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NEC Express5800/D120h
System Configuration Guide



Introduction

This document contains product and configuration information that will enable you to configure your system. The guide will ensure fast and proper configuration of your NEC Express5800 server.

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Technical Specification

Specification

Server Module (1/2)

Model		D120h	
		1U Server Module	2U Server Module
Part Number		N8100-2553F	N8100-2554F
Processor	Type	Intel® Xeon® Processor Bronze 3104 (1.70 GHz, 6C/6T, 8.25MB) Bronze 3106 (1.70 GHz, 8C/8T, 11MB) Silver 4108 (1.80 GHz, 8C/16T, 11MB) Silver 4110 (2.10 GHz, 8C/16T, 11MB) Silver 4114 (2.20 GHz, 10C/20T, 13.75MB) Silver 4116 (2.10 GHz, 12C/24T, 16.50MB) Gold 5118 (2.30 GHz, 12C/24T, 16.50MB) Gold 5120 (2.20 GHz, 14C/28T, 19.25MB) Gold 5122 (3.60 GHz, 4C/8T, 16.50MB) Gold 6130 (2.10 GHz, 16C/32T, 22MB) Gold 6132 (2.60 GHz, 14C/28T, 19.25MB) Gold 6134 (3.20 GHz, 8C/16T, 24.75MB) Gold 6138 (2GHz, 20C/40T, 27.50MB) Gold 6140 (2.30 GHz, 18C/36T, 24.75MB) Gold 6142 (2.60 GHz, 16C/32T, 22MB) Gold 6152 (2.10 GHz, 22C/44T, 30.25MB) Platinum 8160 (2.10 GHz, 24C/48T, 33MB) Platinum 8164 (2GHz, 26C/52T, 35.75MB) Platinum 8160M (2.10 GHz, 24C/48T, 33MB)	
	Number of Processors	1 or 2	
Chipset		Intel® C621 Chipset	
Memory	Type	DDR4-2666 Registered DIMM (8/16/32GB) DDR4-2666 TSV Registered DIMM (64GB/128GB)	
	Standard Capacity	0 GB	
	Maximum Capacity	2TB (16x 128GB) [Platinum 8160M only] 1.5TB (12x 128GB) [Others]	
	Memory protection	ECC, x4/x8 SDDC, DDDC	
Internal Storage	Drive Cage	-	
	Disk Controller	SATA : 6Gb/s, RAID 0/1/5/6/10/50/60 (Optional) SAS: 12 Gb/s, RAID 0/1/5/6/10/50/60 (Optional)	
Expansion Slot		Total: 3 slots available 1 PCIe 3.0 x16 (x16 connector) 1 PCIe 3.0 x8 (x8 connector) 1 PCIe 3.0 x16 for a LAN mezzanine card	Total: 4 slots available 1 PCIe 3.0 x16 (x16 connector) 1 PCIe 3.0 x8 (x8 connector) 1 PCIe 3.0 x16 for a LAN mezzanine card 1 PCIe 3.0 x16 for GPU card
Video	Controller (VRAM)	Integrated in Server Management Controller (32MB)	
	Resolution	1920 x 1200 / 16.7M	
Interfaces	Rear	1x VGA (15-pin mini D-sub), 2x USB3.0, 2x 10GBASE-T LAN connector (RJ-45), 1x 1000BASE-T LAN connector for Management (RJ-45)	
Power Consumption	Minimum	607 W	984 W
Heat Dissipation	Minimum	2,186 kj/h	3,543 kj/h
Dimension (W x D x H)		171.6 × 547.5 × 40.6 mm 6.76 x 21.6 x 1.60 in	171.6 × 547.5 × 81.5 mm 6.76 x 21.6 x 3.21 in
Weight	Minimum	3.3 kg	4.2 kg
	Maximum	4.2 kg	6.7 kg
Temperature, Relative Humidity (non-condensing)		Operating: 10° to 35°C / 50° to 95°F, 20 to 80% Non-operating: -10° to 55°C / 14° to 131°F, 20 to 80%	
Regulatory and Safety		FCC, CE, UL, CB, RoHS, WEEE	
Operating Systems		Microsoft® Windows Server® 2012 R2 Standard Microsoft® Windows Server® 2012 R2 Datacenter Microsoft® Windows Server® 2016 Standard Microsoft® Windows Server® 2016 Datacenter	

Model	D120h
	Red Hat Enterprise Linux 7.3 or later [1] VMware ESXi 6.0 Update 3 VMware ESXi 6.5 Update 1

[1] For Linux support, please contact your sales representative or go to the NEC website at: **http://www.nec.com/global/prod/express/linux/index.html**

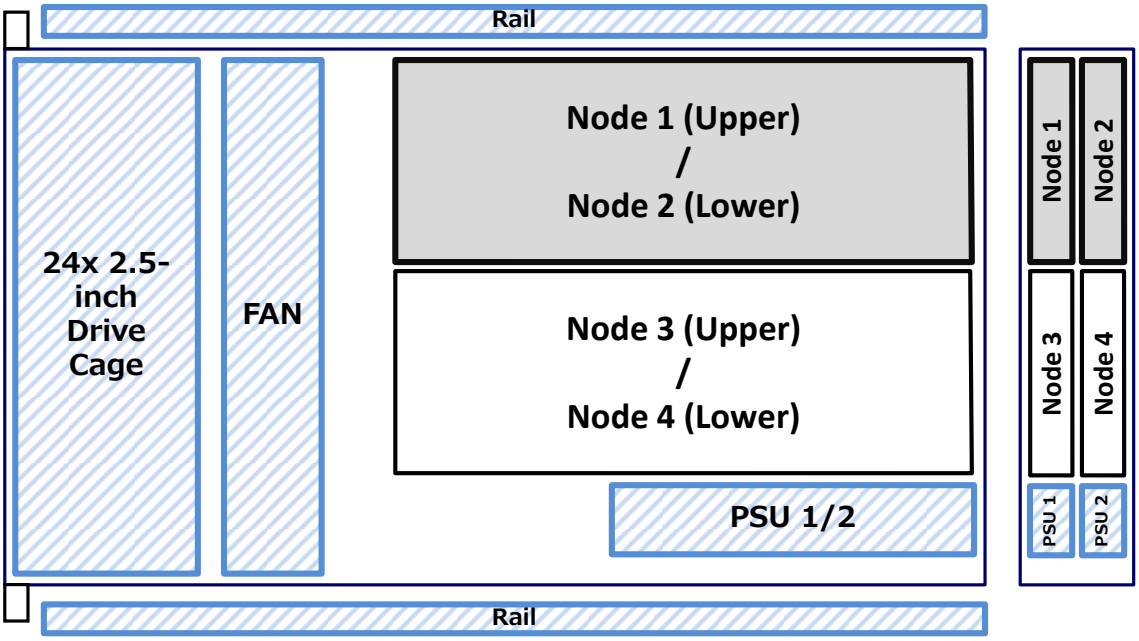
Module Enclosure

Model		D120h		
		1U Module Enclosure (1300W PSU model)	**1U Module Enclosure (2200W PSU model)**	**2U Module Enclosure (2200W PSU model)**
Part Number		N8141-83F (for Embedded SATA) N8141-92F (for RAID / SAS HBA)	N8141-84F (for Embedded SATA) N8141-93F (for RAID / SAS HBA)	N8141-91F (for Embedded SATA) N8141-94F (for RAID / SAS HBA)
Server Module Bays		4	4	2
Internal Storage	**Drive Bays**	24 (6x 2.5-inch SAS/SATA drive)		
	Standard	0GB		
	Maximum	SATA HDD: 48TB (24x 2TB) SAS HDD: 43.2TB (24x 1.8TB) SATA SSD: 46.08TB (24x 1.92TB) SAS SSD: 9.6TB (24x 400GB)		
PSU Bays		2		
Redundant Fan		Standard		
Redundant PSU		Standard, Hot-plug		
PSU		2x 1,300 Watt 80 PLUS® Platinum certified hot-plug PSU 100-240 VAC ± 10% 50 / 60 Hz ± 3Hz	2 x 2,200 Watt 80 PLUS® Platinum certified hot-plug PSU 100-240 VAC ± 10% 50 / 60 Hz ± 3 Hz	2 x 2,200 Watt 80 PLUS® Platinum certified hot-plug PSU 200-240 VAC ± 10% 50 / 60 Hz ± 3 Hz
Power Consumption		100VAC: 1177VA / 1165W 200VAC: 1494VA / 1479W	100VAC: 2369VA / 2322W 200VAC: 3159VA / 3096W	200VAC: 2637VA / 2584W
Heat Dissipation		100VAC: 4194 kJ/h 200VAC: 5325 kJ/h	100VAC: 8360 kJ/h 200VAC: 11146 kJ/h	200VAC: 9,303 kJ/h
Acoustic Noise	**Idle / Max.**	55.0 dB / 76.0 dB	55.0 dB / 76.0 dB	55.0 dB / 76.0 dB
Dimensions (W x D x H)		440.0 x 820.0 x 87.5 mm / 485.0 x 820.0 x 87.5 mm w/ mount ear 17.3 x 32.3 x 3.4 in / 19.1 x 32.3 x 3.4 in w/ mount ear		
Weight	**Maximum**	21.0 kg / 46.3 lbs	22.0 kg / 48.5 lbs	22.0 kg / 48.5 lbs
Weight	**Minimum**	37.8 kg / 83.3 lbs	39.0 kg / 86.0 lbs	35.0 kg / 77.2 lbs
Temperature, Relative Humidity (non-condensing)		Operating: 10° to 35°C / 50° to 95°F, 20 to 80% Non-operating: -10° to 55°C / 14° to 131°F, 20 to 80%		
Regulatory and Safety		FCC, CE, UL, CB, RoHS, WEEE		

Configuration Diagram

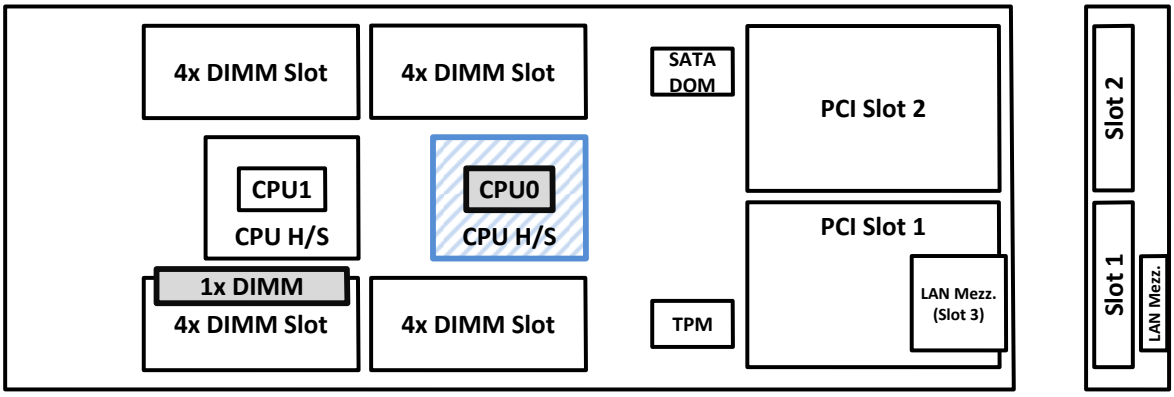
Configuration Diagram is the useful tool for configure D120h. This diagram shows three components. One is the standard components, second is the selectable components, and last is the optional components. For example of 1U Module Enclosure, drive cage, fan, rail and PSU is the standard component which has been already installed into 1U Module Enclosure. All you have to do is purchase two nodes (Server Modules) which is the selectable components. In addition, the rest, you can install more two nodes (server modules) as you need.

