

NEC Express5800/R110i-1 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

2.5-inch Drive Model

(1/2)

Model		R110i-1			
Part Number		N8100-2537F			
Processor	Type	Intel® Pentium® Processor G4560	Intel® Xeon® Processor E3-1220 v6	Intel® Xeon® Processor E3-1225 v6	Intel® Xeon® Processor E3-1230 v6
	Clock Speed	3.50 GHz	3.00 GHz	3.30 GHz	3.50 GHz
	Number of Processor	1			
	Cache	3 MB	8 MB		
	Cores and Threads	2C / 4T	4C / 4T		4C / 8T
Chipset		Intel® C236 Chipset			
Memory	Type	DDR4-2400 ECC Unbuffered DIMM			
	Standard Capacity	0 GB			
	Maximum Capacity	64 GB (4 x 16 GB)			
Internal Storage	Standard Capacity	0 GB			
	Maximum Capacity	SATA HDD: 16 TB (8 x 2 TB) SAS HDD : 19.2 TB (8 x 2.4 TB) SATA SSD 12.8 TB (8 x 1.6 TB) SAS SSD 3.2 TB (8 x 400 GB)			
	Disk Controller	SATA : 6 Gb/s (Integrated) SATA/SAS : 6/12 Gb/s (Optional)			
	RAID	SATA : RAID 0/1/10 (Standard ¹) SATA/SAS : RAID 0/1/5/6/10/50/60 (Optional)			
	Hot Plug	Supported			
	Optical Disk Drive	Optional			
	Optical Drive Bays	1			
	Disk Drive Bays	8			
	Expansion Slots		Total: 3 slots available 1 PCIe 3.0 x16 (x16 connector) 1 PCIe 3.0 x4 (x8 connector) 1 PCIe 3.0 x4 (x8 connector) dedicated RAID slot		
Video	Controller (VRAM)	Integrated in Server Management Controller (32MB)			
	Resolution / Color	1600 x 1200 / 16.7M ²			
Interfaces		1 VGA (15-pin mini D-sub, 1 rear) 1 to 2 Serial (9-pin mini D-sub, RS232-C, 1 to 2 rear) 6 USB 3.0 (2 front, 4 rear) (plus 1 internal USB 3.0) 2 1000BASE-T LAN connector (RJ-45, 2 rear) 1 1000BASE-T LAN connector for management (RJ-45, 1 rear)			
Server Management		EXPRESSSCOPE Engine 3			
Redundant Fan		Optional, non-hot plug			
Power Supply		2 450 Watt 80 PLUS® Gold certified Hot plug PSU 100-240 VAC ± 10% 50 / 60 Hz ± 3 Hz			
Power Consumption	(Max. Config, Idling)	123 VA / 122 Watt	122 VA / 121 Watt	125 VA / 124 Watt	123 VA / 122 Watt
	(Max. Config, Operating)	284 VA / 282 Watt	325 VA / 323 Watt	320 VA / 318 Watt	347 VA / 345 Watt
Acoustic Noise (Sound Pressure Level) ³	Minimum Config.	46 dB			
	Maximum Config.	49 dB			
Dimensions (W x D x H)		444.0 x 615.2 x 43.6 mm / 17.5 x 24.2 x 1.7 in (1U)			
Weight (Minimum / Maximum)		10 kg / 17.5 kg, 22.05 lbs. / 38.58 lbs.			
Temperature, Relative Humidity (non-condensing)		Operating: 5° to 40° C / 41° to 104° F (Standard) or 5° to 45° C / 41° to 113° F (Optional), 10 to 85% Non-Operating: -10° to 55° C / 14° to 131° F, 10 to 85%			

Model	R110i-1
Regulatory and Safety	FCC, c-UL, CE, CB, RoHS, WEEE, BSMI, CCC
Operating Systems and Virtualization Software	Microsoft® Windows Server® 2012 Standard Microsoft® Windows Server® 2012 Datacenter Microsoft® Windows Server® 2012 R2 Standard Microsoft® Windows Server® 2012 R2 Datacenter Microsoft® Windows Server® 2016 Standard Microsoft® Windows Server® 2016 Datacenter Red Hat Enterprise Linux 7.3 or later ⁴ VMware ESXi 6.0 Update 3 ⁵ VMware ESXi 6.5 ⁵ VMware ESXi 6.7 ⁵

- ¹ Embedded SATA RAID controller is supported only on limited operating systems.
- ² Maximum resolution available via EXPRESSSCOPE Engine 3 remote console is 1280 x 1024 / 65K colors.
- ³ Noise emission was measured in accordance with ISO 7779, at 25°C. The actual value may vary by the operating environment.
- ⁴ For Linux support, contact your sales representative or visit the NEC website at:
<http://www.nec.com/en/global/prod/express/linux/index.html>
- ⁵ Supported on Xeon processor systems only.

