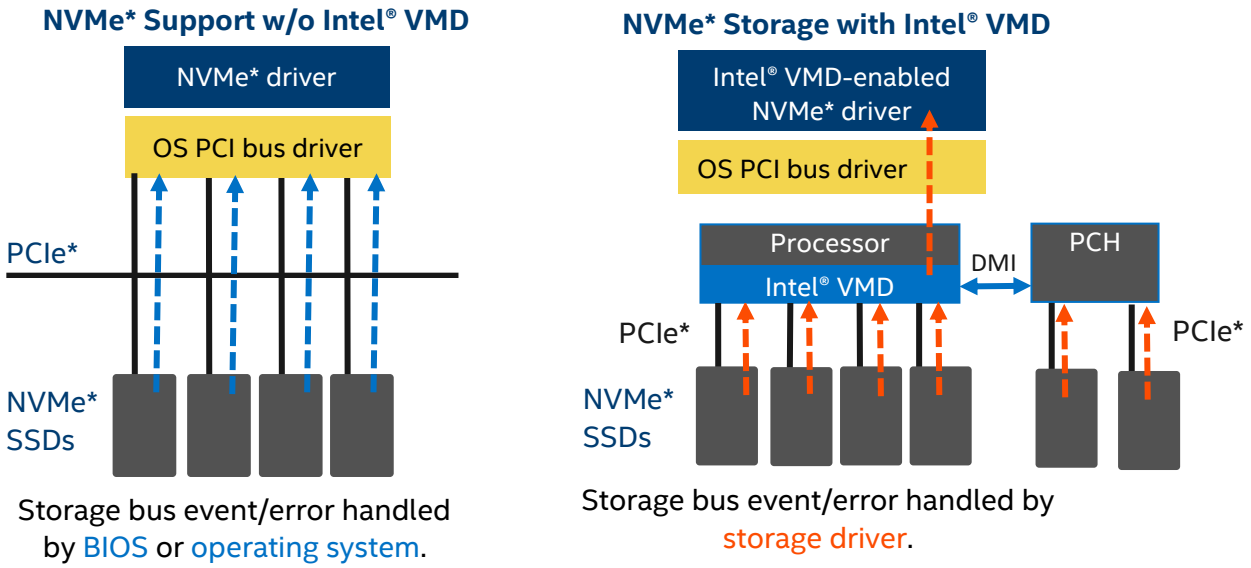


Figure 51. NVMe* Storage Bus Event / Error Handling

Intel VMD handles the physical management of NVMe storage devices as a stand-alone function. However, Intel VMD can be enhanced when Intel VROC support options are enabled to implement RAID-based storage systems.

Intel VMD 2.0 includes the following features and capabilities:

- Hardware is integrated inside the processor PCIe root complex.
- Entire PCIe trees are mapped into their own address spaces (domains).
- Each domain manages x16 PCIe lanes.
- Can be enabled / disabled in the BIOS setup utility at x4 lane granularity.
- Driver sets up / manages the domain (enumerate, event / error handling).
- May load an additional child device driver that is Intel VMD-aware.
- Hot plug support – hot insert array of PCIe NVMe SSDs.
- Support for PCIe NVMe SSDs only.
- Maximum of 128 PCIe bus numbers per domain.
- Support for Management Component Transport Protocol (MCTP) over SMBus only.
- Support for memory-mapped I/O (MMIO) only (no port-mapped I/O).
- Does not support non-transparent bridge (NTB), Intel® Quick Data Technology, Intel® Omni-Path Architecture (Intel® OPA), or single root I/O virtualization (SR-IOV).
- Correctable errors do not bring down the system.
- Intel VMD only manages devices on PCIe lanes routed directly from the processor or chipset PCH.
- When Intel VMD is enabled, the BIOS does not enumerate devices that are behind Intel VMD. The Intel VMD-enabled driver enumerates these devices and exposes them to the host.

Note: A communication cable must be routed from the server board to the backplane to enable support for LED management for PCIe-attached storage using the onboard PCIe SlimSAS cable connectors. The following Intel accessory cable kit includes all cables required to support NVMe drives in the 1U system: **iPN – NTPCBLSL104K**.

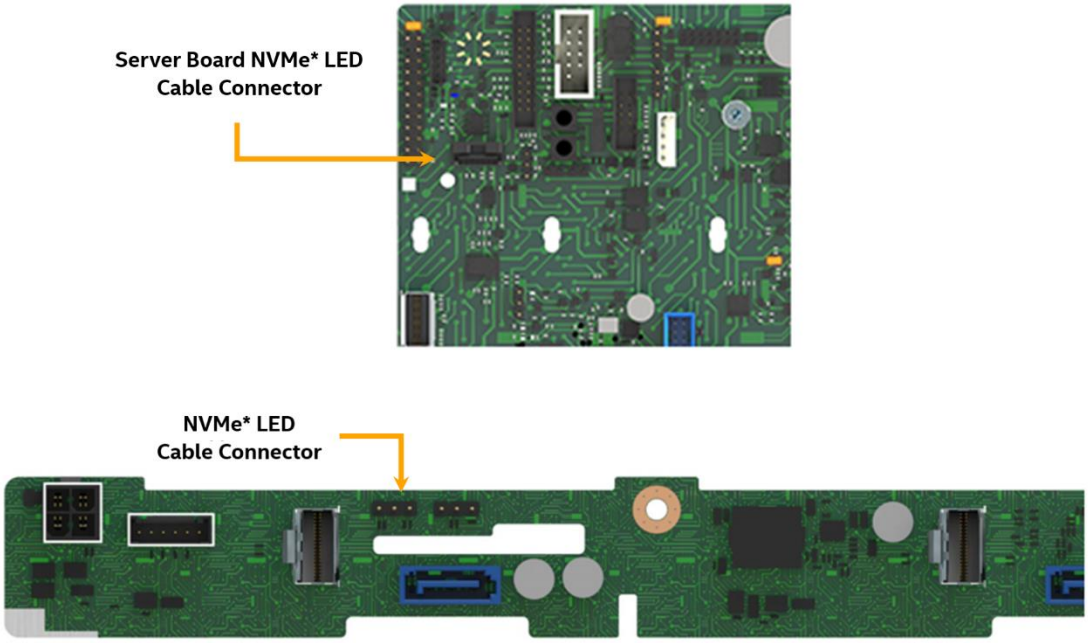


Figure 52. NVMe* Drive Activity LED and Drive Fault LED Cable Connections

6.4.1.1 Enabling Intel® VMD 2.0 for NVMe* Support

For installed NVMe devices to use the Intel VMD features in the system, Intel VMD must be enabled on the appropriate processor PCIe root ports in the BIOS setup utility. By default, Intel VMD support is disabled on all processor PCIe root ports in the BIOS setup utility.