Module Enclosure (1U)



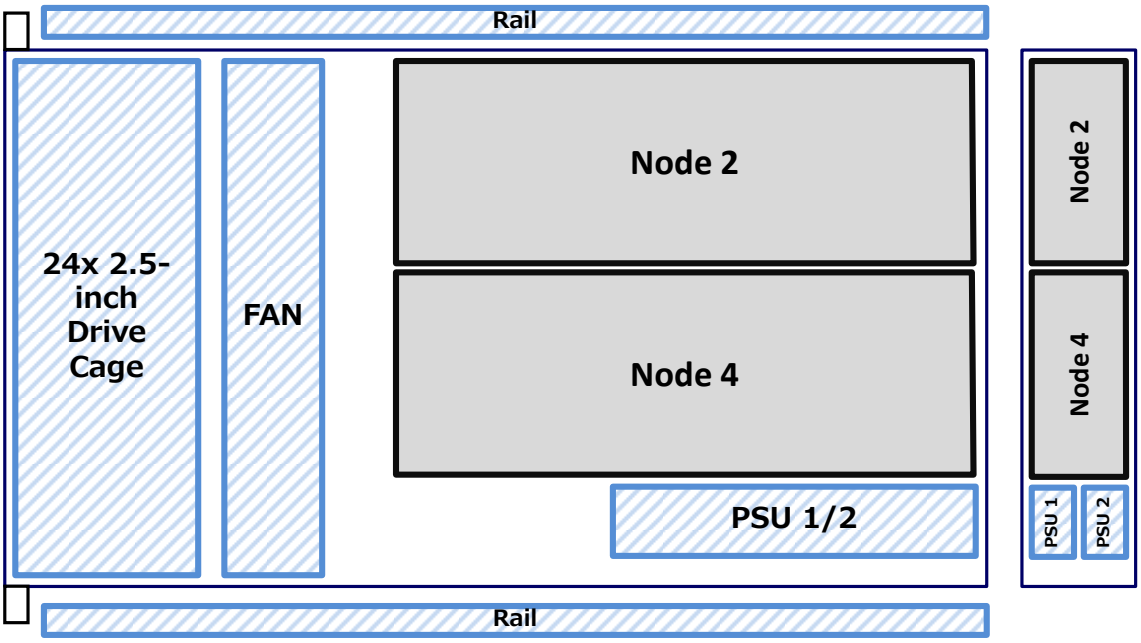
Legend: Standard Components Minimum required components Optional components

1U Server Module



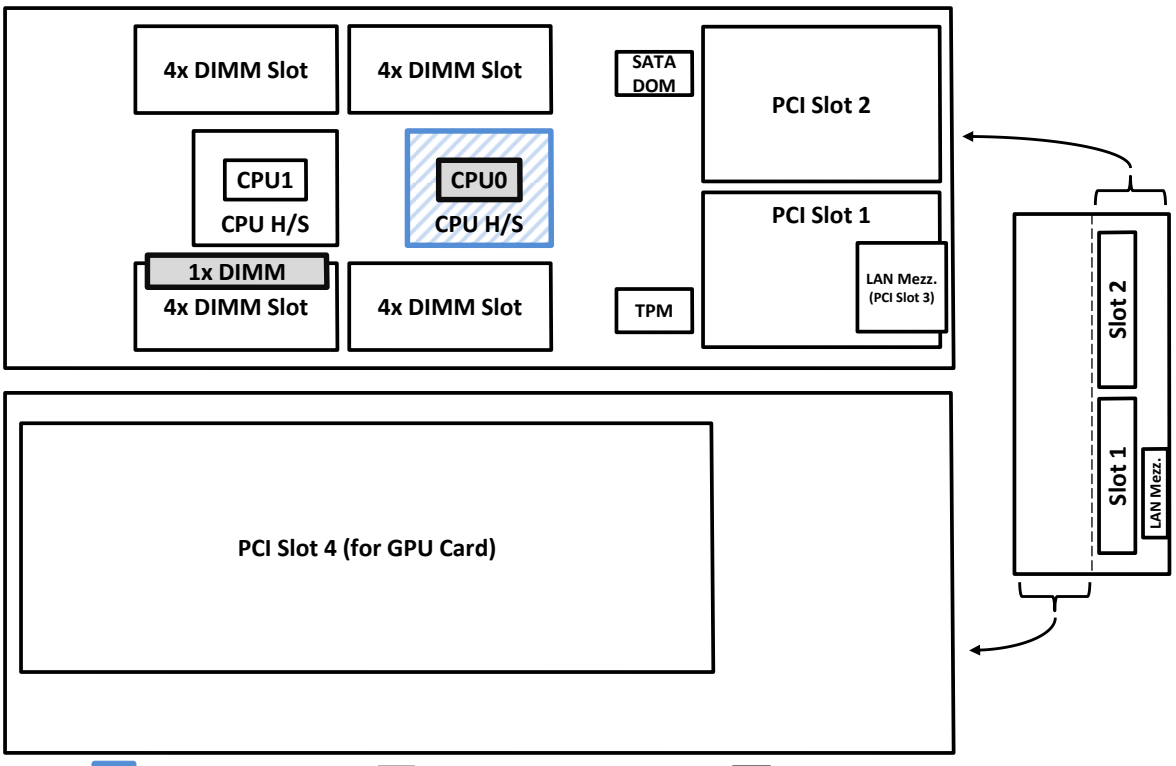
Legend: Standard Components Minimum required components Optional components

Module Enclosure (2U)



Legend: Standard Components Minimum required components Optional components

2U Server Module



Legend: Standard Components Minimum required components Optional components

Server Configuration

1 Maximum Server Module Configuration

See the table below for the maximum server configuration based on processor configuration.
The condition for the maximum server configuration is defined when four servers with the same configuration are installed. For other server configurations, please consult your sales representative.

1.1 Module Enclosure (1U)

1.1.1 2200W PSU Configuration

100VAC Input (with RAID controller, PCI card and LAN mezzanine)

Processor	# of processors	# of DIMMs (128GB TSV RDIMM)	# of drives (1.92TB SATA SSD)
Bronze 3104/3106	2CPUs	Up to 5 DIMMs	Up to 1 drive
		Up to 2 DIMMs	Up to 3 drives
Silver 4110/4114/4116 Gold 5122	2CPUs	Up to 4 DIMMs	Up to 1 drive
		Up to 2 DIMMs	Up to 2 drives
Silver 4108	2CPUs	Up to 3 DIMMs	Up to 1 drive
		Up to 2 DIMMs	Up to 2 drives
Gold 5118/5120	2CPUs	Up to 3 DIMMs	Up to 1 drive
Gold 6130/6138	1CPU	Up to 6 DIMMs	Up to 1 drive
		Up to 1 DIMM	Up to 4 drives
Gold 6132/6134/6140/6142/6152 Platinum 8160/8164/8160M	Not supported		

NOTE:
- Supported configuration depends on the kind of DIMMs, drives.
- Table above is just one example of configuration. For details, please contact your sales representative.
- Configurations which doesn't listed above table, please contact your sales representative.
- When PSU breaks down, processor may slow down in some configurations. For details, please contact your sales representative.

200VAC Input (with RAID controller, PCI card and LAN mezzanine)

Processor	# of processors	# of DIMMs (128GB TSV RDIMM)	# of drives (1.92TB SATA SSD)
Any processors	Any configurations		

NOTE:
- Up to six 128GB TSV RDIMM per processor except Xeon Platinum 8160M.
- When PSU breaks down, processor may slow down in some configurations. For details, please contact your sales representative.

1.1.2 1300W PSU Configuration

100VAC Input (with RAID controller, PCI card and LAN mezzanine)

Processor	# of processors	# of DIMMs (128GB TSV RDIMM)	# of drives (1.92TB SATA SSD)
Bronze 3104/3106, Silver 4108/4110/4114/4116, Gold 5118/5120/5122	Up to 3 server module with configuration limitation. For details, please contact your sales representative.		
Gold 6130/6132/6134/6138/ 6140/6142/6152, Platinum 8160/8164/8160M	Not supported		

200VAC Input (with RAID controller, PCI card and LAN mezzanine)

Processor	# of processors	# of DIMMs (128GB TSV RDIMM)	# of drives (1.92TB SATA SSD)
Bronze 3104/3106, Silver 4108/4110/4114/4116	1CPU	Up to 6 DIMMs	Up to 1 drive
		Up to 1 DIMM	Up to 4 drives
Gold 5118/5120/5122	1CPU	Up to 4 DIMMs	Up to 1 drive
		Up to 1 DIMM	Up to 2 drives
Gold 6130/6132/6134/6138/ 6140/ 6142/6152, Platinum 8160/8164/8160M	Not supported		

NOTE:
- Supported configuration depends on the kind of DIMMs, drives.
- Table above is just one example of configuration. For details, please contact your sales representative.
- Configurations which doesn't listed above table, please contact your sales representative.

1.2 Module Enclosure (2U)

1.2.1 2200W PSU Configuration

200VAC Input (with RAID controller, PCI card and LAN mezzanine)

Processor	# of processors	# of DIMMs (128GB TSV RDIMM)	# of drives (1.92TB SATA SSD)
Any processors	Any configurations		

NOTE:
- Supports 200VAC inlet only.
- When PSU breaks down, processor may slow down in some configurations. For details, please contact your sales representative.

2 Server Module Enclosure

2.1 Module Enclosure

Category	Product Name / Description	Part Number
Module Enclosure **For Embedded SATA Controller Configuration**	**NEC Module Enclosure (1U, 1300W PSU Model)** no Server Module, no Drive, no Power Cord Including : 2x 1300W Power Supply Unit, Slide Rail, EXPRESS BUILDER DVD	N8141-83F
	NEC Module Enclosure (1U, 2200W PSU Model) no Server Module, no Drive, no Power Cord Including : 2x 2200W Power Supply Unit, Slide Rail, EXPRESS BUILDER DVD	N8141-84F
	NEC Module Enclosure (2U, 2200W PSU Model) no Server Module, no Drive, no Power Cord Including : 2x 2200W Power Supply Unit, Slide Rail, EXPRESS BUILDER DVD **NOTE:** - Support 200VAC inlet only.	N8141-91F
Module Enclosure **For RAID Controller / SAS HBA Configuration**	**NEC Module Enclosure (1U, 1300W PSU Model)** no Server Module, no Drive, no Power Cord Including : 2x 1300W Power Supply Unit, Slide Rail, EXPRESS BUILDER DVD	N8141-92F
	NEC Module Enclosure (1U, 2200W PSU Model) no Server Module, no Drive, no Power Cord Including : 2x 2200W Power Supply Unit, Slide Rail, EXPRESS BUILDER DVD	N8141-93F
	NEC Module Enclosure (2U, 2200W PSU Model) no Server Module, no Drive, no Power Cord Including : 2x 2200W Power Supply Unit, Slide Rail, EXPRESS BUILDER DVD **NOTE:** - Support 200VAC inlet only.	N8141-94F

NOTE:
- Module enclosure has to be ordered with at least **two optional server modules**.

- Module enclosure P/N depends on internal drive configuration. Module enclosure for embedded SATA controller configuration [N8141-83F/-84F/-91F] supports module enclosure with embedded SATA controller configuration only. Others [N8141-92F/-93F/-94F] supports with RAID controller configuration or SAS HBA configuration only.
- When installing to 1U server module enclosure, up to four server modules can be installed.
- When installing to 2U server module enclosure, up to two server modules can be installed.
- Please connect CMC management LAN on module enclosure to management server or PC for monitoring cooling fan and PSU.
- Blank modules [N8141-85] must be installed into vacant module enclosure slots.
- Predecessor (ex. Express5800/E120f-M, E120g-M) server module can't install into server module enclosure.

2.2 Options for Server Module Enclosure

2.2.1 Blank Module

Product Name / Description	Part Number
Blank Module 1pc of filter module for Module Enclosure slots.	N8141-85

NOTE:

- Blank Module must be installed into vacant Module Enclosure slots.
- Blank Module is for 1U Module Enclosure [N8141-83F/-84F/-92F/-93F].

3 Server Module

Product Name / Description	Part Number
NEC Express5800/D120h 1U Server Module No processor, no RAM, no RAID Controller, no LAN mezzanine. Including: 1st processor (CPU 0) heat sink, Internal SATA Cable	N8100-2553F
NEC Express5800/D120h 2U Server Module No processor, no RAM, no RAID Controller, no LAN mezzanine Including: 1st processor (CPU 0) heat sink, SAS Expander, Internal SATA Cable, Power Cord for GPU Card(8Pin)	N8100-2554F

NOTE:

- The base model must be ordered with a processor kit and a memory kit.
- At least two server modules must be installed in module enclosure to configure D120h.
- Note for N8100-2553F, N8100-2554F
  - 1U server modules must be installed in N8141-83F, N8141-84F, N8141-92F or N8141-93F.
  - 2U server modules must be installed in N8141-91F or N8141-94F.

4 Processors and Heat Sink

Available sockets: 2

Category	Product Name / Description	Part Number
Bronze 3100	**Xeon Bronze 3104 Processor Kit** Intel® Xeon® Bronze 3104 (1.70 GHz, 6C/6T, 8.25MB, TDP 85W)	N8101-1092F
	Xeon Bronze 3106 Processor Kit Intel® Xeon® Bronze 3106 (1.70 GHz, 8C/8T, 11MB, TDP 85W)	N8101-1093F
Silver 4100	**Xeon Silver 4108 Processor Kit** Intel® Xeon® Silver 4108 (1.80 GHz, 8C/16T, 11MB, TDP 85W)	N8101-1094F
	Xeon Silver 4110 Processor Kit Intel® Xeon® Silver 4110 (2.10 GHz, 8C/16T, 11MB, TDP 85W)	N8101-1095F
	Xeon Silver 4114 Processor Kit Intel® Xeon® Silver 4114 (2.20 GHz, 10C/20T, 13.75MB, TDP 85W)	N8101-1096F
	Xeon Silver 4116 Processor Kit Intel® Xeon® Silver 4116 (2.10 GHz, 12C/24T, 16.5MB, TDP 85W)	N8101-1097F
Gold 5100	**Xeon Gold 5118 Processor Kit** Intel® Xeon® Gold 5118 (2.30 GHz, 12C/24T, 16.50MB, TDP 105W)	N8101-1098F
	Xeon Gold 5120 Processor Kit Intel® Xeon® Gold 5120 (2.20 GHz, 14C/28T, 19.25MB, TDP 105W)	N8101-1367F
	Xeon Gold 5122 Processor Kit Intel® Xeon® Gold 5122 (3.60 GHz, 4C/8T, 16.50MB, TDP 105W)	N8101-1368F
Gold 6100	**Xeon Gold 6130 Processor Kit** Intel® Xeon® Gold 6130 (2.10 GHz, 16C/32T, 22MB, TDP 125W) **NOTE:** - Not supported with 1300W PSU configuration.	N8101-1369F
	Xeon Gold 6132 Processor Kit Intel® Xeon® Gold 6132 (2.60 GHz, 14C/28T, 19.25MB, TDP 140W) **NOTE:** - Not supported with 2200W PSU configuration when the voltage of inlet is 100VAC. - Not supported with 1300W PSU configuration.	N8101-1370F
	Xeon Gold 6134 Processor Kit Intel® Xeon® Gold 6134 (3.20 GHz, 8C/16T, 24.75MB, TDP 130W) **NOTE:** - Not supported with 2200W PSU configuration when the voltage of inlet is 100VAC. - Not supported with 1300W PSU configuration.	N8101-1371F
	Xeon Gold 6138 Processor Kit Intel® Xeon® Gold 6138 (2.00 GHz, 20C/40T, 27.50MB, TDP 125W) **NOTE:** - Not supported with 1300W PSU configuration.	N8101-1372F
	Xeon Gold 6140 Processor Kit Intel® Xeon® Gold 6140 (2.30 GHz, 18C/36T, 24.75MB, TDP 140W) **NOTE:** - Not supported with 2200W PSU configuration when the voltage of inlet is 100VAC. - Not supported with 1300W PSU configuration.	N8101-1373F
	Xeon Gold 6142 Processor Kit Intel® Xeon® Gold 6142 (2.60 GHz, 16C/32T, 22MB, TDP 150W) **NOTE:** - Not supported with 2200W PSU configuration when the voltage of inlet is 100VAC. - Not supported with 1300W PSU configuration.	N8101-1374F
	Xeon Gold 6152 Processor Kit Intel® Xeon® Gold 6152 (2.10 GHz, 22C/44T, 30.25MB, TDP 140W) **NOTE:** - Not supported with 2200W PSU configuration when the voltage of inlet is 100VAC. - Not supported with 1300W PSU configuration.	N8101-1375F
Platinum 8100	**Xeon Platinum 8160 Processor Kit** Intel® Xeon® Platinum 8160 (2.10 GHz, 24C/48T, 33MB, TDP 150W) **NOTE:** - Not supported with 2200W PSU configuration when the voltage of inlet is 100VAC. - Not supported with 1300W PSU configuration.	N8101-1376F