(2/2)

Model	R110i-1			
Part Number	N8100-2537F			
Processor	Type	Intel® Xeon® Processor E3-1240L v5	Intel® Xeon® Processor E3-1260L v5	Intel® Xeon® Processor E3-1270 v6
	Clock Speed	2.10 GHz	2.90 GHz	3.80 GHz
	Number of Processor	1		
	Cache	8 MB		
	Cores and Threads	4C / 8T		
Chipset	Intel® C236 Chipset			
Memory	Type	DDR4-2400 ECC Unbuffered DIMM		
	Standard Capacity	0 GB		
	Maximum Capacity	64 GB (4 x 16 GB)		
Internal Storage	Standard Capacity	0 GB		
	Maximum Capacity	SATA HDD: 16 TB (8 x 2 TB) SAS HDD : 19.2 TB (8 x 2.4 TB) SATA SSD 12.8 TB (8 x 1.6 TB) SAS SSD 3.2 TB (8 x 400 GB)		
	Disk Controller	SATA : 6 Gb/s (Integrated) SATA/SAS : 6/12 Gb/s (Optional)		
	RAID	SATA : RAID 0/1/10 (Standard ¹) SATA/SAS : RAID 0/1/5/6/10/50/60 (Optional)		
	Hot Plug	Supported		
	Optical Disk Drive	Optional		
	Optical Drive Bays	1		
	Disk Drive Bays	8		
	Expansion Slots	Total: 3 slots available 1 PCIe 3.0 x16 (x16 connector) 1 PCIe 3.0 x4 (x8 connector) 1 PCIe 3.0 x4 (x8 connector) dedicated RAID slot		
	Video	Controller (VRAM)	Integrated in Server Management Controller (32MB)	
Resolution / Color		1600 x 1200 / 16.7M ²		
Interfaces	1 VGA (15-pin mini D-sub, 1 rear) 1 to 2 Serial (9-pin mini D-sub, RS232-C, 1 to 2 rear) 6 USB 3.0 (2 front, 4 rear) (plus 1 internal USB 3.0) 2 1000BASE-T LAN connector (RJ-45, 2 rear) 1 1000BASE-T LAN connector for management (RJ-45, 1 rear)			
Server Management	EXPRESSSCOPE Engine 3			
Redundant Fan	Optional, non-hot plug			
Power Supply	2 450 Watt 80 PLUS® Gold certified Hot plug PSU 100-240 VAC ± 10% 50 / 60 Hz ± 3 Hz			

Model		R110i-1		
Power Consumption	(Max. Config, Idling)	117 VA / 116 W	119 VA / 118 W	124 VA / 123 Watt
	(Max. Config, Operating)	170 VA / 169 W	198 VA / 197 Watt	251 VA / 249 Watt
Acoustic Noise (Sound Pressure Level) ³	Minimum Config.	46 dB		
	Maximum Config.	49 dB		
Dimensions (W x D x H)		444.0 x 615.2 x 43.6 mm / 17.5 x 24.2 x 1.7 in (1U)		
Weight (Minimum / Maximum)		10 kg / 17.5 kg, 22.05 lbs. / 38.58 lbs.		
Temperature, Relative Humidity (non-condensing)		Operating: 5° to 40° C / 41° to 104° F (Standard) or 5° to 45° C / 41° to 113° F (Optional), 10 to 85% Non-Operating: -10° to 55° C / 14° to 131° F, 10 to 85%		
Regulatory and Safety		FCC, c-UL, CE, CB, RoHS, WEEE, BSMI, CCC		
Operating Systems and Virtualization Software		Microsoft® Windows Server® 2012 Standard Microsoft® Windows Server® 2012 Datacenter Microsoft® Windows Server® 2012 R2 Standard Microsoft® Windows Server® 2012 R2 Datacenter Microsoft® Windows Server® 2016 Standard Microsoft® Windows Server® 2016 Datacenter Red Hat Enterprise Linux 7.3 or later ⁴ VMware ESXi 6.0 Update 3 ⁵ VMware ESXi 6.5 ⁵ VMware ESXi 6.7 ⁵		

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² Maximum resolution available via EXPRESSSCOPE Engine 3 remote console is 1280 x 1024 / 65K colors.

³ Noise emission was measured in accordance with ISO 7779, at 25°C. The actual value may vary by the operating environment.

⁴ For Linux support, contact your sales representative or visit the NEC website at:
<http://www.nec.com/en/global/prod/express/linux/index.html>

3.5-inch Drive Model

(1/2)

Model		R110i-1			
Part Number		N8100-2359F, N8100-2360F			
Processor	Type	Intel® Pentium® Processor G4560	Intel® Xeon® Processor E3-1220 v6	Intel® Xeon® Processor E3-1225 v6	Intel® Xeon® Processor E3-1230 v6
	Clock Speed	3.50 GHz	3.00 GHz	3.30 GHz	3.50 GHz
	Number of Processor	1			
	Cache	3 MB	8 MB		
	Cores and Threads	2C / 4T	4C / 4T		4C / 8T
Chipset		Intel® C236 Chipset			
Memory	Type	DDR4-2400 ECC Unbuffered DIMM			
	Standard Capacity	0 GB			
	Maximum Capacity	64 GB (4 x 16 GB)			
Internal Storage	Standard Capacity	0 GB			
	Maximum Capacity	SATA : 48 TB (4 x 12 TB)			
	Disk Controller	SATA : 6Gb/s (Integrated)			
	RAID	SATA : RAID 0/1/10 (Standard ¹), RAID 5/6 (Optional)			
	Hot Plug	Supported			
	Optical Disk Drive	Optional			
	Optical Drive Bays	1			
Expansion Slots	Disk Drive Bays	4			
	Total: 3 slots available				
	1 PCIe 3.0 x16 (x16 connector)				
	1 PCIe 3.0 x4 (x8 connector) 1 PCIe 3.0 x4 (x8 connector) dedicated RAID slot				
Video	Controller (VRAM)	Integrated in Server Management Controller (32MB)			
	Resolution / Color	1600 x 1200 / 16.7M ²			