The following table provides the PCIe port routing information for the server board PCIe SlimSAS connectors.

Table 17. CPU to PCIe* NVMe* SlimSAS* Connector Routing

Host	CPU Port	SlimSAS* Connector
CPU 1	PE2 A	PCIe_Port 0
	PE2 B	PCIe_Port 1
	PE2 C	PCIe_Port 2
	PE2 D	PCIe_Port 3

In the BIOS setup utility, the Intel VMD support menu is on the following menu tab: **Socket Configuration > IIO Configuration > Intel® VMD Technology**.

6.4.2 Intel® Virtual RAID on CPU (Intel® VROC) for NVMe*

NVMe drives interfaced through the onboard PCIe SlimSAS connectors have optional support for RAID using Intel VROC 7.5 for NVMe technology. Intel VROC 7.5 supports the following:

- I/O processor with controller (ROC) and DRAM.
- Protected write-back cache – software and hardware that allows recovery from a double fault.
- Isolated storage devices from operating system for error handling.
- Protected R5 data from operating system crash.
- NVMe SSD hot plug and surprise removal on processor PCIe lanes.
- LED management for PCIe attached storage.
- RAID / storage management using Representational State Transfer (RESTful) application programming interfaces (APIs).
- Graphical user interface (GUI) for Linux*.
- 4K built-in NVMe SSD support.

Enabling Intel VROC 7.5 support requires installation of an optional upgrade key on the server board, as shown in Figure 53.

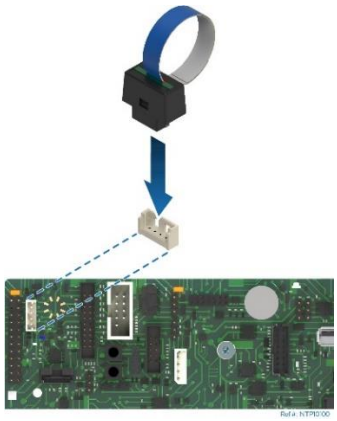


Figure 53. Intel® VROC Key Insertion

The following table identifies available Intel VROC upgrade key options.

Table 18. Optional Intel® VROC for NVMe* Upgrade Key Features

Intel® VROC for NVMe* RAID Features	Standard Intel® VROC Key (iPC – VROCSTANMOD)	Premium Intel® VROC Key (iPC – VROCPREMMOD)	Intel® SSD Only VROC Key (iPC – VROCISSDMOD)
Processor-attached NVMe* SSD – high performance	Yes	Yes	Yes
Boot on RAID volume	Yes	Yes	Yes
Third-party vendor SSD support	Yes	Yes	No
RAID 0/1/10	Yes	Yes	Yes
RAID 0/1/5/10	No	Yes	Yes
RAID write hole closed (RMFBU replacement)	No	Yes	Yes
Hot plug / surprise removal (2.5" SSD form factor only)	Yes	Yes	Yes
Enclosure LED management	Yes	Yes	Yes

6.5 Internal M.2 SSD Storage Support

The server board includes a single M.2 SSD connector allowing support for an internally mounted M.2 NVMe SSD option. Thermal restrictions limit the M.2 SSD usability to a boot device only. Exposing the M.2 SSD to heavy workloads causes the device to overheat, resulting in poor performance.

Supported M.2 SSD form factors include: 2242 (42 mm), 2280 (80 mm), and 22110 (110 mm).

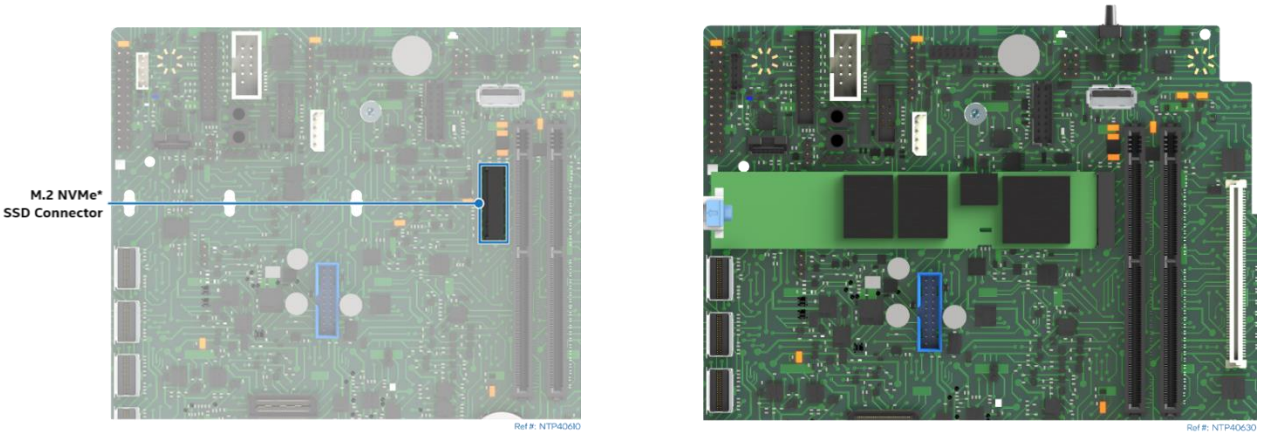


Figure 54. M.2 SSD Placement

When installing the M.2 SSD, it is secured to the server board using a mounting latch that slides over the far edge of the board.

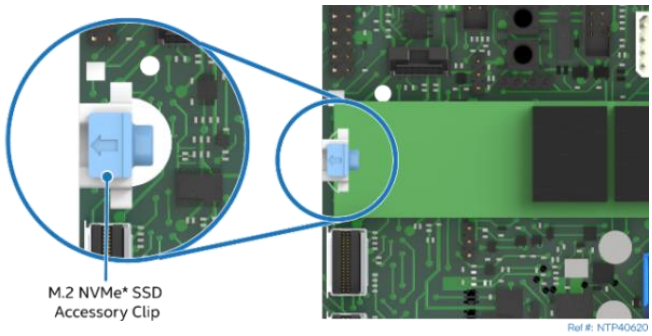


Figure 55. M.2 NVMe* SSD Accessory Clip Placement

The mounting latch can be installed into any of three mounting locations to support the length of the selected M.2 SSD.

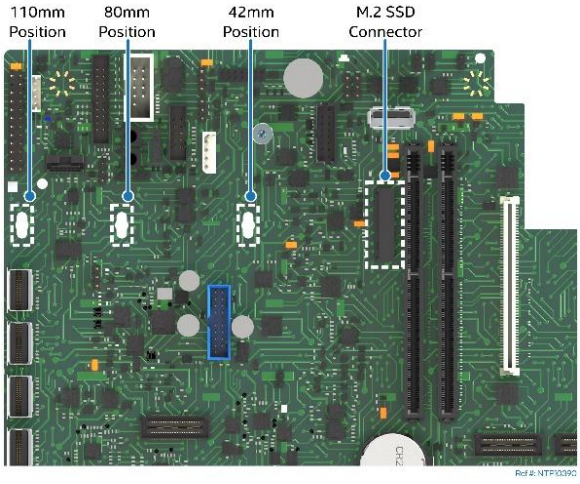


Figure 56. M.2 Mounting Latch Installation Options

7. Front Control Panel

Located over the front drive bay is a multi-functional control panel that provides system power and ID buttons, status LED indicators, and external input/output (I/O) ports.