	Xeon Platinum 8164 Processor Kit Intel® Xeon® Platinum 8164 (2.00 GHz, 26C/52T, 35.75MB, TDP 150W) **NOTE:** - Not supported with 2200W PSU configuration when the voltage of inlet is 100VAC. - Not supported with 1300W PSU configuration.	N8101-1377F
Platinum 8100 M	**Xeon Platinum 8160M Processor Kit** Intel® Xeon® Platinum 8160M (2.10 GHz, 24C/48T, 33MB, TDP 150W) **NOTE:** - The processor kit is make-to-order product. - Not supported with 2200W PSU configuration when the voltage of inlet is 100VAC. - Not supported with 1300W PSU configuration. - Support up to 1.5TB/Socket memory. (Others supports up to 768GB/socket memory.)	N8101-1378F
Heat Sink	**Processor Heat Sink** For 1st Processor	(Standard)
	Processor Heat Sink For 2nd Processor	N8101-1379F

NOTE:

- One processor kit from above must be installed.
- The processors must be the same to configure dual processor system.
- 2nd CPU is required when GPU was installed in 2U Server Module.
- The procedure is required which takes over fixed IP address in case of adding CPU for Windows Server 2012R2/2016 environment with N8104-149/N8104-170. Please refer “Precautions for using” attached to the product.

The maximum number of logical processors supported by OS

See the table below for the maximum number of logical processors that you can actually use on your system.

Operating Systems	Maximum Logical CPUs Supported by Operating Systems	Maximum Logical CPUs
Microsoft Windows Server 2012 R2 Standard Microsoft Windows Server 2012 R2 Datacenter	**640** [1]	**104**
Microsoft Windows Server 2016 Standard Microsoft Windows Server 2016 Datacenter	**640** [1]	**104**
Red Hat Enterprise Linux 7	**384**	**104**
VMware ESXi 6.0	**480**	**104**
VMware ESXi 6.5	**576**	**104**

[1] The maximum numbers of logical processors when using Hyper-V are below:

- Windows Server 2012 R2: 320
- Windows Server 2016: 512

5 Memory

Available slots: 8 per processor

Category	Product Name / Description	Part Number
Registered DIMM (RDIMM)	**8GB DDR4-2666 REG Memory Kit (1x8GB)** 1 x 8GB Registered ECC DIMM, DDR4-2666(PC4-2666), Single Rank	N8102-703F
	16GB DDR4-2666 REG Memory Kit (1x16GB) 1 x 16GB Registered ECC DIMM, DDR4-2666(PC4-2666), Dual Rank	N8102-704F
	32GB DDR4-2666 REG Memory Kit (1x32GB) 1 x 32GB Registered ECC DIMM, DDR4-2666(PC4-2666), Dual Rank	N8102-705F
TSV Registered DIMM (TSV RDIMM)	**64GB DDR4-2666 TSV REG Memory Kit (1x64GB)** 1 x 64GB TSV Registered ECC DIMM, DDR4-2666(PC4-2666), Quad Rank **NOTE:** - The memory kit is make-to-order product.	N8102-706F
	128GB DDR4-2666 TSV REG Memory Kit (1x128GB) 1 x 128GB TSV Registered ECC DIMM, DDR4-2666(PC4-2666), Octal Rank **NOTE:** - The memory kit is make-to-order product.	N8102-707F

NOTE:

- Minimum one memory kit per processor must be installed.
- It is recommended to install memory kits in multiples of six DIMMs for six-channel symmetric memory configurations to increase memory transfer speed.
- Mix configurations of RDIMM and TSV RDIMM are not supported
- The type of TSV RDIMM installed must be identical.
- Estimated production lead time for the make-to-order processor kits will be approximately 3 months.

Maximum Memory Capacity

See the table below for the maximum memory capacity in accordance with the type of processor installed.

Processor Type	Maximum Memory Capacity per CPU
Xeon ® Platinum 8160M	1TB
All other processors	768GB

Maximum Memory Speed

See the table below for the actual maximum memory transfer speed. DDR4 memory speed depends on the native memory bus speed of the memory controller.

Processor Type	DIMM Speed
Xeon ® Platinum 8100 series Xeon ® Gold 6100 series Xeon ® Gold 5122 Processor	2666 MHz
Xeon ® Gold 5100 series excluding Xeon ® Gold 5122 Processor Xeon ® Silver 4100 series	2400 MHz
Xeon ® Bronze 3100 series	2133 MHz

Maximum Available Memory

See the table below for the maximum memory size that you can actually use on your system.

Operating Systems	Maximum Memory Size Supported by Operating Systems	Maximum Available Memory
Microsoft Windows Server 2012 R2 Standard [1] Microsoft Windows Server 2012 R2 Datacenter [1]	4 TB	2 TB
Microsoft Windows Server 2016 Standard [2] Microsoft Windows Server 2016 Datacenter [2]	24 TB	2 TB
Red Hat Enterprise Linux 7.3 or later	12 TB	2 TB
VMware ESXi 6.0 [3]	6 TB	2 TB
VMware ESXi 6.5 [4]	12 TB	2 TB

[1] Hyper-V in Windows Server 2012 R2
- Maximum memory that apply to each Hyper-V: 4 TB
- Maximum memory that apply to each virtual machine: 1 TB

[2] Hyper-V in Windows Server 2016:
- Maximum memory that apply to each Hyper-V: 24 TB
- Maximum memory that apply to each virtual machine: 12 TB

[3] Up to 4 TB of the main memory is available to each virtual machine.

[4] Up to 6128 GB of the main memory is available to each virtual machine.

6 Internal Storage

6.1 Drive Configuration

Refer to below table for RAID configuration.

Module Enclosure	Connection for internal drive	Available drive cage per Server Module	Section	Available Internal Drives
1U Module Enclosure for Embedded SATA Controller Configuration	Non-RAID (Embedded SATA)	6x 2.5-inch Drive Bays (SATA)	6.2.1	SATA HDD
1U Module Enclosure for RAID Controller / SAS HBA Configuration	RAID / SAS Controller	6x 2.5-inch Drive Bays (SAS/SATA)	6.2.2	SATA HDD SATA SSD SAS HDD SAS SSD
2U Module Enclosure for Embedded SATA Controller Configuration	Non-RAID (Embedded SATA)	6x 2.5-inch Drive Bays (SATA)	6.3.1	SATA HDD
2U Module Enclosure for RAID Controller / SAS HBA Configuration	RAID / SAS Controller	12x 2.5-inch Drive Bays (SAS/SATA)	6.3.2	SATA HDD SATA SSD SAS HDD SAS SSD

NOTE:

- Mix configuration of RAID configuration server module and SAS HBA configuration server module in a same module enclosure can be supported.
- Mix configuration of SATA HDDs and SAS HDDs in a same drive cage of server module is not supported.
- Three server modules which installs SATA HDDs in a same module enclosure is not supported.
- Server module which installs SATA HDDs and server module which installs SAS HDDs in a same module enclosure is not supported.
- SAS HBA [N8103-199] will be able to order after end of Oct, 2017.
- All drives within a RAID array should be of the same type, capacity and rotation speed.
- Up to two kinds of drives selected from SAS 10K HDDs (512n), SAS 10K HDDs (512e), SAS 15K HDDs, SAS 15K HDDs (512e), SATA HDDs, SAS SSDs, SATA SSDs (ME) and SATA SSDs (VE) can be mixed in the drive cage of server modules except the combination of SATA HDDs and SAS HDDs.
- To configure a large-capacity RAID array, it is recommended to configure in RAID 6 in order to minimize the risk of becoming multiple hard drives failure during the RAID rebuilding process.

Maximum Internal Storage

The maximum number of available drives depends on the type of processor installed and the number of PCI cards. See the following table to check how many drives can be installed into the server.

Module Enclosure	Processors	Number of PCI card, LAN mezzanine installed	Maximum number of available drives
1U for embedded SATA configuration	Gold 6134 [N8101-1371F]	1 PCI card, 1 PCI card with LAN Mezz.	5
		2 PCI cards	4
		2 PCI cards with LAN Mezz.	2
	Others	1 PCI card, 1 PCI card with LAN Mezz.	6
		2 PCI cards	4
		2 PCI cards with LAN Mezz.	2
1U for RAID controller / SAS HBA configuration	Gold 6134 [N8101-1371F]	Any configurations	5
	Others	-	6
2U for embedded SATA configuration	Any processors	-	6
2U for RAID controller / SAS HBA configuration	Any processors	-	12

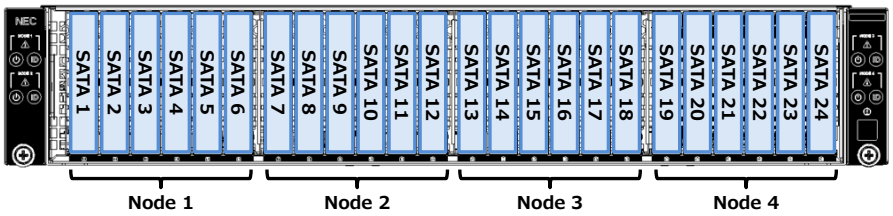
NOTE:

- Mix configuration of SATA HDDs and SAS HDDs in a same drive cage of server module is not supported.
- Three server modules which installs SATA HDDs in a same module enclosure is not supported.

- Server module which installs SATA HDDs and server module which installs SAS HDDs in a same module enclosure is not supported.
- Up to two kinds of drives selected from SAS 10K HDDs (512n), SAS 10K HDDs (512e), SAS 15K HDDs, SAS 15K HDDs (512e), SATA HDDs, SAS SSDs, SATA SSDs (ME) and SATA SSDs (VE) can be mixed in the drive cage of server modules except the combination of SATA HDDs and SAS HDDs.

6.2 Storage Controllers and Options for Module Enclosure (1U)

6.2.1 Embedded SATA Controller

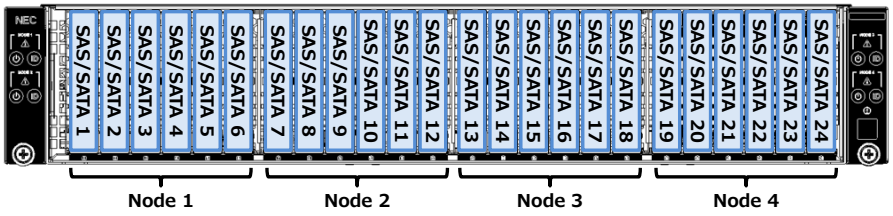


Category	Product Name / Description	Part Number
Storage Controller	**Embedded SATA Controller** 6x 6Gb/s SATA	(Standard in Server Module)
SATA Cable	**Internal SATA Cable** 1x [1x Slimline SAS – 1x Slimline SAS] cable	(Standard in Server Module)
Drive Cage	**24x 2.5-inch Drive Cage** 6x 2.5-inch Drive Cage per Server Module	(Standard in Module Enclosure)

NOTE:

- Module Enclosure has to be for embedded SATA controller model [N8141-83F/-84F/91F] to install module enclosure for embedded SATA controller configuration.
- Hot plug insertion/removal are not supported because the drives are not redundant in this configuration.

6.2.2 RAID / SAS Controller



Category		Product Name / Description	Part Number
Storage Controller Required	**RAID**	**RAID Controller (0GB, RAID 0/1)** RAID 0/1/10, No cache memory, Internal 8 port, PCIe 3.0, SAS 12Gb/s, SATA 6Gb/s	N8103-188
		RAID Controller (1GB, RAID 0/1) RAID 0/1/10, 1GB cache memory, Internal 8 port, PCIe 3.0, SAS 12Gb/s, SATA 6Gb/s	N8103-176
		RAID Controller (1GB, RAID 0/1/5/6) RAID 0/1/5/6/10/50/60, 1GB cache memory, Internal 8 port, PCIe 3.0, SAS 12Gb/s, SATA 6Gb/s	N8103-177
		RAID Controller (2GB, RAID 0/1/5/6) RAID 0/1/5/610/50/60, 2GB cache memory, Internal 8 port, PCIe 3.0, SAS 12Gb/s, SATA 6Gb/s	N8103-178
	SAS	**SAS Controller** Internal 8 port, PCIe 3.0, SAS 12Gb/s, SATA 6Gb/s	N8103-199
SAS/SATA Cable Required		**Internal SAS/SATA Cable** 1x [2x Mini SAS HD – 1x Slimline SAS] cable	K410-356(00)
Drive Cage		**24x 2.5-inch Drive Cage** 6x 2.5-inch Drive Cage per Server Module	(Standard in Module Enclosure)

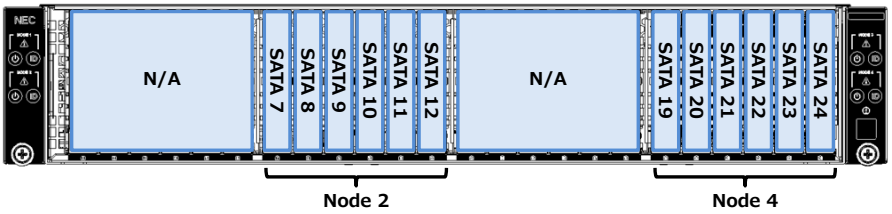
NOTE:

- The storage controller for all server modules in the same module enclosure must be identical.
- SAS Controller [N8103-199] will be able to order after end of Oct, 2017.