Model		R110i-1			
Interfaces		1 VGA (15-pin mini D-sub, 1 rear) 1 to 2 Serial (9-pin mini D-sub, RS232-C, 1 to 2 rear) 6 USB 3.0 (2 front, 4 rear) (plus 1 internal USB 3.0) 2 1000BASE-T LAN connector (RJ-45, 2 rear) 1 1000BASE-T LAN connector for management (RJ-45, 1 rear)			
Server Management		EXPRESSSCOPE Engine 3			
Redundant Fan		Optional, non-hot plug			
Power Supply		1 400 Watt 80 PLUS® Platinum certified non-Hot plug PSU 2 450 Watt 80 PLUS® Gold certified Hot plug PSU 100-240 VAC ± 10% 50 / 60 Hz ± 3 Hz			
Power Consumption	(Max. Config, Idling)	116 VA / 115 Watt	116 VA / 115 Watt	116 VA / 115 Watt	117 VA / 116 Watt
	(Max. Config, Operating)	158 VA / 157 Watt	195 VA / 194 Watt	194 VA / 193 Watt	224 VA / 222 Watt
Acoustic Noise (Sound Pressure Level)³	Minimum Config.	40 dB			
	Maximum Config.	49 dB			
Dimensions (W x D x H)		444.0 x 615.2 x 43.6 mm / 17.5 x 24.2 x 1.7 in (1U)			
Weight (Minimum / Maximum)		10 kg / 17.5 kg, 22.05 lbs. / 38.58 lbs.			
Temperature, Relative Humidity (non-condensing)		Operating: 5° to 40° C / 41° to 104° F (Standard) or 5° to 45° C / 41° to 113° F (Optional), 10 to 85% Non-Operating: -10° to 55° C / 14° to 131° F, 10 to 85%			
Regulatory and Safety		FCC, c-UL, CE, CB, RoHS, WEEE, BSMI, CCC			
Operating Systems and Virtualization Software		Microsoft® Windows Server® 2012 Standard Microsoft® Windows Server® 2012 Datacenter Microsoft® Windows Server® 2012 R2 Standard Microsoft® Windows Server® 2012 R2 Datacenter Microsoft® Windows Server® 2016 Standard Microsoft® Windows Server® 2016 Datacenter Red Hat Enterprise Linux 7.3 or later ⁴ VMware ESXi 6.0 Update 3 ⁵ VMware ESXi 6.5 ⁵ VMware ESXi 6.7 ⁵			

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⁵ Supported on Xeon processor systems only.

(2/2)

Model		R110i-1		
Part Number		N8100-2359F, N8100-2360F		
Processor	Type	Intel® Xeon® Processor E3-1240L v5	Intel® Xeon® Processor E3-1260L v5	Intel® Xeon® Processor E3-1270 v6
	Clock Speed	2.10 GHz	2.90 GHz	3.80 GHz
	Number of Processor	1		
	Cache	8 MB		
	Cores and Threads	4C / 8T		
Chipset		Intel® C236 Chipset		
Memory	Type	DDR4-2400 ECC Unbuffered DIMM		
	Standard Capacity	0 GB		
	Maximum Capacity	64 GB (4 x 16 GB)		
Internal Storage	Standard Capacity	0 GB		
	Maximum Capacity	SATA : 48 TB (4 x 12 TB)		
	Disk Controller	SATA : 6Gb/s (Integrated)		
	RAID	SATA : RAID 0/1/10 (Standard ¹), RAID 5/6 (Optional)		
	Hot Plug	Supported		
	Optical Disk Drive	Optional		
	Optical Drive Bays	1		

Model		R110i-1		
	Disk Drive Bays	4		
Expansion Slots		Total: 3 slots available 1 PCIe 3.0 x16 (x16 connector) 1 PCIe 3.0 x4 (x8 connector) 1 PCIe 3.0 x4 (x8 connector) dedicated RAID slot		
Video	Controller (VRAM)	Integrated in Server Management Controller (32MB)		
	Resolution / Color	1600 x 1200 / 16.7M ²		
Interfaces		1 VGA (15-pin mini D-sub, 1 rear) 1 to 2 Serial (9-pin mini D-sub, RS232-C, 1 to 2 rear) 6 USB 3.0 (2 front, 4 rear) (plus 1 internal USB 3.0) 2 1000BASE-T LAN connector (RJ-45, 2 rear) 1 1000BASE-T LAN connector for management (RJ-45, 1 rear)		
Server Management		EXPRESSSCOPE Engine 3		
Redundant Fan		Optional, non-hot plug		
Power Supply		1 400 Watt 80 PLUS® Platinum certified non-Hot plug PSU 2 450 Watt 80 PLUS® Gold certified Hot plug PSU 100-240 VAC ± 10% 50 / 60 Hz ± 3 Hz		
Power Consumption	(Max. Config, Idling)	117 VA / 116 Watt	116 VA / 115 Watt	117 VA / 116 Watt
	(Max. Config, Operating)	155 VA / 154 Watt	183 VA / 182 Watt	226 VA / 224 Watt
Acoustic Noise (Sound Pressure Level) ³	Minimum Config.	40 dB		
	Maximum Config.	49 dB		
Dimensions (W x D x H)		444.0 x 615.2 x 43.6 mm / 17.5 x 24.2 x 1.7 in (1U)		
Weight (Minimum / Maximum)		10 kg / 17.5 kg, 22.05 lbs. / 38.58 lbs.		
Temperature, Relative Humidity (non-condensing)		Operating: 5° to 40° C / 41° to 104° F (Standard) or 5° to 45° C / 41° to 113° F (Optional), 10 to 85% Non-Operating: -10° to 55° C / 14° to 131° F, 10 to 85%		
Regulatory and Safety		FCC, c-UL, CE, CB, RoHS, WEEE, BSMI, CCC		
Operating Systems and Virtualization Software		Microsoft® Windows Server® 2012 Standard Microsoft® Windows Server® 2012 Datacenter Microsoft® Windows Server® 2012 R2 Standard Microsoft® Windows Server® 2012 R2 Datacenter Microsoft® Windows Server® 2016 Standard Microsoft® Windows Server® 2016 Datacenter Red Hat Enterprise Linux 7.3 or later ⁴ VMware ESXi 6.0 Update 3 ⁵ VMware ESXi 6.5 ⁵ VMware ESXi 6.7 ⁵		

¹ Embedded SATA RAID controller is supported only on limited operating systems.