Figure 57. Front Control Panel

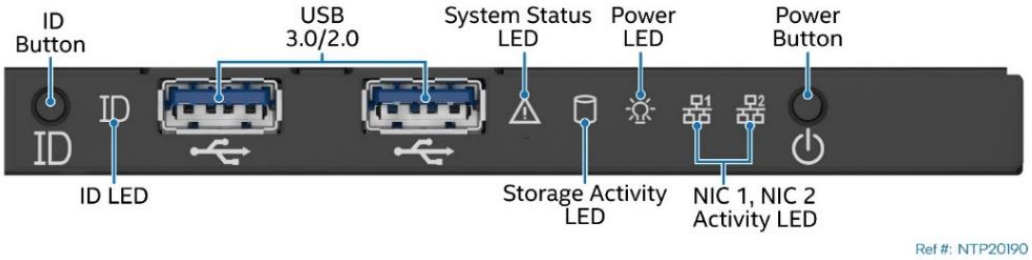


Figure 58. Control Panel Features

7.1 Power / Sleep Button and LED

System power management is a function of the integrated baseboard management controller (BMC). With the system in a power-off state, pressing the power button on the front panel signals the BMC to turn the system power on.

With the system in a power-on state, the power button functionality is dependent on whether the system has booted to an operating system, and whether the operating system has support for ACPI.

- With no operating system loaded or if the operating system has no support for ACPI, pressing the power button signals the BMC to power down the server.
- With an operating system that supports ACPI, the functionality of the power button is dependent on the supported and/or programmed ACPI functionality of the operating system.

The power LED is a single color (green) and supports different indicator states as defined in Table 19.

Table 19. Power / Sleep LED Functional States

Power Mode	LED	System State	Description
Non-ACPI	Off	Power-off	System power is off, and the BIOS has not initialized the chipset PCH.
	On	Power-on	System power is on.
ACPI	Off	S5	Mechanical is off and the operating system has not saved any context to the hard disk drive.
	On	S0	System and the operating system are up and running.

7.2 System ID LEDs

The system supports a pair of blue system ID LEDs, one on the front control panel, and the other on the back edge of the server board, which is viewable from behind the server. The system ID LEDs can be turned on or turned off using either of the following methods:

- System ID button located on the front control panel.
- Using the IPMI command `Chassis Identify`. Using this option causes the LEDs to blink for 15 seconds.

7.3 Drive Activity LED

The drive activity LED on the front control panel indicates drive activity from the server board SATA and sSATA storage controllers.

7.4 System Status LED

The system status LED is a bi-color (green / amber) indicator that shows the current health of the server system. The system status LED states are driven by the server board platform management subsystem. When the server is powered down (transitions to the DC-off state or S5), standby power allows the BMC to retain the sensor and front panel status LED state established before the power-down event. The following table provides a description of each supported LED state.

Table 20. System Status LED State Definitions

Status LED State		System State	Status Description
Off		Powered off. No stand-by power.	System has no AC power.
Green	**Solid Green**	System is operating normally.	System is running (in S0 / S5 state) and its status is healthy. The system is not exhibiting any errors. Source power is present, BMC has booted, and manageability functionality is up and running.
	Blinking Green	• System is operating in a degraded state, but still functional. • System is operating in a redundant state but with an impending failure warning.	• Non-critical threshold crossed – Temperature (including HSBP temp.), voltage, input power to power supply, output current for main power rail from power supply and processor thermal control (Therm Ctrl) sensors. • Battery failure. • BMC watchdog has reset the BMC.
Amber	**Blinking Amber**	System is operating in a degraded state with an impending failure warning, although still functioning. System is likely to fail.	• Critical threshold crossed – Voltage, temperature (including HSBP temp.), input power to power supply, output current for main power rail from power supply and PROCHOT (Therm Ctrl) sensors. • VRD hot asserted.
	Solid Amber	• Critical / non-recoverable – System is halted. • Fatal alarm – System has failed or shut down.	• Processor `CATERR` signal asserted. • Processor thermal trip. • DIMM thermal trip or equivalent. • SSB thermal trip or equivalent.

8. System I/O Features

The system includes several external and internal I/O features. This chapter provides an overview of each.

8.1 Remote Management Port

The system includes a dedicated 1 Gb/s RJ45 management port used to access embedded system management features remotely.

Note: The management port is dedicated for system management access purposes only. The port is not intended or designed to support standard LAN data traffic.

Figure 59. Remote Management Port

To access the server remotely using the management port requires network parameters to be configured using the <F2> BIOS setup utility. Navigate to the **Server Management** tab and select **BMC Network Configuration** to enter the **BMC LAN Configuration** screen.

Reference the *Intel® Server Board M20NTP2SB Technical Product Specification* for additional information related to remote management port setup and other supported server management features.

8.2 Serial Ports

The server board supports two serial ports:

- COM1 – External (back panel I/O)
- COM2 – Internal DH-10 cable connector

Figure 60. Serial Port COM1 (External)

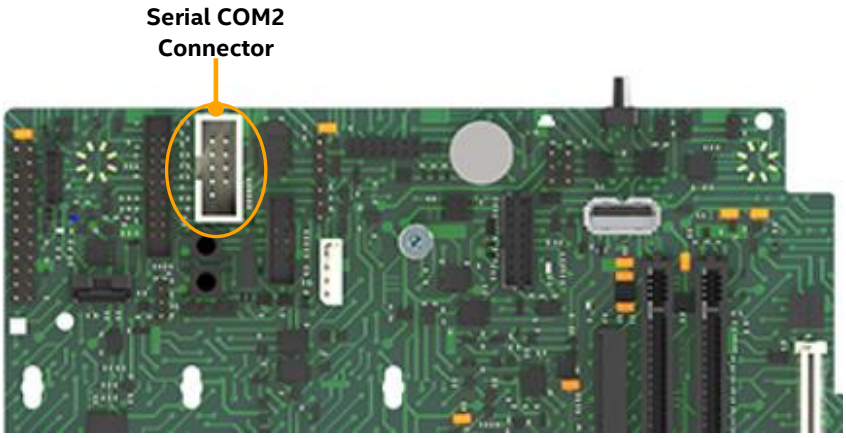
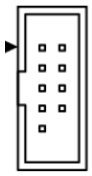


Figure 61. Serial COM2 Header (Internal)

Table 21. Serial Port B Header Pinout



Signal	Pin	Pin	Signal
COM2_DCD	1 (∇)	2	COM2_DSR
COM2_RXD	3	4	COM2_RTS
COM2_TXD	5	6	COM2_CTS
COM2_DTR	7	8	COM2_NRI
GND	9	10	KEY

8.3 Video Support

A standard 15-pin video connector is on the back edge of the server board.