- Module Enclosure has to be for RAID controller/SAS HBA model [N8141-94F] to install module enclosure for RAID or SAS Controller configuration.
- SAS Controller [N8103-199] doesn't support booting to disks which connected to SAS Controller. Please use with VMware ESXi support kit (SATA DOM) [N8106-012] for booting.
- D120h doesn't support mixing configuration with disks connected to Embedded SATA and with SAS Controller [N8103-199].
- We will release "lifespan monitoring tool for SAS HBA" to monitor the lifespan of SSD after Jan, 2018.

6.3 Storage Controllers and Options for Module Enclosure (2U)

6.3.1 Embedded SATA Controller

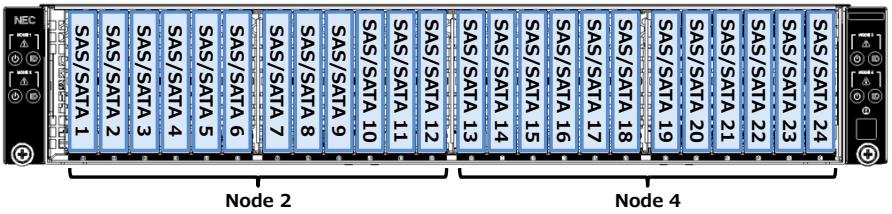


Category	Product Name / Description	Part Number
Storage Controller	**Embedded SATA Controller** 6x 6Gb/s SATA	(Standard in Server Module)
SATA Cable	**Internal SATA Cable** 1x [1x Slimline SAS – 1x Slimline SAS] cable	(Standard in Server Module)
Drive Cage	**24x 2.5-inch Drive Cage** 6x 2.5-inch Drive Cage per Server Module	(Standard in Module Enclosure)

NOTE:

- Module Enclosure has to be for embedded SATA controller model [N8141-83F/-84F/91F] to install module enclosure for embedded SATA controller configuration.
- Hot plug insertion/removal are not supported because the drives are not redundant in this configuration.

6.3.2 RAID / SAS Controller in Module Enclosure (2U)



Category		Product Name / Description	Part Number
Storage Controller Required	**RAID**	**RAID Controller (0GB, RAID 0/1)** RAID 0/1/10, No cache memory, Internal 8 port, PCIe 3.0, SAS 12Gb/s, SATA 6Gb/s	N8103-188
		RAID Controller (1GB, RAID 0/1) RAID 0/1/10, 1GB cache memory, Internal 8 port, PCIe 3.0, SAS 12Gb/s, SATA 6Gb/s	N8103-176
		RAID Controller (1GB, RAID 0/1/5/6) RAID 0/1/5/6/10/50/60, 1GB cache memory, Internal 8 port, PCIe 3.0, SAS 12Gb/s, SATA 6Gb/s	N8103-177
		RAID Controller (2GB, RAID 0/1/5/6) RAID 0/1/5/610/50/60, 2GB cache memory, Internal 8 port, PCIe 3.0, SAS 12Gb/s, SATA 6Gb/s	N8103-178
	SAS	**SAS Controller** Internal 8 port, PCIe 3.0, SAS 12Gb/s, SATA 6Gb/s	N8103-199
SAS Expander		**SAS Expander** SAS 12Gb/s, SATA 6Gb/s	(Standard in Server Module)
SAS/SATA Cable Required		**Internal SAS/SATA Cable** 1x [2x Mini SAS HD – 1x Slimline SAS] cable, 1x [1x Slimline SAS – 1x Slimline SAS] cable	K410-357(00)
Drive Cage		**24x 2.5-inch Drive Cage** 12x 2.5-inch Drive Cage per Server Module	(Standard in Module Enclosure)

NOTE:

- SAS Controller [N8103-199] will be able to order after end of Oct, 2017.
- Module Enclosure has to be for RAID controller/SAS HBA model [N8141-94F] to install module enclosure for SAS HBA configuration.
- SAS Controller [N8103-199] doesn't support booting to disks which connected to SAS Controller. Please use with VMware ESXi support kit (SATA DOM) [N8106-012] for booting.
- D120h doesn't support mixing configuration with disks connected to Embedded SATA and with SAS Controller [N8103-199].
- We will release "lifespan monitoring tool for SAS HBA" to monitor the lifespan of SSD after Jan, 2018.

6.4 Internal Drives

6.4.1 2.5-inch SATA Hard Disk Drives

Category	Product Name / Description	Part Number
512n Sector/ 7,200 rpm	**1TB 7.2K Hot Plug 2.5-inch SATA HDD** 1 x 1 TB SATA HDD, 2.5-inch, 6Gb/s, 7,200 rpm, 512n sector	N8150-575
	2TB 7.2K Hot Plug 2.5-inch SATA HDD 1 x 2 TB SATA HDD, 2.5-inch, 6Gb/s, 7,200 rpm, 512n sector	N8150-576

NOTE:

- All drives within a RAID array should be of the same type, capacity and rotation speed.
- Up to two kinds of drives selected from SAS 10K HDDs, SAS 15K HDDs, SATA HDDs, SATA SSDs can be mixed.

6.4.2 2.5-inch SATA Solid State Drives

Category	Product Name / Description	Part Number
Value Endurance	**240GB Hot Plug 2.5-inch SATA SSD** 1 x 240GB SATA SSD, 2.5-inch, 6Gb/s, 512n sector, Value Endurance	N8150-770
	480GB Hot Plug 2.5-inch SATA SSD 1 x 480GB SATA SSD, 2.5-inch, 6Gb/s, 512n sector, Value Endurance	N8150-771
	960GB Hot Plug 2.5-inch SATA SSD 1 x 960GB SATA SSD, 2.5-inch, 6Gb/s, 512n sector, Value Endurance	N8150-772
	1.92TB Hot Plug 2.5-inch SATA SSD 1 x 1.92TB SATA SSD, 2.5-inch, 6Gb/s, 512n sector, Value Endurance	N8150-773
Middle Endurance	**200GB Hot Plug 2.5-inch SATA SSD** 1 x 200GB SATA SSD, 2.5-inch, 6Gb/s, 512n sector, Middle Endurance	N8150-767
	400GB Hot Plug 2.5-inch SATA SSD 1 x 400GB SATA SSD, 2.5-inch, 6Gb/s, 512n sector, Middle Endurance	N8150-768
	800GB Hot Plug 2.5-inch SATA SSD 1 x 800GB SATA SSD, 2.5-inch, 6Gb/s, 512n sector, Middle Endurance	N8150-769

NOTE:

- 2.5-inch SATA solid state drives are supported with RAID controller or SAS controller configurations.
- All drives within a RAID array should be of the same type, capacity.
- Up to two kinds of drives selected from SAS 10K HDDs, SAS 15K HDDs, SATA HDDs, SATA SSDs can be mixed.

6.4.3 2.5-inch SAS Hard Disk Drives

Category	Product Name / Description	Part Number
512n Sector / 10,000 rpm	**300GB 10K Hot Plug 2.5-inch SAS HDD** 1 x 300 GB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512n sector	N8150-577
	600GB 10K Hot Plug 2.5-inch SAS HDD 1 x 600 GB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512n sector	N8150-578
	900GB 10K Hot Plug 2.5-inch SAS HDD 1x 900 GB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512n sector	N8150-579
512e Sector / 10,000 rpm	**1.2TB 10K Hot Plug 2.5-inch SAS HDD** 1 x 1.2TB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512e sector	N8150-580
	1.8TB 10K Hot Plug 2.5-inch SAS HDD 1 x 1.8TB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512e sector	N8150-581
512n Sector / 15,000 rpm	**300GB 15K Hot Plug 2.5-inch SAS HDD** 1x 300 GB SAS HDD, 2.5-inch, 12Gb/s, 15,000 rpm, 512n sector	N8150-583
	600GB 15K Hot Plug 2.5-inch SAS HDD 1x 600 GB SAS HDD, 2.5-inch, 12Gb/s, 15,000 rpm, 512n sector	N8150-584

512e Sector / 15,000 rpm	**900GB 15K Hot Plug 2.5-inch SAS HDD** 1x 900 GB SAS HDD, 2.5-inch, 12Gb/s, 15,000 rpm, 512e sector	N8150-585

- 512e sector drives are not available for VMware ESXi 6.0 system.
- All drives within a RAID array should be of the same type, capacity and rotation speed.
- Up to two kinds of drives selected from SAS 10K HDDs, SAS 15K HDDs, SATA HDDs, SATA SSDs can be mixed.
- To configure a large-capacity RAID array, it is recommended to configure in RAID 6 or RAID 60 in order to minimize the risk of becoming multiple hard drives failure during the RAID rebuilding process.

6.4.4 2.5-inch SAS Solid State Drives

Category	Product Name / Description	Part Number
Middle Endurance	**400GB Hot Plug 2.5-inch SAS SSD** 1 x 400GB SAS SSD, 2.5-inch, 12Gb/s, 512n sector, Middle Endurance	N8150-766

NOTE:

- Up to two kinds of drives selected from SAS 10K HDDs, SAS 15K HDDs, SATA HDDs, SATA SSDs can be mixed.

7 Optical Drive

Category	Product Name / Description	Part Number
External	**External DVD Dual Drive** Slim DVD Dual drive, USB bus powered, not including writing software, Cable length: 60cm DVD read speed: 8x (DVD-ROM / -R / -RW / -R DL / +R / +RW / +R DL) CD read speed: 24x (CD-ROM / -R / -RW)	N8160-101F

NOTE:

- Optical disk drive is required for OS Installation and system maintenance.

8 Flash FDD

Choose the Flash FDD if you need to prepare an alternative device for a floppy drive.

Product Name / Description	Part Number
Flash FDD USB flash emulating USB floppy disk, Native capacity 1.44 MB	N8160-96

NOTE:

- Up to one drive can be connected.
- Not supported when VMware is running on the server.

9 PCI Card

Please refer to **Supported PCI Cards and Installable Slots** with regard to the position of PCI slot which can mount PCI card supported.

9.1 Network Interface Controller

Category		Product Name / Description	Part Number
LOM	**10GbE**	**Dual Port 10GBASE-T LOM** Intel® Ethernet Controller X550-AT2 PCIe 3.0(x4)	(Standard)
Adapter	**1GbE**	**1000BASE-T Adapter** Broadcom ® BCM5718 Gigabit Ethernet Controller PCIe 2.0(x1)	N8104-150
		Dual Port 1000BASE-T Adapter Broadcom ® BCM5718 Gigabit Ethernet Controller PCIe 2.0(x1) **NOTE:** - Network cables with RJ-45 plug covers cannot be used.	N8104-151
		Quad Port 1000BASE-T Adapter Broadcom ® BCM5719 Gigabit Ethernet Controller PCIe 2.0(x4) **NOTE:** - Network cables with RJ-45 plug covers cannot be used.	N8104-152
	10GbE	**10GBASE SFP+ Adapter (SFP+/2ch)** QLogic NetXtreme II BCM57810S PCIe 2.0(x8) **NOTE:** - - N8104-129 SFP+ Module is required to connect with an optical cable.	N8104-149
		Dual Port 10GBASE-T Adapter Intel® Ethernet Controller X550 PCIe 3.0(x4)	N8104-157
		10GBASE Adapter (SFP+/2ch) Intel® Ethernet Converged Network Adapters X710 PCIe 3.0(x8) **NOTE:** - N8104-129 SFP+ Module is required to connect with an optical cable.	N8104-158
		10GBASE Adapter (QSFP+/4ch) Intel® Ethernet Converged Network Adapters XL710 PCIe 3.0(x8) **NOTE:** - Only 10Gb connection is supported for higher level network. - N8104-161 QSFP+ Module is required to connect - Use optical breakout cable for N8104-161.	N8104-159
LAN Mezzanine	**1GbE**	**Quad Port 1000BASE-T Adapter** Intel Ethernet Controller i350-AM4, PCIe2.0 x4 RJ.5 connector **NOTE:** - The connector is 4x RJ.5. Please purchase required number of K410-366(0A) to connect RJ45 cable.	N8104-168
	10GbE	**Dual Port 10GBASE-SFP+ Adapter** QLogic BCM57810S, PCIe 2.0 x8 **NOTE:** - N8104-129 SFP+ Module is required to connect with an optical cable.	N8104-170
SFP Module	**10GbE**	**SFP+ Module (10G-SR)** 1 x SFP+ Module	N8104-129
		QSFP+ Module 1 x QSFP+ Module for N8104-159	N8104-161
Cable	**1GbE**	**RJ.5 Conversion Cable** RJ.5 – RJ45 conversion cable, 25cm, one cable **NOTE:** **- K410-366(0A) is for N8104-168. Please purchase required number of K410-366(0A) if you install N8104-168.**	K410-366(0A)

NOTE:

- Network performance depends on the application running on the system and the memory bandwidth. Installing more than six ports of 10G LAN (including on-board 2-port LAN) may degrade network performance. If network throughput is important, we recommend that you evaluate the performance with your systems in advance.
- The NIC cards must be installed under the maximum configuration limits for networking when running with VMware systems. For more detail, see the Networking Maximum in the Configuration Maximums document for VMware.