² Maximum resolution available via EXPRESSSCOPE Engine 3 remote console is 1280 x 1024 / 65K colors.

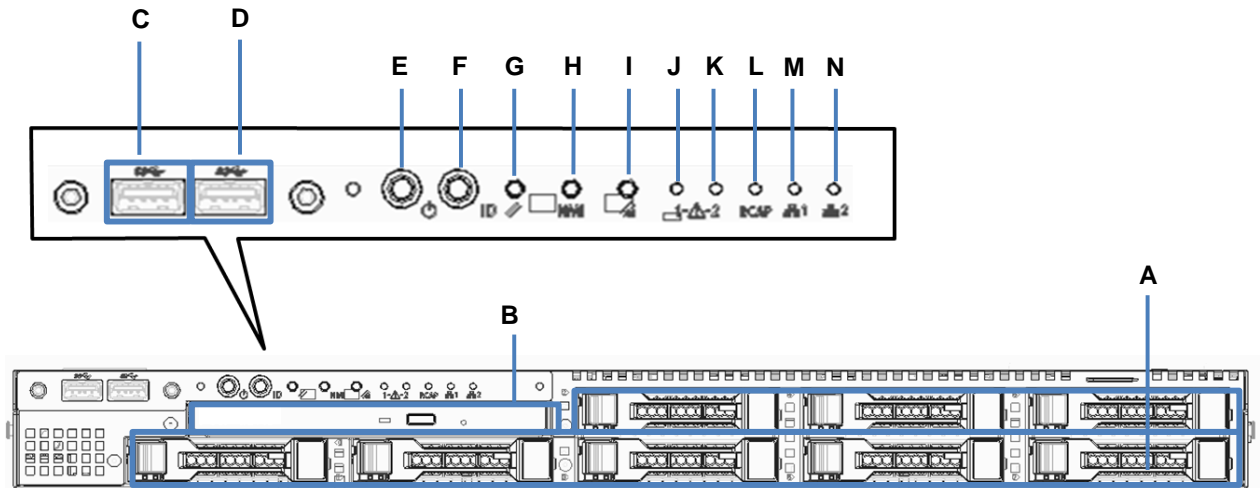
³ Noise emission was measured in accordance with ISO 7779, at 25°C. The actual value may vary by the operating environment.

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<http://www.nec.com/en/global/prod/express/linux/index.html>