Figure 62. Rear Panel VGA Connector

8.3.1 Video Resolutions

The graphics controller in the Aspeed AST2500 Server Management Processor (SMP) is a VGA-compliant controller with 2D hardware acceleration and full bus requester support. With 16 MB of memory reserved, the video controller supports the resolutions specified in the following table.

Table 22. Supported Video Resolutions

2D Mode Resolution	2D Video Support (Color Bit)			
	8 bpp	16 bpp	24 bpp	32 bpp
640 x 480	60, 72, 75, 85	60, 72, 75, 85	Not supported	60, 72, 75, 85
800 x 600	60, 72, 75, 85	60, 72, 75, 85	Not supported	60, 72, 75, 85
1024 x 768	60, 72, 75, 85	60, 72, 75, 85	Not supported	60, 72, 75, 85
1152 x 864	75	75	75	75
1280 x 800	60	60	60	60
1280 x 1024	60	60	60	60
1440 x 900	60	60	60	60
1600 x 1200	60	60	Not supported	Not supported
1680 x 1050	60	60	Not supported	Not supported
1920 x 1080	60	60	Not supported	Not supported
1920 x 1200	60	60	Not supported	Not supported

Reference the *Intel® Server Board M20NTP2SB Technical Product Specification* for additional information related to other video support features.

8.4 Network Connectivity

The server board includes two Intel® I210-AT Ethernet Controllers. These controllers support advanced features such as audio-video bridging (AVB), IEEE 802.1AS precision timestamping, error-correcting code (ECC) packet buffers, and enhanced-management interface options.

Each Ethernet controller supports one external RJ45 1000BASE-T Ethernet connector.

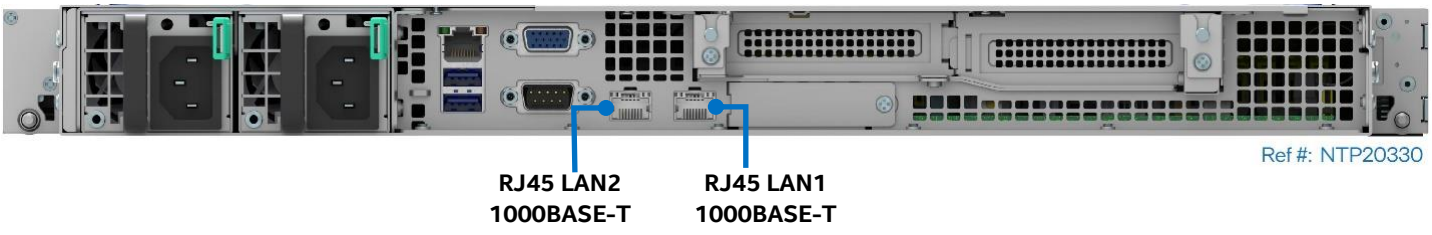
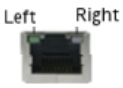


Figure 63. LAN Ports

Each RJ45 LAN connector includes link and activity LEDs that function as defined in the following table.

Table 23. RJ45 LAN connector Link / Activity LEDs

10 Mbps / 100 Mbps / 1 Gbps LAN Link / Activity LED Scheme			
		**Left LED**	**Right LED**
No link		Off	Off
10 Mbps	Link	**Green**	Off
	Active	**Blinking green**	Off
100 Mbps	Link	**Green**	**Solid green**
	Active	**Blinking green**	**Solid green**
1 Gbps	Link	**Green**	**Solid amber**
	Active	**Blinking green**	**Solid amber**

Additional network connectivity options can be supported by installing an optional OCP Mezzanine 2.0 networking card. See Section 5.2.

8.5 USB Support

The system includes USB ports on the front and back panels. Each USB port adheres to the USB 3.0 specification.

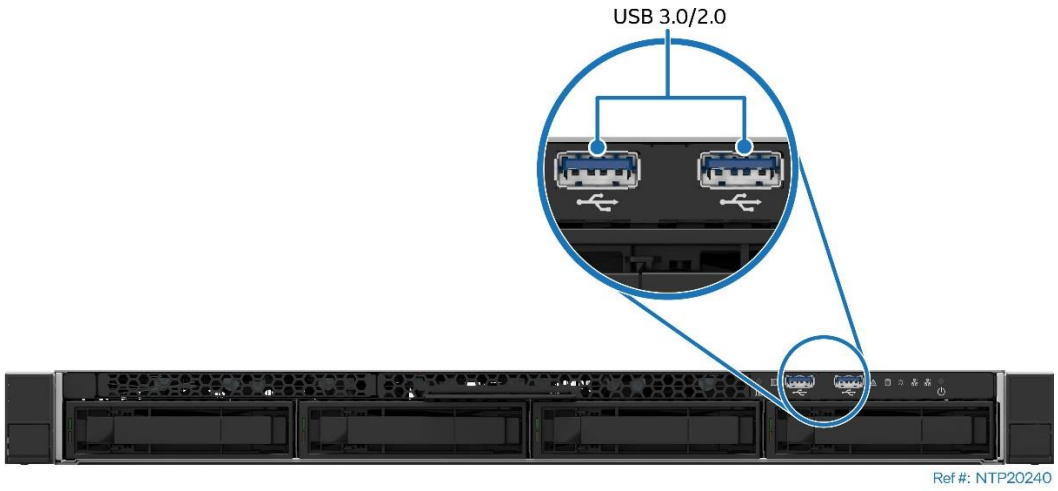


Figure 64. Front Panel USB Support

Figure 65. Rear Panel USB Support

The server board includes a USB 3.0 type A connector allowing support for a single internally mounted USB storage device.

Figure 66. Internal USB 3.0 Type A connector

Appendix A. Getting Help

Available Intel support options with Intel® Server Systems:

1. 24x7 support through Intel's support webpage at: https://www.intel.com/content/www/us/en/support/products/1201/server-products.html.

   Information available at the support site includes:

   - Latest BIOS, firmware, drivers, and utilities.
   - Product documentation, setup, and service guides.
   - Full product specifications, technical advisories, and errata.
   - Compatibility documentation for memory, hardware add-in cards, and operating systems.
   - Server and chassis accessory parts list for ordering upgrades or spare parts.
   - A searchable knowledge base to search for product information throughout the support site.