- For VMware ESXi 6.0: https://www.vmware.com/pdf/vsphere6/r60/vsphere-60-configuration-maximums.pdf
- For VMware ESXi 6.5: https://www.vmware.com/pdf/vsphere6/r65/vsphere-65-configuration-maximums.pdf

NIC Teaming feature – NIC Teaming and bonding features

See the table below for supported network interfaces and OS combinations.

Network Interface	Team	Operating Systems
10GBASE-T LOM **10GBASE-T NIC** N8104-157	Up to four ports per one team	Windows Server 2016 Windows Server 2012 R2 Red hat Enterprise Linux 7.3 or later VMware ESXi 6.0 Update3 VMware ESXi 6.5 Update1
1000BASE-T NIC N8104-150/-151 and -152	Up to four ports per one team	Windows Server 2016 Windows Server 2012 R2 Red hat Enterprise Linux 7.3 or later VMware ESXi 6.0 Update3 VMware ESXi 6.5 Update1
1000BASE-T NIC **N8104-168**	Up to four ports per one team	Windows Server 2016 Windows Server 2012 R2 Red hat Enterprise Linux 7.3 or later VMware ESXi 6.0 Update3 VMware ESXi 6.5 Update1
10GBASE SFP+ NIC N8104-149 and -170	Up to four ports per one team	Windows Server 2016 Windows Server 2012 R2 Red hat Enterprise Linux 7.3 or later VMware ESXi 6.0 Update3 VMware ESXi 6.5 Update1
10GBASE SFP+ NIC **N8104-158**	Up to four ports per one team	Windows Server 2016 Windows Server 2012 R2 Red hat Enterprise Linux 7.3 or later VMware ESXi 6.0 Update3 VMware ESXi 6.5 Update1
10GBASE SFP+ NIC **N8104-159**	Up to four ports per one team	Red hat Enterprise Linux 7.3 or later

NOTE:
- NIC Teaming feature is not supported on iSCSI interfaces.
- The network interfaces for each NIC teaming must be the same.
- When 10GbE and 1GbE NIC teams are mixed, the maximum number of teams is up to five per one system.

Using iSCSI

See the table below for supported network interfaces and OS combinations.

Category	Network Interface	Operating Systems
1GbE	**N8104-150/-151/-152/-168**	Windows Server 2012 R2, Windows Server 2016, Red hat Enterprise Linux 7.3 or later / VMware ESXi 6.0 Update3 / VMware ESXi 6.5 Update1
10GbE	**On-board LAN Interface** **N8104-157/-158/-149/-170**	Windows Server 2012 R2, Windows Server 2016, Red hat Enterprise Linux 7.3 or later / VMware ESXi 6.0 Update3 / VMware ESXi 6.5 Update1
	N8104-159	Red hat Enterprise Linux 7.3 or later

NOTE:
- NIC Teaming feature is not supported on iSCSI interfaces.

9.2 External Storage Controller

9.2.1 Fibre Channel / SAS Controller

Category	Product Name / Description	Part Number
Fibre Channel	**Fibre Channel Controller (1ch)** QLogic, QLE2690 16Gb/s, Optical, PCIe 3.0 x8	N8190-161
	Fibre Channel Controller (2ch) QLogic, QLE2692	N8190-162

	16Gb/s, Optical, PCIe 3.0 x8	
SAS	**SAS Controller** LSI SAS9300-8e Host Bus Adapter 12Gb/s SAS, ext. 8(SFF-8644 x2), PCIe 3.0 x8	N8103-184

9.3 Serial Port Adapter

Product Name / Description	Part Number
Serial Port Adapter Serial port Connector, Up to one Serial Port Adapter can be installed	N8117-01A

10 Other Add-in Components

10.1 Trusted Platform Module Kit

Product Name / Description	Part Number
Trusted Platform Module Kit TPM 2.0 module	N8115-31

NOTE:

- The kit is not available in China.
- The kit is not removable after attachment.
- The kit supports only with Windows operating system configured with UEFI boot mode.
- "Security Device Support" in BIOS setup menu must be activated prior to use of this product.
- To use Windows BitLocker drive encryption, be sure to keep the "recovery password" of BitLocker function. The recovery password is required to restore data for hardware replacement during a system error.

10.2 USB Memory Kit

Product Name / Description	Part Number
VMware ESXi support kit 16GB SATA DOM, SLC, Support for VMware ESXi 6.0, 6.5.	N8106-012

NOTE:

- VMware ESXi support kit doesn't support with Embedded SATA configuration. If you install VMware ESXi support kit, you should configure with RAID controller or SAS HBA.
- The kit does not include VMware ESXi installation media and license.

11 Add-on Components

11.1 17-inch LCD Console Drawer

Category		Product Name / Description	Part Number
Drawer w/ KVM	**Drawer**	**17-inch LCD Console Drawer (8port)** 17-inch LCD, US 83-keys Keyboard, Optical mouse, 8 port KVM switch, 1U height	N8143-106F
	Cable	**Switch Unit Connection Cable Set (USB, 1.8m)** 1.8 m, 1 x 15-pin mini D-sub to 1 x 15-pin mini D-sub / 1 x 4-pin USB A	K410-118(1A)
		Switch Unit Connection Cable Set (USB, 3m) 3 m, 1 x 15-pin mini D-sub to 1 x 15-pin mini D-sub / 1 x 4-pin USB A	K410-118(03)
		Switch Unit Connection Cable Set (USB, 5m) 5 m, 1 x 15-pin mini D-sub to 1 x 15-pin mini D-sub / 1 x 4-pin USB A	K410-118(05)
Drawer w/o KVM	**Drawer**	**17inch LCD Console Unit 1U** 17-inch LCD, US 83-keys Keyboard, Optical mouse, 1U height, 4-pin USB B to 4-pin USB A cable 2 m, PS/2 Y-splitter cable 2m, 15-pin mini D-sub VGA cable 2 m	N8143-105F
		17inch LCD Console Drawer (1port) 17-inch LCD, US 103-keys Keyboard with 10-key, Touch pad with 3-button, 1U height, 4-pin USB B to 4-pin USB A cable 1.8 m, Two PS/2 cable 1.8 m, 15-pin mini D-sub VGA cable 1.8 m	N8143-108F
		17.3inch LCD Console Drawer (1port) 17.3-inch wide Full HD LCD, US 103-keys Keyboard with 10-key, Touch pad with 2-button, 1U height, 4-pin USB B to 4-pin USB A cable 1.8 m, 15-pin mini D-sub VGA cable 1.8 m, DVI-D cable 1.8m	N8143-122F
	Keypad	**Keyboard Unit (JP)** JP 108-keys Keyboard with 10-key for N8143-108F 17inch LCD Console Drawer (1port)	N8143-109
		Keyboard Unit (UK) UK 104-keys Keyboard with 10-key, for N8143-108F 17inch LCD Console Drawer (1port)	N8143-111

NOTE:

- One Switch Unit Connection Cable Set is required to connect one server.

11.2 KVM Switch

Category		Product Name / Description	Part Number
KVM Switch		**Server Switch Unit (8 server)** 1U USB 8 port KVM switch	N8191-14F
Cable	**KVM**	**Switch Unit Connection Cable Set (USB,1.8m)** 1.8 m, 1 x 15-pin mini D-sub to 1 x 15-pin mini D-sub / 1 x 4-pin USB A	K410-118(1A)
		Switch Unit Connection Cable Set (USB,3m) 3 m, 1 x 15-pin mini D-sub to 1 x 15-pin mini D-sub / 1 x 4-pin USB A	K410-118(03)
		Switch Unit Connection Cable Set (USB,3m) 5 m, 1 x 15-pin mini D-sub to 1 x 15-pin mini D-sub / 1 x 4-pin USB A	K410-118(05)
	Cascading	**Switch Unit Connection Cable 1.8 m** 1.8 m, 1 x 15-pin mini D-sub - 1x 15-pin mini D-Sub / 2x PS/2	K410-119(1A)

NOTE:

- One Switch Unit Connection Cable Set is required to connect one server.

11.3 Server Management License

The server integrates the Baseboard Management Controller as standard. Refer to **Server Management** for the standard management features. For more extensive remote KVM and remote media features, choose the following kit.

Product Name / Description	Part Number
Remote KVM and Media License Kit License for one server. Remote KVM and remote media are enabled regardless of OS status. Remote KVM: - Displays a graphics console on the web browser of the remote terminal (PC/server). - Controls keyboard and mouse via the remote terminals' web browser Remote media: - Enables the user to use the CD / DVD / FD / Flash memory of the remote terminals (PC/server) as if accessing the local drives.	N8115-32

NOTE:

- Remote KVM and remote media features are not available for virtual machines.

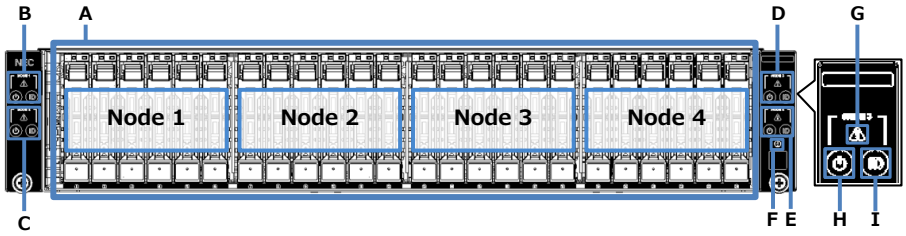
References

External Views

Front and Rear Views

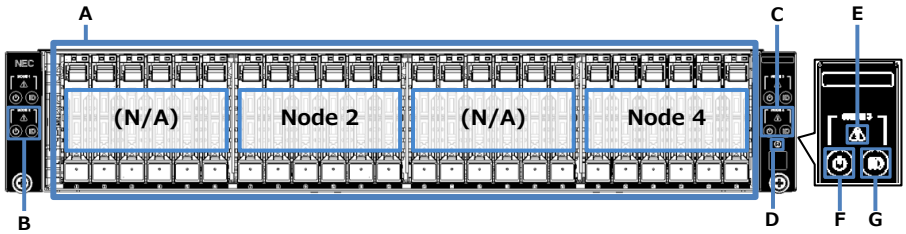
Front View for Module Enclosure

1U



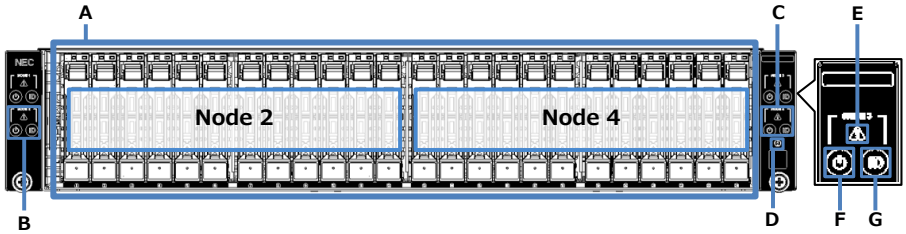
Legend			
A.	2.5-inch Drive Bays	**F.**	CMC(Module Enclosure) Status LED
B.	Front Panel (Node 1)	**G.**	System Status LED
C.	Front Panel (Node 2)	**H.**	Power Button / Power LED
D.	Front Panel (Node 3)	**I.**	UID Button / UID LED
E.	Front Panel (Node 4)		

2U Embedded SATA Configuration



Legend			
A.	2.5-inch Drive Bays	**E.**	System Status LED
B.	Front Panel (Node 2)	**F.**	Power Button / Power LED
C.	Front Panel (Node 4)	**G.**	UID Button / UID LED
D.	CMC(Module Enclosure) Status LED		

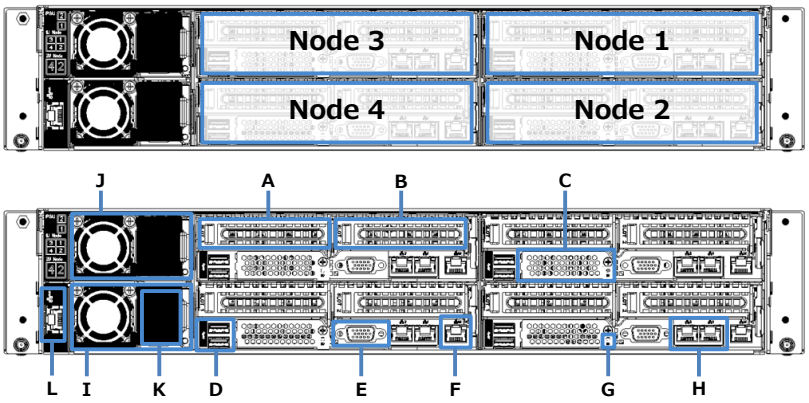
2U RAID Controller Configuration



Legend			
A.	2.5-inch Drive Bays	**E.**	System Status LED
B.	Front Panel (Node 2)	**F.**	Power Button / Power LED
C.	Front Panel (Node 4)	**G.**	UID Button / UID LED
D.	CMC(Module Enclosure) Status LED		