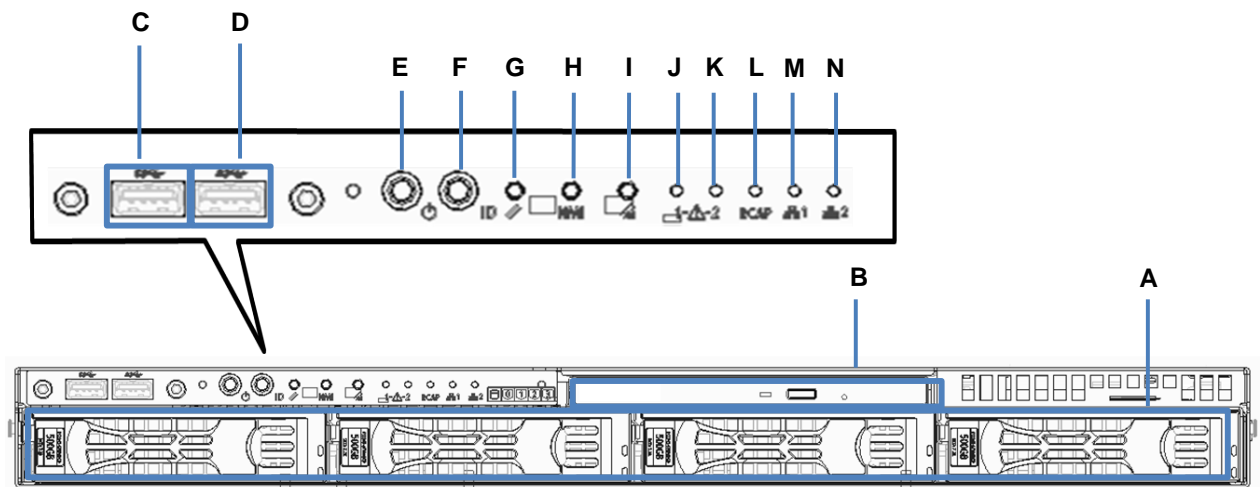
External Views

Front and Rear Views

Front View for 2.5-inch Drive Model

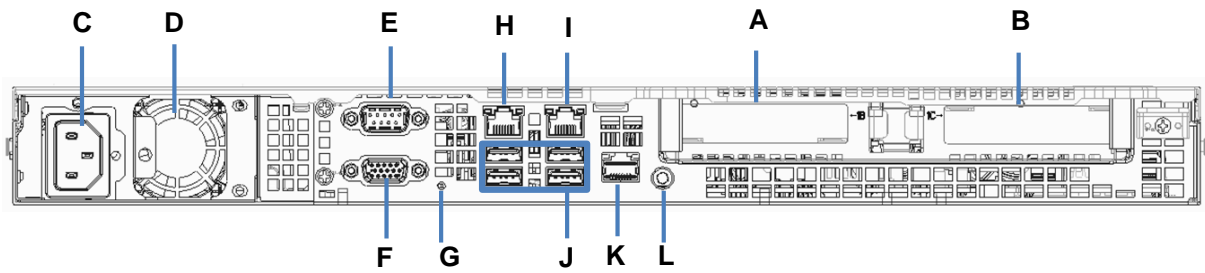


Front View for 3.5-inch Drive Model

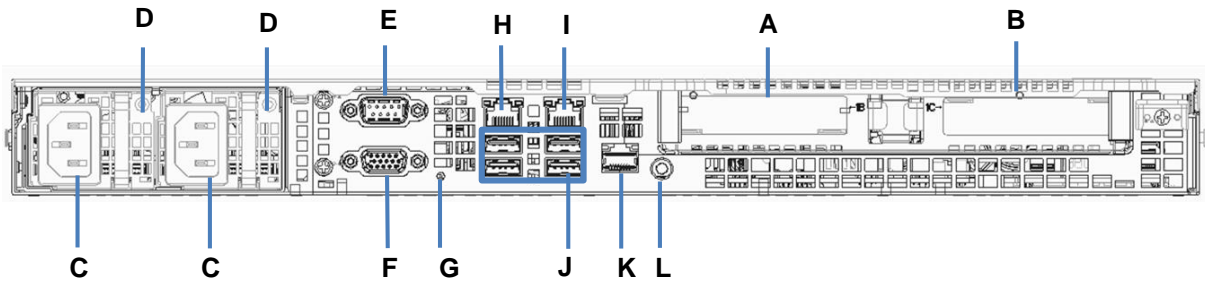


Legend			
A.	Drive Bays	H.	Dump (NMI) Switch
B.	Optical Drive Bay	I.	BMC Reset Button
C.	USB Connector	J.	System Status LED 1
D.	USB Connector	K.	System Status LED 2
E.	Power Button / Power LED	L.	Power Capping LED
F.	UID LED Button	M.	Data LAN 1 Activity LED
G.	Reset Button	N.	Data LAN 2 Activity LED

Rear View for Non-redundant PSU Configuration



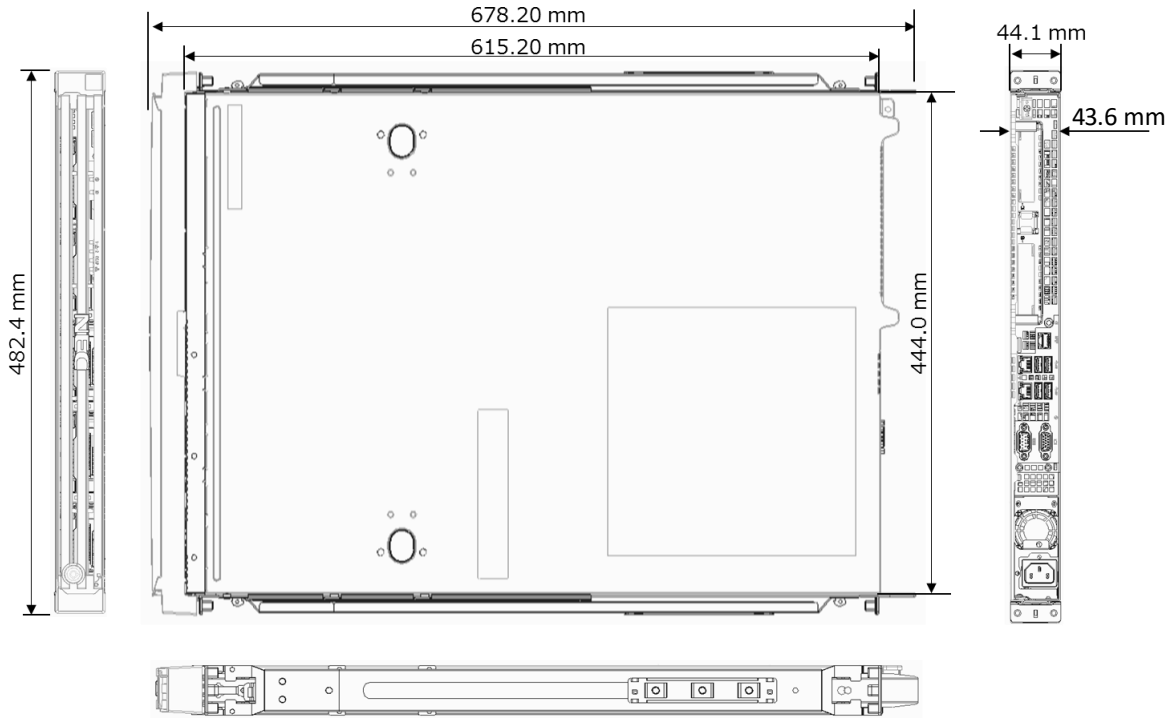
Rear View for Redundant PSU Configuration