   Quick Links:

Use the following links for support on Intel server boards and server systems	**Download Center** http://www.intel.com/support/downloadserversw	**BIOS Support Page** http://www.intel.com/support/serverbios	**Troubleshooting Boot Issue** http://www.intel.com/support/tsboot
Use the following links for support on Intel® Data Center Block (Intel® DCB) Integrated Systems[1] [1] Intel® DCB comes pre-populated with processors, memory, storage, and peripherals based on how it was ordered through the Intel Configure to Order tool.	**Download Center** http://www.intel.com/support/downloaddcbsw	**Technical Support Documents** http://www.intel.com/support/dcb	**Warranty and Support Info** http://www.intel.com/support/dcbwarranty

2. If a solution cannot be found at Intel's support site, submit a service request via Intel's online service center at https://supporttickets.intel.com/servicecenter?lang=en-US. In addition, it is also possible to view previous support requests (login required to access previous support requests).
3. Contact an Intel support representative using one of the support phone numbers available at https://www.intel.com/content/www/us/en/support/contact-support.html (charges may apply).

Intel also offers Intel® Partner Alliance program members around-the-clock 24x7 technical phone support on Intel server boards, server chassis, server RAID controller cards, and Intel® Server Management at https://www.intel.com/content/www/us/en/partner-alliance/overview.html.

Note: The 24x7 support number is available after logging in to the Intel Partner Alliance website.

Warranty Information

To obtain warranty information, visit http://www.intel.com/p/en_US/support/warranty.

Appendix B. System Integration, Service, and Usage Tips

This appendix provides a list of useful information that is unique to the Intel Server System M20NTP1UR and should be kept in mind when configuring, servicing, and using this server system.

- To prevent personal injury or damage to the system when performing any service where access to the inside of the chassis is necessary, ensure that all power cords are disconnected from the server before removing the top cover.
- The server system supports the 3rd Gen Intel Xeon Scalable processor family with a thermal design power (TDP) of up to and including 185 W. Previous generations of the Intel Xeon processor and Intel Xeon Scalable processor families are not supported.
- Processors must be installed in order. CPU 0 must be populated for the server board to operate.
- Riser Card #2 and all four PCIe SlimSAS connectors on the server board can only be used in dual processor configurations.
- The riser card slots are specifically designed to support riser cards only. Attempting to install a PCIe add-in card directly into a riser card slot on the server board may damage the add-in card, the server board, or both.
- For the best performance, the number of DDR4 DIMMs installed should be balanced across both processor sockets and memory channels.
- The system status LED is set to a steady amber color for all fatal errors that are detected during processor initialization. A steady amber system status LED indicates that an unrecoverable system failure condition has occurred.
- Make sure that the latest system software is loaded on the server. This includes system BIOS and BMC firmware. The latest system software can be downloaded from http://downloadcenter.intel.com.
- To ensure LED support for installed NVMe drives, a communication cable must be routed from the server board to the backplane. See Figure 53.
- Intel accessory kits for trusted platform module (TPM) **JNPTPM** and **JNPTPMCH** are not compatible with Microsoft Windows Server 2022.
- Tri-mode storage and RAID PCIe add-in cards are not supported for NVMe SSD configurations. For NVMe SSD support, use the four onboard PCIe SlimSAS connectors.
- Cables necessary to support NVMe SSDs can be obtained by ordering the following Intel accessory cable kit: **NTPCBLSL104K**.

Appendix C. Thermal Compatibility

The Intel Server System M20NTP1UR is designed to operate at ambient temperatures between 10–35° C for most system configurations. Support for some system configuration options may require a lower maximum ambient temperature for the system to continue operating with best reliability and performance when exposed to the highest supported ambient temperature.

The following table identifies the maximum supported ambient temperature supported when the system is configured with a specified configuration option. A system configured with two power supplies supports fan redundancy. When a system fan fails, the remaining system fans are still capable of providing enough airflow to keep the system operating. However, in a fan failed condition, processor and memory throttling may occur, impacting system performance until the faulty fan is replaced. Should a processor surpass is upper critical thermal limit, the system will shut down.

All configuration options for the Intel Server System M20NTP1UR are listed in the following table. Moving right along the table for each option shows their support for the specified ambient temperature. All cells will show one of three support classifications:

- A cell with a bullet (●) indicates full support without limitation.
- A cell with a 1 (one) or more numbers indicates conditional support, where each number references a specific support note that is listed before the table.
- A blank cell indicates that the configuration is not supported, where the system is not capable of providing enough airflow to prevent a component or system failure.

The following notes define conditional support for specific system configurations. Conditional support only applies to configuration options that reference the specific note within the table.

Configuration Support Notes:

1. Any configuration specified with a constrained maximum ambient (less than 35C) is limited to maximum altitude of 900m. Altitudes higher than 900m require the ambient to be de-rated an additional 1C per 300m above 900m.
2. Processor and memory throttling may occur with systems operating ≦10 °C over the specified ambient temperature. System performance will be impacted should throttling occur, but the system will not shut down.
3. SSD Throughput throttling is expected when the SSD SMART thermal sensor exceeds 70 °C.
4. M.2 drives are limited to operating system and boot only and may see performance impact under heavy workload.

Table 24. Thermal Configuration Matrix – M20NTP1U304 – 3.5" and 2.5" Drive Configurations