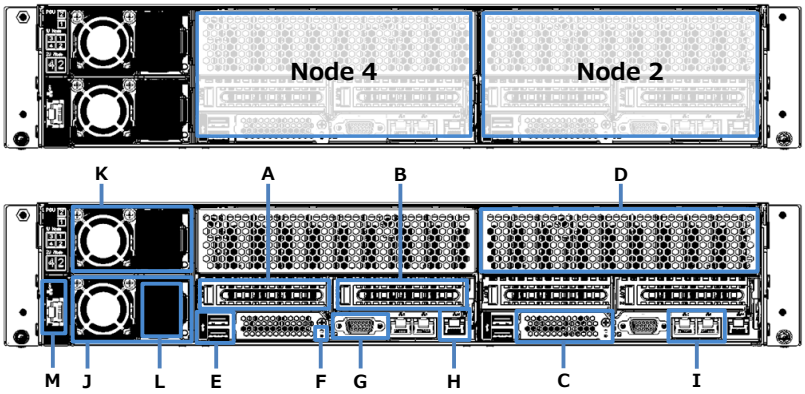
Rear View for Module Enclosure

1U



Legend			
A.	PCI Slot 1	**G.**	UID LED
B.	PCI Slot 2	**H.**	2x Data LAN Connectors
C.	LAN Mezzanine (PCI Slot 3)	**I.**	Power Supply 1
D.	2x USB 3.0 Connectors	**J.**	Power Supply 2
E.	VGA Connector	**K.**	AC Inlet
F.	Server Module Management LAN Connector	**L.**	CMC(Module Enclosure) Management LAN Connector

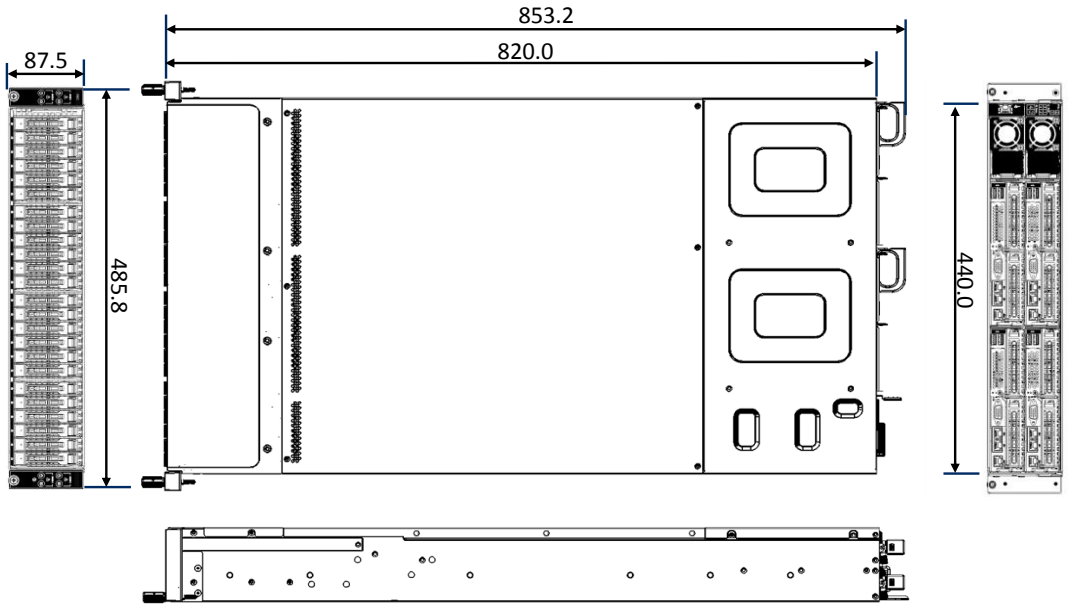
2U



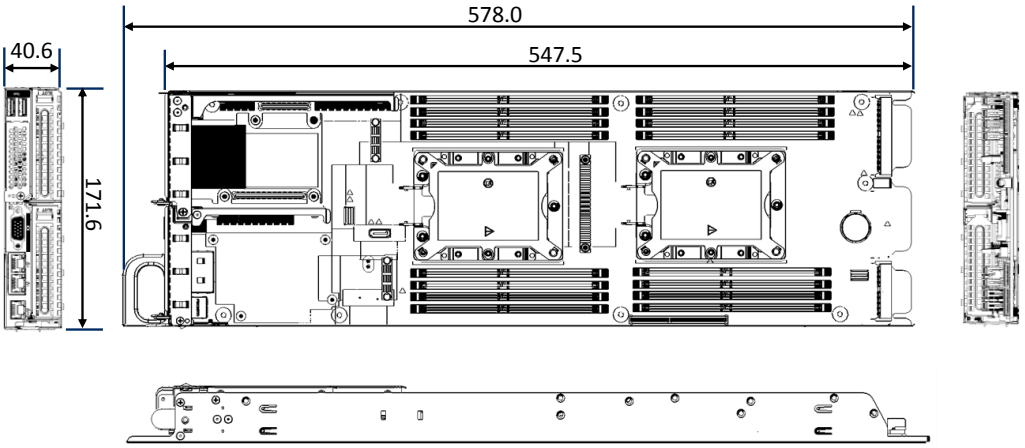
Legend			
A.	PCI Slot 1	**H.**	Server Module Management LAN Connector
B.	PCI Slot 2	**I.**	2x Data LAN Connector
C.	LAN Mezzanine (PCI Slot 3)	**J.**	Power Supply 1
D.	PCI Slot 4 (Dedicated for GPU Card)	**K.**	Power Supply 2
E.	2x USB 3.0 Connectors	**L.**	AC Inlet
F.	UID LED	**M.**	CMC(Module Enclosure) Management LAN Connector
G.	VGA Connector		

Dimensions (mm)

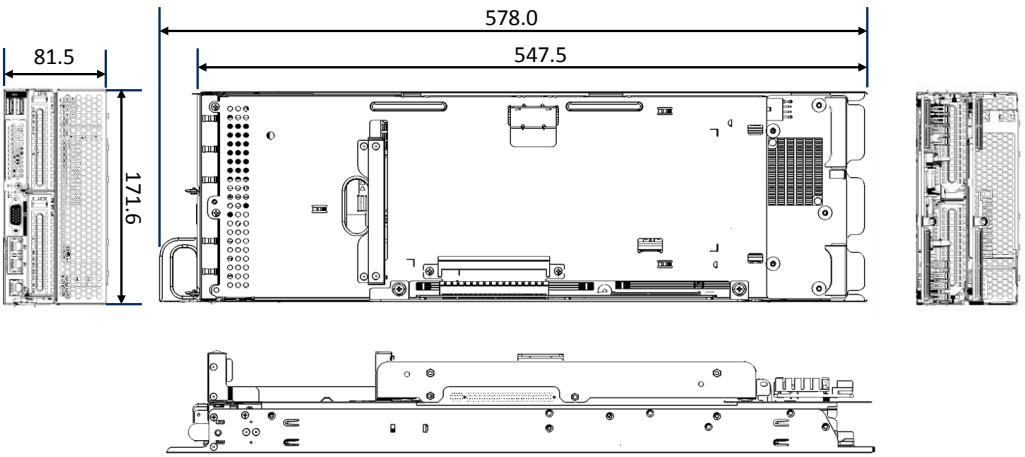
Module Enclosure



1U Server Module



2U Server Module



General Supplementary Matters

HDD

- Capacity of Hard disk drive is displayed in decimal not binary. 1GB＝1000^3B、1TB=1000^4B.

PCI Expansion Slot

- Transfer speed of PCI Express
  - PCI Express (PCIe): 2.5Gb/s (simplex) per lane
  - PCI Express 2.0 (PCIe 2.0): 5Gb/s (simplex) per lane
  - PCI Express 3.0 (PCIe 3.0): 8Gb/s (simplex) per lane

Time Display

- The system clock is affected by temperature conditions in storage. If high accuracy of the system clock is required, use of NTP servers is recommended.

EXPRESSBUILDER

- EXPRESSBUILDER DVD media is attached in the module enclosure with including following items
  - Server management software: ESMPRO/ServerManager, ESMPRO/ServerAgentService
  - User Guide by PDF Ver.
  - RAID management software: Universal RAID Utility (URU)
  - Other Drivers (Starter Pack)

EXPRESSBUILDER DVD Function Table

○Support －Not Support

Category	Function List	DVD Media
Operating System	Windows Set-up	○
Setup	Apply for Starter Pack.	○
Server monitoring, management	The installation for ESMPRO/ServerAgentService	○
	The installation for Express report service	○
	The Installation for ESMPRO/ServerManager	○
	The installation for ESMPRO/ServerAgent Extension	○
	The installation for ExpressUpdateAgent	○
	The installation for Universal Raid Utility	○
	The execution of system diagnosis (T&D)	○
Others	The instruction browsing (user guide) from window OS	○

Supplementary matters

- EXPRESSBUILDER DVD media is attached in the module enclosure
- EXPRESSBUILDER DVD ISO image also can obtain form below web-site
  http://support.express.nec.co.jp/pcserver/

Memory Supplementary Matters

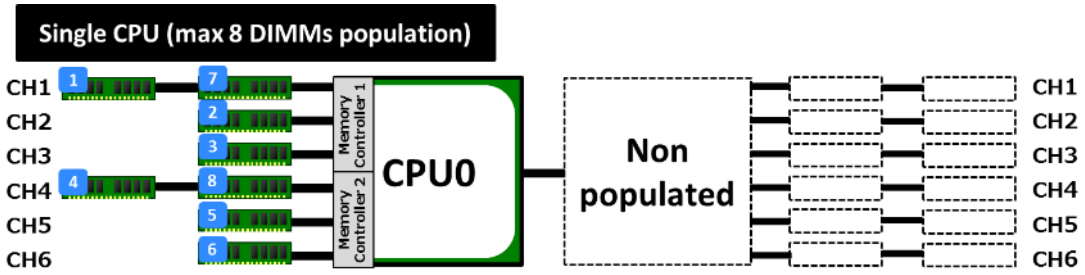
Installation Rule

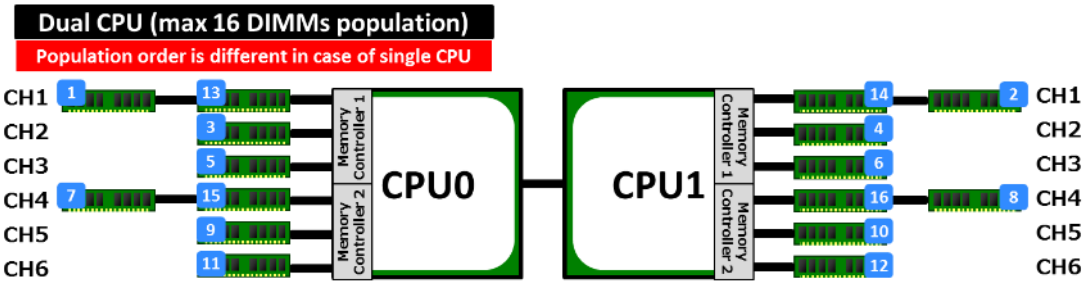
- The number of memory which can be installed varies depending on the number of CPU.
- This installation rule defined to maximize performance efficiently in multiple cores and tasks operation.
- DIMM can be installed up to 8 per 1CPU.
- Mixing of RDIMM, TSV-RDIMM (64GB) and TSV-RDIMM (128GB) is not allowed to be installed.

When install DIMMs, higher capacity memory must be installed preferentially, if ignored this rule, it may cause failures of DIMMs. This rule applies in factory installation.
In installation of 5, 7, or 8 DIMMs per CPU, optimal performance might NOT be obtained. Other memory populations are recommended.

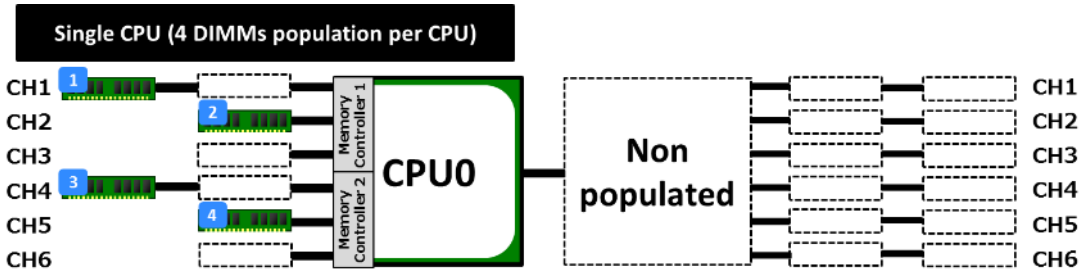
- DIMM can be installed up to 8 per 1CPU.
- Mixing of RDIMM, TSV-RDIMM (64GB) and TSV-RDIMM (128GB) is not allowed to be installed.
- In installation of 5, 7, or 8 DIMMs per CPU, optimal performance might NOT be obtained. Other memory populations are recommended.