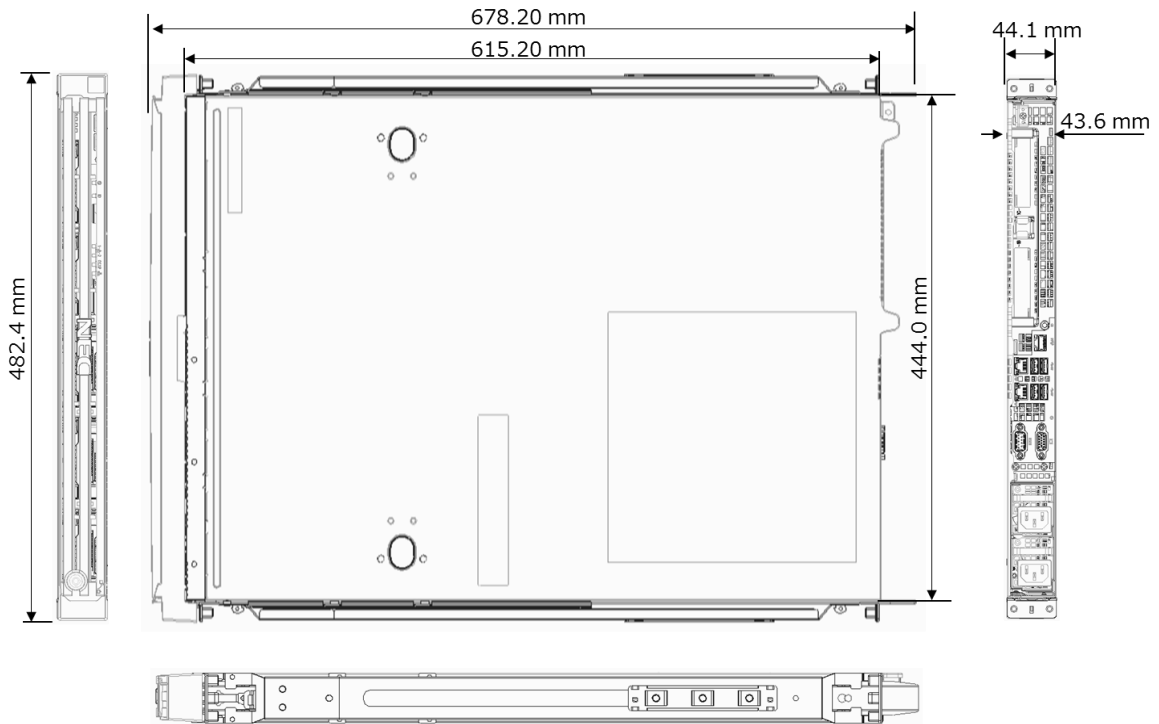
Legend	
A.	PCI Slot 1B
B.	PCI Slot 1C
C.	AC Inlet
D.	Power Unit
E.	Serial Port Connector
F.	VGA Connector
G.	Power LED
H.	Data LAN 1 Connector
I.	Data LAN 2 Connector
J.	USB 3.0 Connectors
K.	Management LAN Connector
L.	UID LED / Button

Dimensions (mm)