Intel® Server System M20NTP1UR Thermal Config Matrix for Normal Fan Operation		Base System: 2.5" SSD Configuration						Base System: 3.5" HDD Configuration					
ASHRAE (see Note 1)	Classifications				27C	A1	A2				27C	A1	A2
	Max Ambient	15 °C	20 °C	25 °C	27 °C	32 °C	35 °C	15 °C	20 °C	25 °C	27 °C	32 °C	35 °C
PSU	Acbel R18A2751A	●	●	●	●	●	●	●	●	●	●	●	●
3rd Gen Intel® Xeon® Scalable Processor support	185W, 26 Core, Gold 5320	●	●	●	●	2	2	●	●	●	●	2	2
	165W, 24 Core, Gold 5318S	●	●	●	●	●	●	●	●	●	●	●	●
	165W, 24 Core, Gold 5318Y	●	●	●	●	●	●	●	●	●	●	●	●
	150W, 12 Core, Gold 5317	●	●	●	●	●	●	●	●	●	●	●	●
	150W, 24 Core, Gold 5318N	●	●	●	●	●	●	●	●	●	●	●	●
	150W, 20 Core, Gold 5320T	●	●	●	●	2	2	●	●	●	●	2	2
	150W, 20 Core, Silver 4316	●	●	●	●	●	●	●	●	●	●	●	●
	140W, 8 Core, Gold 5315Y	●	●	●	●	●	●	●	●	●	●	●	●
	135W, 16 Core, Silver 4314	●	●	●	●	●	●	●	●	●	●	●	●
	120W, 12 Core, Silver 4310	●	●	●	●	●	●	●	●	●	●	●	●
	105W, 8 Core, Silver 4309Y	●	●	●	●	●	●	●	●	●	●	●	●
	105W, 10 Core, Silver 4310T	●	●	●	●	●	●	●	●	●	●	●	●
DDR4 DIMM Support	LRDIMM QRx4 (16Gb) – 2DPC 13w	●	●	●	●	2	2	●	●	●	2	2	
	LR-DIMM 8Rx4 – 2DPC 16w	●	2					2	2				
	LRDIMM QRx4 – 2DPC 12w	●	●	●	●	●	2	●	●	●	●	2	2
	RDIMM-DRx4 – 2DPC 7w	●	●	●	●	●	●	●	●	●	●	●	●
	RDIMM-DRx8 – 2DPC 4w	●	●	●	●	●	●	●	●	●	●	●	●
	RDIMM SRx4 – 2DPC 5w	●	●	●	●	●	●	●	●	●	●	●	●
	RDIMM SRx8 – 2DPC 3w	●	●	●	●	●	●	●	●	●	●	●	●
PCIe* Add-in Cards	PCIe Riser 1 (R) – 100LFM	●	●	●	●	●	●	●	●	●	●	●	●
	PCIe Riser 1 (R) – 200LFM	●	●	●	●	●	●	●	●	●	●	●	●
	PCIe Riser 1 (R) – 300LFM	●	●	●	●	●		●	●	●	●	●	
	PCIe Riser 2 (L) – 100LFM	●	●	●	●	●	●	●	●	●	●	●	●
	PCIe Riser 2 (L) – 200LFM	●	●	●	●	●	●	●	●	●	●	●	●
	PCIe Riser 2 (L) – 300LFM	●	●	●	●	●		●	●	●	●	●	●
M.2 SSD (rated to 70C) (see Note 4)	SSD DC P4801X	●	●	●	●	3	3	●	●	●	●	3	3
	XG6	●	●	●	●	●	●	●	●	●	●	●	●
2.5" NVMe* SSD	TDP=25 W	●	●	●	●	3	3	NA	NA	NA	NA	NA	NA
	TDP = 20W	●	●	●	●	●	●	NA	NA	NA	NA	NA	NA
	P4800X (TDP = 18W)	●	●	●	●	●	●	NA	NA	NA	NA	NA	NA
3.5" SAS HDD	Exos X16 (TDP=15 W)	NA	NA	NA	NA	NA	NA	●	●	●	●	●	●
OCP 2.0	ASIC (DAC)	●	●	●	●	●		●	●	●	●		
	SR Optic	●	●	●	●	●		●	●	●	●		

Appendix D. Statement of Volatility

The tables in this section are used to identify the volatile and non-volatile memory components for system boards used within the Intel Server System M20NTP1UR.

The tables provide the following data for each identified component.

- **Component type**: Three types of components are on the server board assembly:
  - **Non-volatile**: Non-volatile memory is persistent and is not cleared when power is removed from the system. Non-volatile memory must be erased to clear data. The exact method of clearing these areas varies by the specific component. Some areas are required for normal operation of the server, and clearing these areas may render the server board inoperable.
  - **Volatile**: Volatile memory is cleared automatically when power is removed from the system.
  - **Battery powered RAM**: Battery powered RAM is similar to volatile memory but is powered by a battery on the server board. Data in battery powered RAM is persistent until the battery is removed from the server board.
- **Size**: Size of each component in bits, kilobits (Kb), megabits (Mb), bytes, kilobytes (KB), or megabytes (MB).
- **Board Location**: Board location is the physical location of each component corresponding to information on the server board silkscreen.
- **User Data**: The flash components on the server boards do not store user data from the operating system. No operating system level data is retained in any listed components after AC power is removed. The persistence of information written to each component is determined by its type as described in the table.

  Each component stores data specific to its function. Some components may contain passwords that provide access to that device's configuration or functionality. These passwords are specific to the device and are unique and unrelated to operating system passwords. The specific components that may contain password data are:
  - **BIOS**: The server board's basic input/output system (BIOS) provides the capability to prevent unauthorized users from configuring BIOS settings when a BIOS password is set. This password is stored in BIOS flash and is only used to set BIOS configuration access restrictions.
  - **BMC**: The server boards support an Intelligent Platform Management Interface (IPMI) 2.0 conformant baseboard management controller (BMC). The BMC provides health monitoring, alerting, and remote power control capabilities for the Intel server board. The BMC does not have access to operating system level data.

    The BMC supports the capability for remote software to connect over the network to perform health monitoring and power control. This access can be configured to require authentication by a password. If configured, the BMC maintains user passwords to control this access. These passwords are stored in the BMC flash.

The Intel Server System M20NTP1UR includes several components that can be used to store data. A list of those components is included in the following tables.

Table 25. SOV – Server Board Components

Component	Size	Board location	User Data	Name
Non-Volatile	32 MB	BIOS_SPI1	Yes	BIOS Flash
Non-Volatile	64 MB	BMC_SPI1	Yes	BMC FW
Non-Volatile	4 MB	U396	No	LAN1 EEPROM Flash
Non-Volatile	4 MB	U398	No	LAN2 EEPROM Flash
Volatile	4 Gb	BMC_MEM1	No	BMC Firmware SDRAM

Table 26. SOV – 1-Slot PCIe* Riser Card

Component	Size	Board Location	User Data	Name
N/A	N/A	None	No	N/A

Table 27. SOV – Front Panel Board

Component	Size	Board Location	User Data	Name
Non-Volatile	256x8	U3	Yes	FRU

Table 28. SOV – 4 x 3.5" Hot Swap Backplane Board

Component	Size	Board Location	User Data	Name
Non-Volatile	256x8	U12	Yes	FRU
Non-Volatile	N/A	U2	No	CPLD

Appendix E. Product Regulatory Information

This product has been evaluated and certified as Information Technology Equipment (ITE), which may be installed in offices, schools, computer rooms, and similar commercial type locations. The suitability of this product for other product certification categories and/or environments (such as: medical, industrial, telecommunications, NEBS, residential, alarm systems, test equipment, and so on), other than an ITE application, requires further evaluation and may require additional regulatory approvals.

Intel has verified that all L3, L6, and L9 server products **as configured and sold by Intel** to its customers comply with the requirements for all regulatory certifications defined in the following table. It is the Intel customer's responsibility to ensure that their final server system configurations are tested and certified to meet the regulatory requirements for the countries to which they plan to ship and or deploy server systems into.

Notes:

- An L9 system configuration is a power-on ready server system with no operating system installed.
- An L6 system configuration requires installation of additional components to make it power-on ready.
- The L3 are component building block options that require integration into a chassis to create a functional server system.