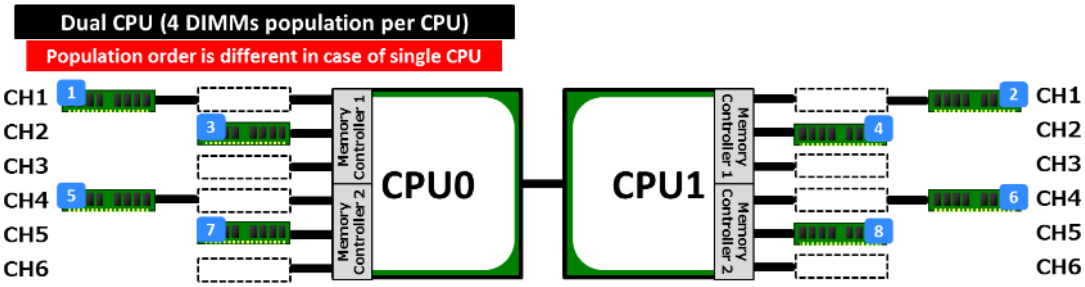
DIMM Population Order (excluding 4 DIMMs per 1CPU)





DIMM Population Order (4 DIMMs per 1CPU)





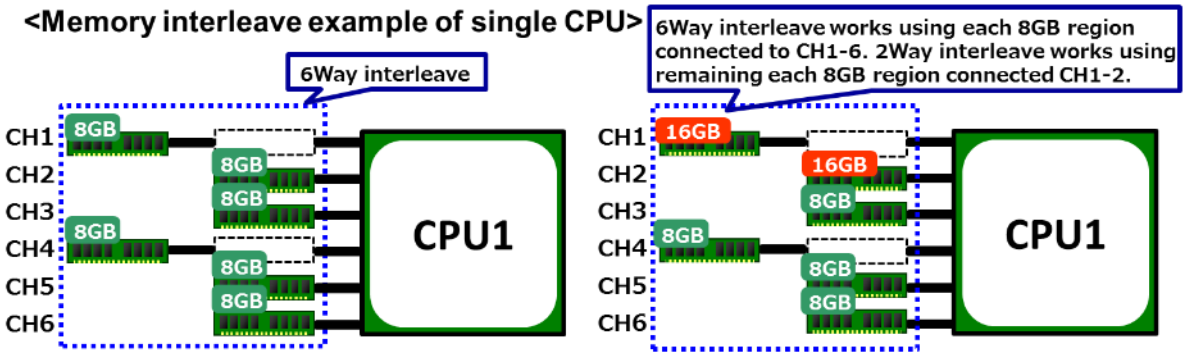
Interleave

Memory interleave is the function which multiple memory bank is accessed in parallel to increase in speed.
2/3/4/6Way interleave is supported in case of dual CPU with NUMA enable or single CPU. 2/4/6/8/12Way interleave is supported in case of dual CPU with NUMA disable. (Default setting for NUMA is enable.)

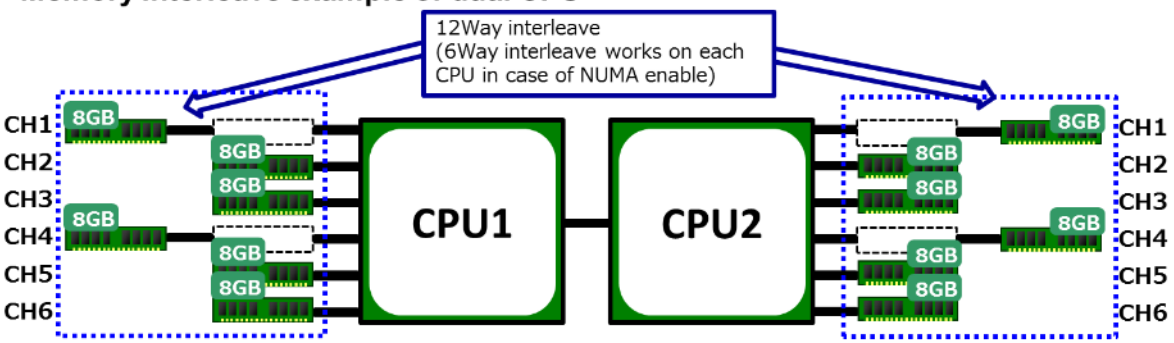
Memory Access

- D120h supports the independent channel which each memory channel is used independently. The memory band width is increased by populating multiple memories at different memory channel. If memory performance is placed high priority, it is capable to increase in speed by memory interleave.
- BIOS checks memory configuration and configure memory interleave. If there is region that cannot configure interleave, that region is used as non-interleave configuration.

<Memory interleave example of single CPU>



<Memory interleave example of dual CPU>



Example of memory configuration to enable memory interleave

- Select following configuration that support interleave if increasing memory access in speed is needed.
- In case that NUMA setting is disabled at BIOS set up menu, 2/4/6/8/12Way interleave is supported in dual CPU configuration depending on configuration.

Interleave configuration of "Dual CPU+NUMA enable" or "Single CPU"

Memory Capacity	Memory interleave mode			
	2Way	3Way	4Way	6Way
16GB	2x 8GB DIMM	-		-
24GB	-	3x 8GB DIMM		-
32GB	2x 16GB DIMM	-	4x 8GB DIMM	-
48GB	-	3x 16GB DIMM		6x 8GB DIMM
64GB	2x 32GB DIMM	-	4x 16GB DIMM	-
96GB	-	3x 32GB DIMM		6x 16GB DIMM
128GB	2x 64GB DIMM	-	4x 32GB DIMM	-
192GB	-	3x 64GB DIMM		6x 32GB DIMM
256GB	2x 128GB DIMM	-	4x 64GB DIMM	-
384GB	-	3x 128GB DIMM		6x 64GB DIMM
512GB	-	-	4x 128GB DIMM	-
768GB	-	-		6x 128GB DIMM

Internal Drive Supplementary Matters

Conditions of internal drive configuration in BTO Shipment

In BTO Shipment, there are some required conditions of Drive Types and RAID levels as below.

Common

- In BTO Shipment, internal drives are included in the packing of Server Module. Internal drives are not mounted in the Module Enclosure. RAID configuration is pre-configured in BTO Shipment
- All drives in BTO Shipment should be the same type, the same sector, and the same rotation speed.
- For the shipment with RAID array, arrange the drives in the same capacity as many as needed.

RAID controller configuration in BTO Shipment

- RAID level 0, 1, 5, 6, 10 can be installed for BTO Shipment. Selectable RAID levels are depending on the RAID controller.
- Capacity of logical drive can be within 2TB with legacy boot mode, capacity of logical drive can be within the total capacity of logical disks with UEFI boot mode.
- As factory shipment, initial cache policy of RAID controllers is Write Through. If customer set Write back, using UPS is recommended because there is a possibility that the data is lost by the blackout.

RAID pre-configuration in BTO Shipment

Storage controller	Number of Drives	RAID pre-configuration in BTO Shipment
Non RAID	1-6	Non RAID (Single attachment)
RAID controller (RAID 0/1/10)	1	1drive in RAID0 (Single drive)
	2	2drives in RAID1
	3	2deives in RAID1, 1drive for a hot spare
	4/6/8	4/6/8drives in RAID10
	5/7/9	4/6/8drives in RAID10, 1drive for a hot spare
	10	8drives in RAID10, 2drives in RAID1
	11	8drives in RAID10, 2drives in RAID1, 1drive for a hot spare
	12	8drives in RAID10, 4drives in RAID10
RAID controller (RAID 0/1/5/6/10/50/60)	1	1drive in RAID0(Single drive)
	2	2drives inRAID1
	3-8	3-8drives in RAID5
	9	8drives in RAID 5, 1drive in RAID0(Single drive)
	10	8drives in RAID 5, 2drives in RAID 1
	11/12	8drives in RAID 5, 3/4drives in RAID 5

NOTE:

- 1U Server Module can support up to 6 drives. 2U Server Module can support up to 12 drives.

Condition for mixing Drive Types of Internal Drives

- Up to two types of drive can be installed in standard drive cage for each Server Module (6 drive slots for 1U Server Module, 12 drive slots for 2U Server Module). There are eight “Drive Types”, such as SAS HDD 10k, SAS HDD 10k(512e), SAS HDD 15k, SAS HDD 15k(512e), SATA HDD, SAS SSD(ME), SATA SSD(ME), and SATA SSD(VE)
- RAID controller is required for mixing Drive Types in Server Module
- In BTO Shipment, mixing Drive Types is not allowed to be installed. In BTO Shipment, please order a server containing one Drive Type, and another Drive Type separately.
- However, mixing SATA HDD and SAS HDD (10k, 10k 512e, 15k, 15k 512e) in one module enclosure is not supported.
- One RAID array has to be configured by drives of both identical capacity and one Drive Type. One RAID array cannot have Mixed Drives Types.
- When using hot spare disk for several RAID arrays with different Drive Types, assign “Dedicated Hot Spare” drive of the same Drive Type to each RAID array, to prevent from mixing two Drive Types in a RAID array. “Global Hot Spare” cannot be used.

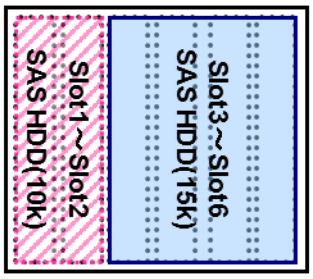
Mixing Drive Types in Server Module

Two types of drive can be installed in a Server Module (6 drive slots for 1U Server Module, 12 drive slots for 2U Server Module). However, mixing SATA HDD and SAS HDD (10k, 10k 512e, 15k, 15k 512e) in Module Enclosure is not supported. There are eight “Drive Types”, such as SAS HDD 10k, SAS HDD 10k(512e), SAS HDD 15k, SAS HDD 15k(512e), SATA HDD, SAS SSD(ME), SATA SSD(ME), and SATA SSD(VE).

Followings are examples of 1U Server Module.

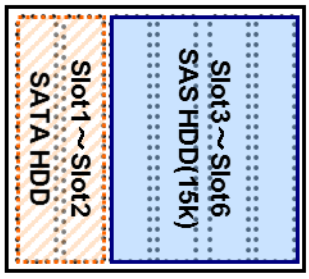
OK

Up to two Drive Types can be installed in one drive cage. Any combination of drives is OK excluding mixing SATA HDD and SAS HDD.
(Ex. 2x SAS HDD(10k) and 4x SAS HDD(15k))



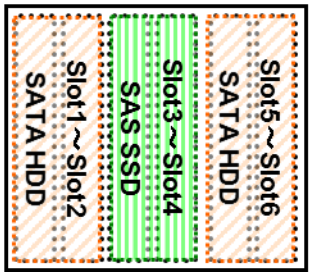
N/A

Mixing SATA HDD and SAS HDD is not supported in one cage.



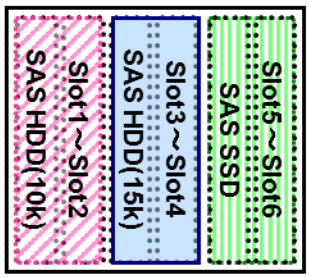
N/A

Drives of one Drive Type are put in 2 places or more separately in one cage.



N/A

More than two Drive Types can not be installed in one cage.



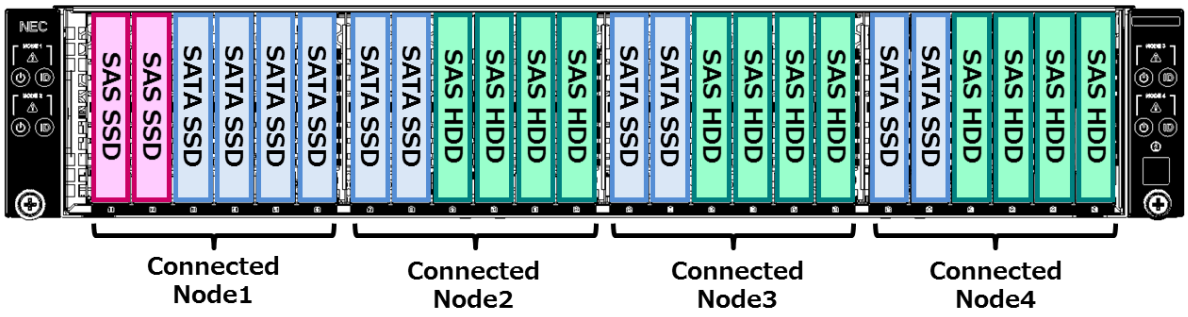
Mixing Drive Types in a Module Enclosure

Mixing SATA HDD and SAS HDD (10k, 15k) in a Module Enclosure is not supported. The internal drives should be selected from a group of “SATA HDD, SATA SSD, and SAS SSD” and “SAS HDD(10k), SAS HDD(15k), SATA SSD, and SAS SSD” for mounting in Module Enclosure. “SAS HDD (10k)” contains the Drive Types, both SAS HDD 10k and SAS HDD 10k (512e). “SAS HDD (15k)” contains the Drive Types, both SAS HDD 15k and SAS HDD 15k (512e).

Followings are examples of Module Enclosure (1U).

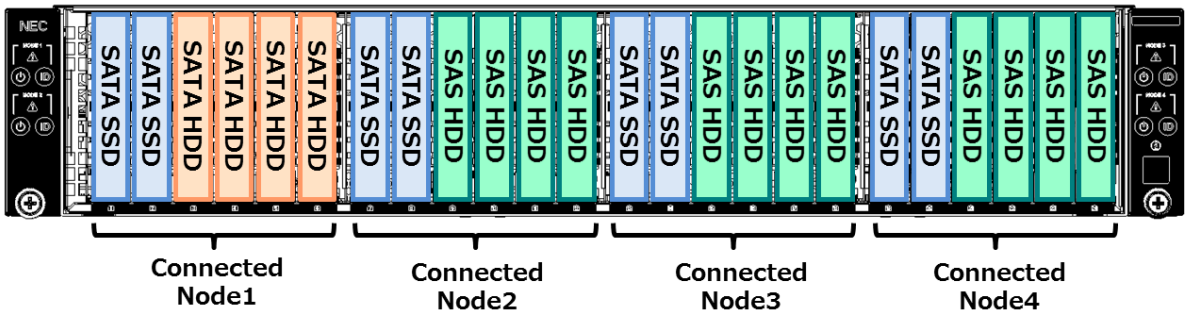
OK configuration

Not mixing SATA HDD and SAS HDD(10k, 15k) in one Module Enclosure



N/A configuration

Mixing SATA HDD and SAS HDD (10k, 15k) in one Module Enclosure



Server Module mounting location in case of mounting SATA HDD

In case of mounting SATA HDD, please locate the Server Module with SATA HDD in the Module Enclosure in accordance with following table in order to maximize performance. If Server Module is mounted at the location that is not listed in following table, it is not supported because the performance is not maximized. The configuration of three 1U Server Modules with SATA HDD is also not supported. There is no limitation to the Server Module location in the configuration of the Server Module without SATA HDD.