Non-Hot plug PSU Configuration

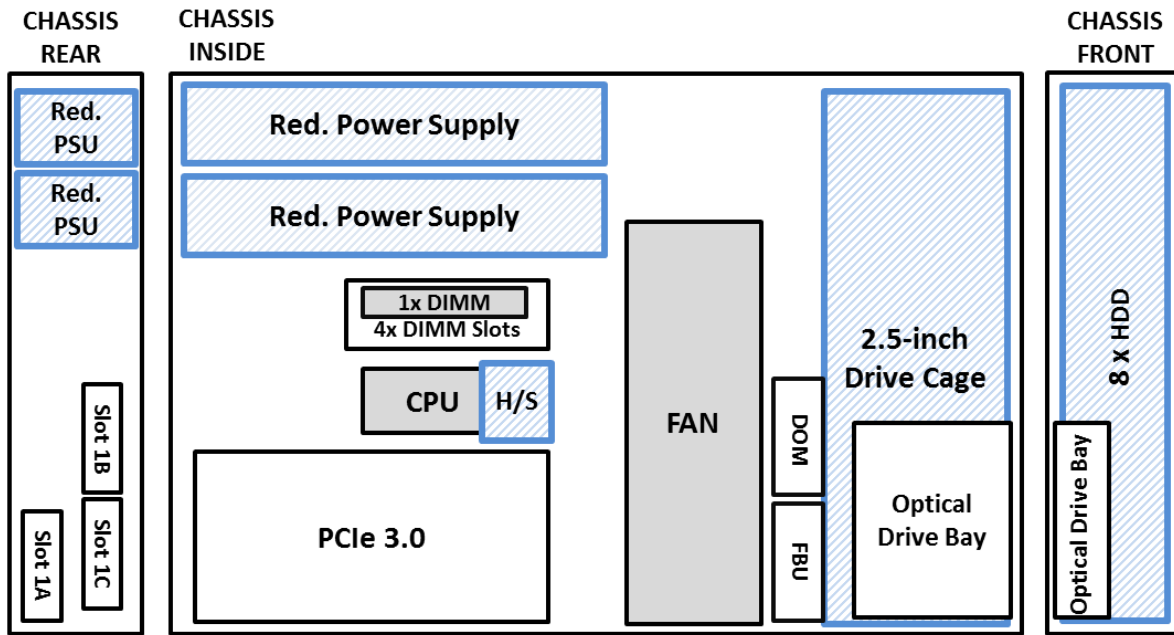


Hot plug PSU Configuration



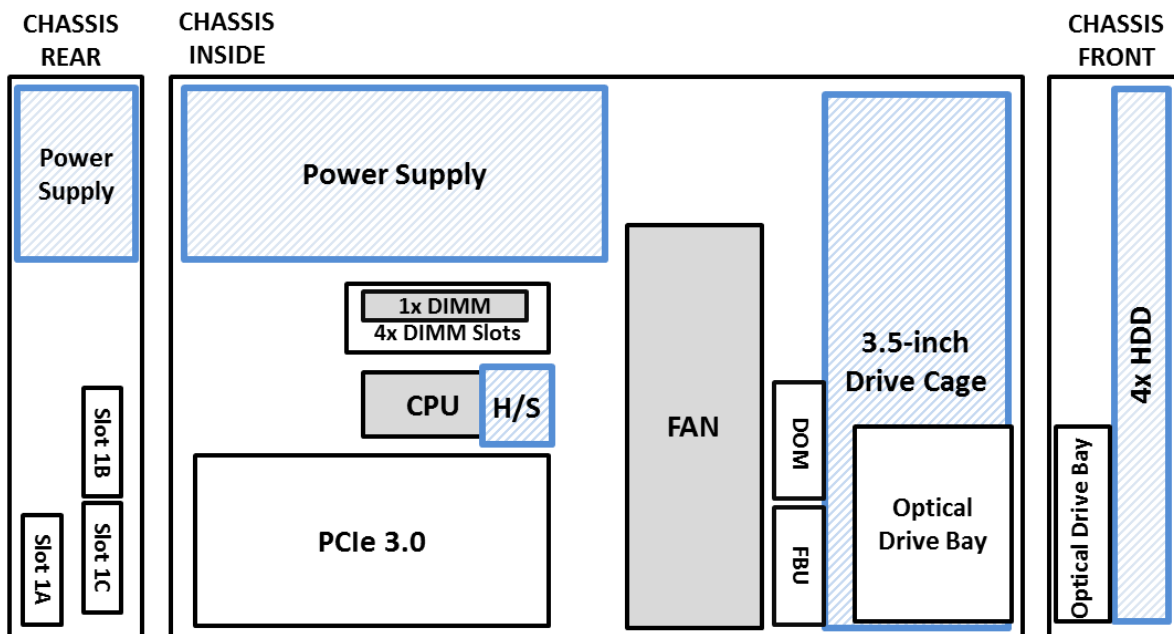
Configuration Diagram

2.5-inch Drive Model



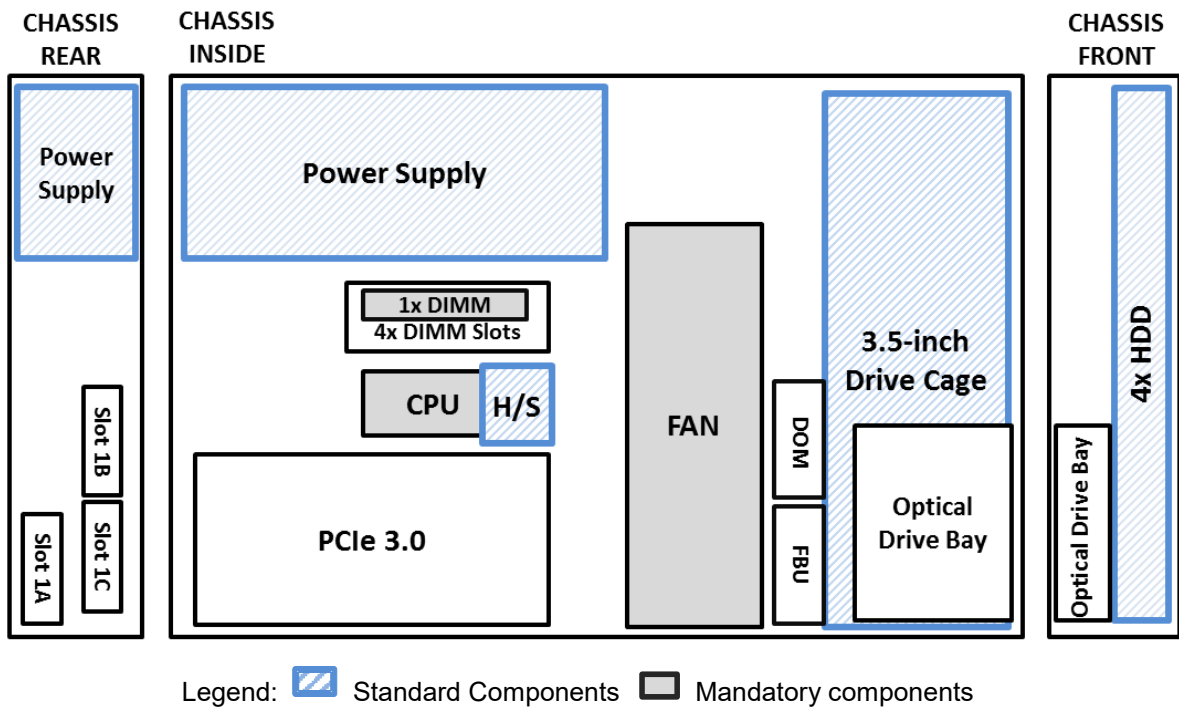
Legend: Standard Components Mandatory components

3.5-inch Drive Model (Non-redundant PSU)

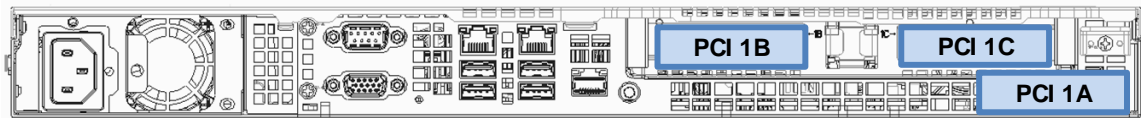


Legend: Standard Components Mandatory components

3.5-inch Drive Model (Redundant PSU)



Expansion Slots



Legend

#1A	PCIe 3.0 (x4) x4 lanes, x8 connector, for a dedicated RAID controller
#1B	PCIe 3.0 (x16) x16 lanes, x16 connector, Low profile, up to 173 mm length
#1C	PCIe 3.0 (x4) x4 lanes, x8 connector, Low profile, up to 173 mm length