	Intel® Server System M20NTP1UR	Notes
	"North Pass"	Intel project code name.
	L6 System	Product integration level.
	M20NTP	Product family identified on certification.
Regulatory Certification		
Australia and New Zealand ACMA DoC	✓	
Canada ICES – 003 Certification	✓	
CB Certification and Report (International – report to include all CB country national deviations)	✓	
China CCC certification	○	
CU Certification and DoC (Russia / Belarus / Kazakhstan)	✓	
Europe CE DoC	✓	
FCC Part 15 Emissions Verification (USA)	✓	
Germany GS Certification	✓	
India BIS Certification	○	
International Compliance – CISPR32 and CISPR35	✓	
Japan VCCI Certification	✓	
Korea KC Certification	✓	
Mexico NOM Certification	✓	
NRTL Certification (USA and Canada)	✓	
South Africa Certification	✓	
Taiwan BSMI Certification and DoC	✓	
United Kingdom UKCA DoC	✓	
Ukraine Certification	✓	

Table Key

Not Tested / Not Certified	○
Tested / Certified – Limited OEM SKUs only	●
Testing / Certification (Planned)	(Date)
Tested / Certified	✓

EU Directive 2019/424 (Lot 9)

Beginning on March 1, 2020, an additional component of the European Union (EU) regulatory CE marking scheme, identified as EU Directive 2019/424 (Lot 9), is in effect. After this date, all new server systems shipped into or deployed within the EU must meet the full CE marking requirements including those defined by the additional EU Lot 9 regulations.

Intel has verified that all L3, L6, and L9 server products **as configured and sold by Intel** to its customers comply with the full CE regulatory requirements for the given product type, including those defined by EU Lot 9. It is the Intel customer's responsibility to ensure that their final server system configurations are SPEC* SERT* tested and meet the new CE regulatory requirements.

Note: An L9 system configuration is a power-on ready server system with NO operating system installed. An L6 system configuration requires additional components to be installed to make it power-on ready. The L3 are component building block options that require integration into a chassis to create a functional server system.

Visit the following website for additional EU Directive 2019/424 (Lot9) information:

https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32019R0424

In compliance with the EU Directive 2019/424 (Lot 9) materials efficiency requirements, Intel makes available all necessary product collaterals as identified in the following list:

- **System Disassembly Instructions**
  - *Intel® Server System M20NTP1UR Integration and Service Guide*
    Links: https://www.intel.com/content/dam/support/us/en/documents/server-products/M20NTP1UR-ServiceGuide.pdf
    https://www.intel.com/content/dam/support/us/en/documents/server-products/M20NTP-Family-Config-Guide.pdf
- **Product Specifications**
  - *Intel® Server System M20NTP1UR Technical Product Specification* (this document)
    Link: https://www.intel.com/content/www/us/en/support/articles/000089953/server-products/server-boards.html
  - *Intel® Server Board M20NTP2SB Technical Product Specification*
    Link: https://www.intel.com/content/dam/support/us/en/documents/server-products/server-boards/m20ntp2sb-server-board-tps.pdf
- **System BIOS/Firmware and Security Updates – Intel® Server M20NTP Family**
  - System Update Package (SUP) – UEFI only
    http://downloadcenter.intel.com
- **Intel® Solid State Drive (SSD) Secure Data Deletion and Firmware Updates**
  Note: For system configurations that may be configured with an Intel® SSD
  Intel® Solid State Drive Toolbox
  https://downloadcenter.intel.com/product/35125/Memory-and-Storage
- **Intel® RAID Controller Firmware Updates and other support collaterals**
  Note: For system configurations that may be configured with an Intel® RAID controller
  https://www.intel.com/content/www/us/en/support/products/43732/server-products/raid-products.html

EU Lot 9 Support Summary – M201111UR – Intel® Server System M201111UR Family (North Pass)

Disclaimer: The information contained within this document is for reference only and is intended to provide customers with a template to report information needed for (EU) 2019/424 (Lot 9) server conformity assessment. The information provided herein does not represent any final shipping server system test results, and customer's actual test results for shipping server configurations may differ from this list. Use of this information is at the sole risk of the user, and Intel assumes no responsibility for customers' server system level regulation compliance with EU 2019/424 (Lot 9).

<table>
<tr><th colspan="2">Product Information</th></tr>
<tr><td>Product type</td><td>Server</td></tr>
<tr><td>Manufacturer name</td><td>Intel Corporation</td></tr>
<tr><td>Registered trade name and address</td><td>Intel
2200 Mission College Blvd., Santa Clara, CA 95054-1594, USA</td></tr>
<tr><td>Product model number and model numbers for low end performance and high-end performance configure if applicable</td><td>M201111UR</td></tr>
<tr><td>Year of manufacture</td><td>2022</td></tr>
<tr><td>PSU efficiency at 10%, 20%, 50%, and 100% of rated output power</td><td>Acbel Polytech, Inc. Model – R1BA2751A, 750 W
<table>
<tr><th rowspan="2">Compliant with 80 PLUS*</th><th>Loading</th><th>100%</th><th>50%</th><th>20%</th><th>10%</th></tr>
<tr><td>Minimum efficiency</td><td>92.63%</td><td>94.46%</td><td>92.85%</td><td>84.8%</td></tr>
</table></td></tr>
<tr><td>PSU factor at 50% of rated load level</td><td>0.99</td></tr>
<tr><td>PSU rated power output
(server only)</td><td>750 W</td></tr>
<tr><td>Idle state power (server only)
(Watts)</td><td>Refer to the following table</td></tr>
<tr><td>List of all components for additional idle power allowances (server only)</td><td>Refer to the following table</td></tr>
<tr><td>Maximum power (server only)</td><td>Refer to the following table</td></tr>
<tr><td>Declared operating condition class</td><td>ASHRAE Class A2 – Continuous Operation. 10 °C – 35 °C (50 °F – 95 °F) with the maximum rate of change not to exceed 10 °C per hour
<table>
<tr><th>Parameter</th><th>Support Limits</th></tr>
<tr><td>Operating Temperature</td><td>+10 °C to +35 °C with the maximum rate of change not to exceed 10 °C per hour</td></tr>
<tr><td>Non-Operating Temperature</td><td>-40 °C to +70 °C</td></tr>
<tr><td>Non-Operating Humidity</td><td>90%, non-condensing at 35 °C</td></tr>
</table></td></tr>
<tr><td>Idle state power (Watts) at the higher boundary temperature (server only)</td><td>Refer to the following table</td></tr>
<tr><td>the active state efficiency and the performance in active state of the server (server only)</td><td>Refer to the following table</td></tr>
<tr><td>Information on the secure data deletion functionality</td><td>Refer to the following table</td></tr>
<tr><td>For blade server, a list of recommended combinations with compatible chassis (server only)</td><td>Not applicable</td></tr>
<tr><td>If product model is part of a server product family, a list of all model configurations that are represented by the model shall be supplied (server only)</td><td>Not applicable</td></tr>
</table>