1U Server Module

Server Module	Number of node	#	Drive cage 1 (Node 1)	Drive cage 2 (Node 2)	Drive cage 3 (Node 3)	Drive cage 4 (Node 4)
1U (2U4node)	2node	1	SATA HDD	SSD	-	-
		2	SATA HDD	-	-	SATA HDD
	3node	3	SATA HDD	SSD	SSD	-
		4	SATA HDD	SSD	-	SATA HDD
	4node	5	SATA HDD	SSD	SSD	SSD
		6	SATA HDD	SSD	SSD	SATA HDD
		7	SATA HDD	SATA HDD	SATA HDD	SATA HDD

SSD: The configuration which only SATA SSD and/or SAS SSD is mounted in the cage (SATA HDD is not included in one drive cage).

SATA HDD: The configuration which equal or more than one SATA HDD is mounted (Including the mixing case of SSD and SATA HDD in one drive cage).

2U Server Module

In case of 2U Server Module, not only Server Module location but also SATA HDD drive location depending on SATA HDD quantity has to accord with the following table in order to maximize performance

Server Module	Number of node	#	Drive cage 1 (Node 2)	Drive cage 2 (Node 2)	Drive cage 3 (Node 4)	Drive cage 4 (Node 4)
2U (2U2node)	2node	8		SATA HDD		SSD
		9	-	SATA HDD	-	SATA HDD
		10	SATA HDD			SATA HDD
		11	SATA HDD		SATA HDD	

SSD: The configuration which only SATA SSD and/or SAS SSD is mounted in the cage (SATA HDD is not included in drive cage for a Server Module).

SATA HDD: The configuration which equal or more than one SATA HDD is mounted (Including the mixing case of SSD and SATA HDD in drive cage for a Server Module).

Server Management

BMC (Baseboard Management Controller), integrated into the server, provides superior remote control and system management features listed in the table below.

		Standard	With Remote KVM and Media License kit
Hardware monitoring	Temperature/Voltage/Power/Drive/FAN/CPU/ Memory	✓	✓
	Hardware configuration information collection	✓	✓
	Hardware event log collection	✓	✓
Boot monitoring	BIOS/POST stall, Booting, OS stall, shutdown	✓[1]	✓[1]
Alerting	HW error, Boot error , and OS panic (by SNMP, E-Mail)	✓	✓
Remote KVM (via LAN)	POST/BIOS setup, ROM utility	✓	✓
	Panic screen, Boot screen	✓[2,]	✓
	CUI-based screen (OS console)	✓	✓
	GUI-based screen (OS console)	-	✓
	Plugin-less GUI-based screen (HTML5)	-	✓
Remote control (via LAN)	Remote reset/power on-off/ dump	✓	✓
	Remote power capping	✓	✓
	BIOS/BMC FW update	✓	✓
	OS shutdown	✓[1]	✓[1]
	Remote media (CD/DVD/FD/USB)	-	✓
	CLP (Command Line Protocol) (DMTF compliant)	✓	✓
	Remote control via Web browser (multi user login at the same time)	✓	✓
Others	Set automatic IP address via DNS/DHCP	✓	✓
	LDAP/Active Directory verification/user control	✓	✓
	Clock synchronization	✓[3]	✓[3]
	IPMI	2.0	2.0
	IPv6(Web console/CLP only)	✓	✓
	Redfish™ API	✓	✓

[1] The feature is not supported on VMware ESXi systems.

[2] Monitoring boot screens is not supported on VMware systems.

[3] Requires installation of the NEC ESMPRO ServerAgentService to synchronize clock of the BMC and the RTC. Or enabling the NTP (Network Time Protocol) setting of the BMC to synchronize clock of the BMC and remote server if the NEC ESMPRO ServerAgentService cannot be installed to the server.

OS Support Matrix for PCI Cards and Embedded Controller

Part Number	Product Name	WS2012R2	WS2016	RHEL 7.3	ESXi 6.0	ESXi 6.5
-	Embedded SATA Controller					
-	Embedded 10GbE NIC					
N8103-199	SAS Controller	✓	✓	✓	✓	✓
N8103-188	RAID Controller (0GB, RAID 0/1)	✓	✓	✓	✓	✓
N8103-176	RAID Controller (1GB, RAID 0/1)	✓	✓	✓	✓	✓
N8103-177	RAID Controller (1GB, RAID 0/1/5/6)	✓	✓	✓	✓	✓
N8103-178	RAID Controller (2GB, RAID 0/1/5/6)	✓	✓	✓	✓	✓
N8103-184	SAS Controller	✓	✓	✓	✓	✓
N8190-161	Fibre Channel Controller (1ch)	✓	✓	✓	✓	✓
N8190-162	Fibre Channel Controller (2ch)	✓	✓	✓	✓	✓
N8104-150	1000BASE-T Adapter	✓	✓	✓	✓	✓
N8104-151	Dual Port 1000BASE-T Adapter	✓	✓	✓	✓	✓
N8104-152	Quad Port 1000BASE-T Adapter	✓	✓	✓	✓	✓
N8104-149	10GBASE SFP+ Adapter (SFP+/2ch)	✓	✓	✓	✓	✓
N8104-158	10GBASE Adapter (SFP+/2ch)	✓	✓	✓	✓	✓
N8104-159	10GBASE Adapter (QSFP+/4ch)	-	-	✓	-	-
N8104-157	Dual Port 10GBASE-T Adapter	✓	✓	✓	✓	✓
N8104-168	Quad Port 1000BASE-T Adapter	✓	✓	✓	✓	✓
N8104-170	Dual Port 10GBASE-SFP+ Adapter	✓	✓	✓	✓	✓

Supported PCI Cards and Installable Slots

1U Server Module

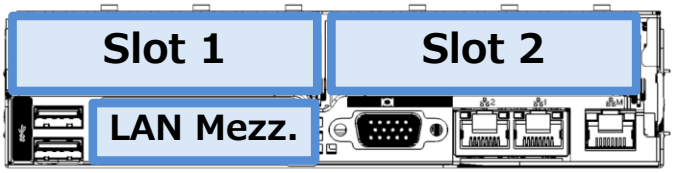
Part Number	Product Name	Slots		
		PCI #1	PCI #2	LAN Mezz.
N8103-199	SAS Controller	-	✓	-
N8103-188	RAID Controller (0GB, RAID 0/1)	-	✓	-
N8103-176	RAID Controller (1GB, RAID 0/1)	-	✓	-
N8103-177	RAID Controller (1GB, RAID 0/1/5/6)	-	✓	-
N8103-178	RAID Controller (2GB, RAID 0/1/5/6)	-	✓	-
N8103-184	SAS Controller	✓	✓	-
N8190-161	Fibre Channel Controller (1ch)	✓	✓	-
N8190-162	Fibre Channel Controller (2ch)	✓	✓	-
N8104-150	1000BASE-T Adapter	✓	✓	-
N8104-151	Dual Port 1000BASE-T Adapter	✓	✓	-
N8104-152	Quad Port 1000BASE-T Adapter	✓	✓	-
N8104-149	10GBASE SFP+ Adapter (SFP+/2ch)	✓	✓	-
N8104-158	10GBASE Adapter (SFP+/2ch)	✓	✓	-
N8104-159	10GBASE Adapter (QSFP+/4ch)	✓	✓	-
N8104-157	Dual Port 10GBASE-T Adapter	✓	✓	-
N8104-168	Quad Port 1000BASE-T Adapter	-	-	✓
N8104-170	Dual Port 10GBASE-SFP+ Adapter	-	-	✓
N8117-01A	Serial Port Adapter	✓	-	-
-	NVIDIA Tesla K80	-	-	-

2U Server Module

Part Number	Product Name	Slots			
		PCI #1	PCI #2	LAN Mezz.	PCI #4
N8103-199	SAS Controller	-	✓	-	-
N8103-188	RAID Controller (0GB, RAID 0/1)	-	✓	-	-
N8103-176	RAID Controller (1GB, RAID 0/1)	-	✓	-	-
N8103-177	RAID Controller (1GB, RAID 0/1/5/6)	-	✓	-	-
N8103-178	RAID Controller (2GB, RAID 0/1/5/6)	-	✓	-	-
N8103-184	SAS Controller	✓	✓	-	-
N8190-161	Fibre Channel Controller (1ch)	✓	✓	-	-
N8190-162	Fibre Channel Controller (2ch)	✓	✓	-	-
N8104-150	1000BASE-T Adapter	✓	✓	-	-
N8104-151	Dual Port 1000BASE-T Adapter	✓	✓	-	-
N8104-152	Quad Port 1000BASE-T Adapter	✓	✓	-	-
N8104-149	10GBASE SFP+ Adapter (SFP+/2ch)	✓	✓	-	-
N8104-158	10GBASE Adapter (SFP+/2ch)	✓	✓	-	-
N8104-159	10GBASE Adapter (QSFP+/4ch)	✓	✓	-	-
N8104-157	Dual Port 10GBASE-T Adapter	✓	✓	-	-
N8104-168	Quad Port 1000BASE-T Adapter	-	-	✓	-
N8104-170	Dual Port 10GBASE-SFP+ Adapter	-	-	✓	-
N8117-01A	Serial Port Adapter	✓	-	-	-
-	NVIDIA Tesla K80	-	-	-	✓

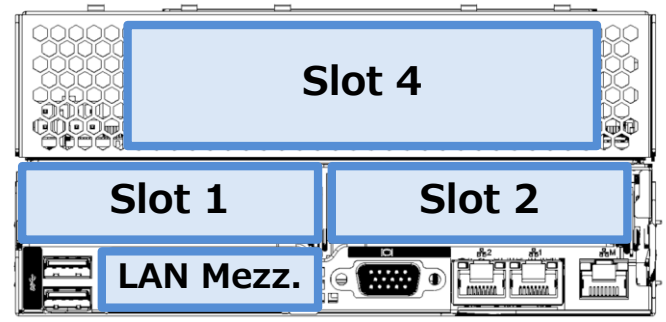
Expansion Slots

1U Server Module



Slot Name	Standard	Bus Width	Connector Width	Height	Length	Processor
Slot 1	PCIe 3.0	x16	x16	Low Profile	Up to 220 mm	CPU1
Slot 2	PCIe 3.0	X8	x8	Low Profile	Up to 220 mm	CPU1
LAN Mezz.	PCIe 3.0	x16	x16	-	-	CPU1

2U Server Module



Slot Name	Standard	Bus Width	Connector Width	Height	Length	Processor
Slot 1	PCIe 3.0	x16	x16	Low Profile	Up to 220 mm	CPU1
Slot 2	PCIe 3.0	X8	x8	Low Profile	Up to 220 mm	CPU1
LAN Mezz.	PCIe 3.0	x16	x16	-	-	CPU1
Slot 4	PCIe 3.0	x16	x16	-	-	CPU2

Supported Tape and Removal Disk Backup Drive List

See the following table for supported tape and removal disk backup drives. An optional tape drive enclosure is needed to connect the backup drives to the server.

Category	Product Name / Description	Part Number
LTO	**Internal LTO (SAS)** LTO4, Half height, Native capacity 800 GB	N8151-127
	Internal LTO (SAS) LTO5, Half height, Native capacity 1.5 TB	N8151-128
	Internal LTO (SAS) **LTO6, Half height, Native capacity 2.5 TB**	N8151-129
	Internal LTO (SAS) LTO7, Half height, Native capacity 6 TB	N8151-136
RDX	**Internal RDX (USB)**	N8151-125

Boot Mode Setting

The server supports Legacy mode and UEFI mode (default) as an OS Boot Mode. See the table below for the Boot Mode and X2APIC setting for each Operating System. As the default settings at the factory, UEFI mode is set as OS Boot mode and X2APIC is enabled. Refer to the User's Guide and change the settings before installing an Operating System requiring Legacy Mode.

Operating System	Supported Boot Mode	Supported X2APIC Setting
Windows Server 2012 R2	UEFI	Enabled
Windows Server 2016	UEFI	Enabled
Red Hat Enterprise Linux 7	UEFI	Enabled
VMware ESXi 6.0 Update3	UEFI	Enabled
VMware ESXi 6.5 Update1	UEFI	Enabled

Secure Boot Mode

This server supports Secure Boot. It is supported with UEFI Boot mode and protects the security by only allowing software programs with digital signature to run. The supported operating systems, software, and boot devices are below. The default setting of Secure Boot is disabled. Keep the setting disabled to use other operating systems and/or software.

Supported OS and Software for Secure Boot Mode

Operating System	Supported Boot Mode	Secure Boot Mode
Windows Server 2012 R2	UEFI	✓
Windows Server 2016	UEFI	✓
VMware ESXi 6.5	UEFI	✓
Software Related to Boot	**Supported Boot Mode**	**Secure Boot Mode**
System Diagnostics Utility	UEFI	✓
EXPRESSBUILDER	UEFI	✓

Supported Boot Device for Secure Boot Mode

Supported Boot Device	Part Number
RAID controller (RAID0/1)	N8103-188
RAID controller (1GB, RAID0/1)	N8103-176
RAID controller (1GB, RAID0/1/5/6)	N8103-177
RAID controller (2GB, RAID0/1/5/6)	N8103-178

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For hard drive capacity measurements, 1 GB = 1 billion bytes. Actual formatted capacity is less.

Revision History

Revision	Date	Description
2.0	January 17, 2018	**New products added:** ● 900GB 15K Hot Plug 2.5-inch SAS HDD / N8150-585 **Others:** ● Updated the note for N8104-152 Quad Port 1000BASE-T Adapter ● Updated support OS for N8104-158 10GBASE Adapter (SFP+/2ch) ● Information in References is updated
1.0	October 12, 2017	Initial release