Energy Efficiency Data of Intel® Server System M20NTP1UR – 1 (Single) Processor Installed Configurations

Configuration			1-CPU Low-End	1-CPU High-End
Details	Chassis	Model	Intel® Server System M20NTP1UR	Intel® Server System M20NTP1UR
	Node	Quantity		
		Model		
	CPU	Quantity	1	1
		Model	Intel® Xeon® Silver 4309Y 8C	Intel® Xeon® Platinum 8352Y 32C
	Memory	Quantity	8	8
		Capacity per DIMM (GB)	8	64
		Total memory amount (GB)	64	512
	SSD	SSD quantity	2	2
	PSU	Quantity	2	2
		Model	Acbel*, FSG020-00AG	Acbel, FSG020-00AG
	FW		**BIOS:** SE5C620.86B.0010.D01.2110220801 **BMC:** 00.13.84bc **FRU:** Factory flash FRUSDR	**BIOS:** SE5C620.86B.0010.D01.2110220801 **BMC:** 00.13.84bc **FRU:** Factory flash FRUSDR
Measured and Calculated Server Allowance	P base		25	25
	Additional CPU		46.1	140.7
	Additional power supply		0	0
	Storage devices		10	10
	Additional memory		10.8	91.44
	Additional I/O device (10Gx 15 W / 2 port on MB)		0	0
	Perf CPU		4.61	14.07
Limits/ Results	Idle power allowances (W)		91.9	267.1
	Idle power tested (W) per node		**78.0**	**109.6**
	Minimum Eff_{ACTIVE}		9	9
	Eff_{ACTIVE} tested		**22.4**	**50.7**
Other Tests Results	Idle power at higher temperature (per node) at 35 °C		101.8	139.8
	Maximum power (per node)		251	369.7

Energy Efficiency Data of Intel® Server System M20NTP1UR – 2 (Dual) Processor Installed Configuration

Configuration			2-CPU Low-end	2-CPU High-end
Details	Chassis	Model	Intel® Server System M20NTP1UR	Intel® Server System M20NTP1UR
	Node	Quantity		
		Model		
	CPU	Quantity	2	2
		Model	Intel® Xeon® Silver 4309Y 8c	Intel® Xeon® Platinum 8352Y 32C
	Memory	Quantity	16	16
		Capacity per DIMM (GB)	8	64
		Total memory amount (GB)	128	1024
	SSD	SSD quantity	2	2
	PSU	Quantity	1	1
		Model	Acbel, FSG020-00AG	Acbel, FSG020-00AG
	FW		**BIOS:** SE5C620.86B.0010.D01.2110220801 **BMC:** 00.13.84bc **FRU:** Factory flash FRUSDR	**BIOS:** SE5C620.86B.0010.D01.2110220801 **BMC:** 00.13.84bc **FRU:** Factory flash FRUSDR
Measured and Calculated Server Allowance	P base		38	38
	Additional CPU		59.3	192.7
	Additional power supply		0	0
	Storage devices		10	10
	Additional memory		22.32	183.6
	Additional I/O device (10Gx 15 W / 2 port on MB)		0	0
	Perfcpu		8.47	27.53
Limits/ Results	Idle power allowances (W)		129.6	424.3
	Idle power tested (W) per node		**127.1**	**148.4**
	Minimum Eff_{ACTIVE}		9.5	9.5
	Eff_{ACTIVE} tested		**31.6**	**57.4**
Other Tests Results	Idle power at higher temperature (per node) at 35 °C		205.5	226.8
	Max power (per node)		367.7	689.6

Other Information

Chemical Declaration
• Neodymium Not Applicable. (No HDD offered by Intel). • Cobalt Not Applicable. (No BBUs. Coin battery is out of scope).

Appendix F. Glossary

Term	Definition
ACPI	Advanced Configuration and Power Interface
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers
AVB	Audio-video bridging
BMC	Baseboard management controller
BIOS	Basic input/output system
CMOS	Complementary metal-oxide-semiconductor
CPU	Central processing unit
Intel® DCB	Intel® Data Center Block
Intel® DCM	Intel® Data Center Manager
DDR4	Double data rate 4
DIMM	Dual In-line memory module
DMA	Direct memory access
ECC	Error-correcting code
EDS	External design specification
EEPROM	Electrically erasable programmable read-only memory
FRU	Field replaceable unit
GPIO	General purpose input/output
GUI	Graphical user interface
I²C	Inter-integrated circuit bus
IIO	Integrated input/output
iPC	Intel Product Code
IPMI	Intelligent Platform Management Interface
ISTA	International safe transit association
LED	Light emitting diode
LFM	Linear feet per minute – airflow measurement
LRDIMM	Load reduced DIMM
MMIO	Memory-mapped I/O
NTB	Non-transparent bridge
NVMe*	Non-Volatile Memory Express* is an optimized, high-performance scalable storage interface designed to address the needs of enterprise systems that use PCIe-based solid-state storage. NVMe provides efficient access to non-volatile memory storage devices. NVMe allows host hardware and software to take advantage of the levels of parallelism possible in modern SSDs.
OEM	Original equipment manufacturer
OCP*	Open compute project
OCP	Overcurrent protection
Intel® OPA	Intel® Omni-Path Architecture
OTP	Over-temperature protection
OVP	Over-voltage protection
PCH	Platform controller hub
PCI	Peripheral Component Interconnect
PCIe*	Peripheral Component Interconnect Express*
POST	Power-on self-test
PSoC*	Programmable System-on-Chip*
PSU	Power supply unit
QR	Quad rank
RAID	Redundant array of independent disks
RAM	Random access memory
RDIMM	Registered DIMM
RESTful	Representational State Transfer
ROC	RAID on chip
SAS	Serial Attached SCSI
SATA	Serial Advanced Technology Attachment
Intel® SDP Tool	Intel® Server Debug and Provisioning Tool
SEL	System event log
SCSI	Small Computer System Interface

Term	Definition
SDR	Sensor data record
SFF	Small form factor
SGPIO	Serial general purpose input/output
Intel® SGX	Intel® Software Guard Extensions
SMBus	System management bus
SMP	Server management processor
SR	Single rank
SR-IOV	Single root I/O virtualization
SSD	Solid state device
TDP	Thermal design power
Intel® TME	Intel® Total Memory Encryption
TPM	Trusted platform module
TPS	Technical product specification
Intel® TXT	Intel® Trusted Execution Technology
UEFI	Unified Extensible Firmware Interface
Intel® UPI	Intel® Ultra Path Interconnect
VLSI	Very large scale integration
VSB	Voltage standby
Intel® VROC	Intel® Virtual RAID on CPU