Server Configuration

1 Base Models

Product Name / Description	Part Number
NEC Express5800/R110i-1 No CPU, no RAM, no 3.5-inch HDD, no Cooling FAN, no ODD Including: 3.5-inch Drive Cage, 1x 400 Watt non-hot plug power supply, Front bezel	N8100-2359F
NEC Express5800/R110i-1 No CPU, no RAM, no 3.5-inch HDD, no Cooling FAN, no ODD Including: 3.5-inch Drive Cage, 2 x 450 Watt hot plug power supply, Front bezel	N8100-2360F
NEC Express5800/R110i-1 No CPU, no RAM, no 2.5-inch HDD, no Cooling FAN, no ODD Including: 2.5-inch Drive Cage, 2 x 450 Watt hot plug power supply, Front bezel,	N8100-2537F

NOTE:

- The base model must be ordered with a processor kit, a memory kit, a cooling fan kit, and internal hard drive cable

2 Processor

Available sockets: 1

Category	Product Name / Description	Part Number
Processors Required	Pentium G4560 Processor Kit Intel® Pentium® Processor G4560 (3.50 GHz, 2C/4T, 3 MB)	N8101-1086F
	Xeon E3-1220 v6 Processor Kit Intel® Xeon® Processor E3-1220 v6 (3 GHz, 4C/4T, 8 MB)	N8101-1091F
	Xeon E3-1225 v6 Processor Kit Intel® Xeon® Processor E3-1225 v6 (3.30 GHz, 4C/4T, 8 MB)	N8101-1090F
	Xeon E3-1230 v6 Processor Kit Intel® Xeon® Processor E3-1230 v6 (3.50 GHz, 4C/8T, 8 MB)	N8101-1089F
	Xeon E3-1240L v5 Processor Kit Intel® Xeon® Processor E3-1240L v5 (2.10 GHz, 4C/8T, 8 MB)	N8101-943F
	Xeon E3-1260L v5 Processor Kit Intel® Xeon® Processor E3-1260L v5 (2.90 GHz, 4C/8T, 8 MB)	N8101-944F
	Xeon E3-1270 v6 Processor Kit Intel® Xeon® Processor E3-1270 v6 (3.80 GHz, 4C/8T, 8 MB)	N8101-1088F

NOTE:

- The processor kit must be ordered with the base model.
- VMware ESXi is not supported on Pentium processor systems.

3 Memory

Available slots: 4

Product Name / Description	Part Number
8GB DDR4-2400 UNB Memory Kit 8GB Unbuffered ECC DIMM, DDR4-2400	N8102-701F
16GB DDR4-2400 UNB Memory Kit 16GB Unbuffered ECC DIMM, DDR4-2400	N8102-702F

NOTE:

- Minimum one memory kit must be installed.
- It is recommended to install memory kits in pairs of two identical DIMMs for dual-channel symmetric memory configurations to increase memory transfer speed.
- At least 5 GB of memory is required for VMware ESXi™ 6.0 and VMware ESXi™ 6.5

Maximum Available Memory

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

The maximum available memory is less than the maximum physical memory supported by your system because some chipsets require PCI resource space of about 750MB. PCI resource requirements vary depending on the type and the number of PCI cards you are using.

Operating Systems	Maximum Memory Size Supported by Operating Systems	Maximum Available Memory
Microsoft Windows Server 2012 Standard Microsoft Windows Server 2012 Datacenter Microsoft Windows Server 2012 R2 Standard Microsoft Windows Server 2012 R2 Datacenter	4 TB ¹	64 GB
Microsoft Windows Server 2016 Standard Microsoft Windows Server 2016 Datacenter	24TB ¹	64GB
Red Hat Enterprise Linux 7	6 TB	64 GB
VMware ESXi 6.0	6 TB ²	64 GB
VMware ESXi 6.5	12 TB ³	64 GB
VMware ESXi 6.7 ³	16 TB	64 GB

¹ The maximum available memory size of Hyper-V systems are below:

- Windows Server 2012, Windows Server 2012 R2 : 4 TB
- Windows Server 2016 : 24 TB

² Up to 4 TB of main memory is available to each virtual machine.

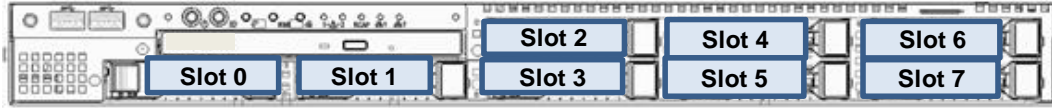
³ Up to 6 TB of main memory is available to each virtual machine.

4 Internal Hard Disk Drives

4.1 RAID Configuration

Refer to the section in accordance with your disk form factor and RAID configuration.

4.1.1 2.5-inch Drive



Operating System	Supported RAID configuration		Supported HDD/SSD
	RAID and Cache	Section	
VMware ESXi 6.0	Non-RAID (Embedded SATA)	4.2.1	4.3.1
	RAID 0/1/10 No Cache	4.2.3	4.3.3
	RAID 5/6/50/60 2GB Cache	4.2.7	
Windows Server 2012 Windows Server 2012 R2 Windows Server 2016	Non-RAID (Embedded SATA)	4.2.1	4.3.1
	RAID 0/1 (Embedded SATA RAID)	4.2.2	4.3.2
	RAID 0/1/10 No Cache	4.2.4	4.3.4
	RAID 0/1/10 2GB Cache	4.2.5	
	RAID 5/6/50/60 2GB Cache	4.2.9	
	RAID 5/6/50/60 4GB Cache	4.2.10	
VMware ESXi 6.5	Non-RAID (Embedded SATA)	4.2.1	4.3.1
	RAID 0/1/10 No Cache	4.2.4	4.3.4
	RAID 0/1/10 2GB Cache	4.2.5	
	RAID 5/6/50/60 2GB Cache	4.2.9	
	RAID 5/6/50/60 4GB Cache	4.2.10	
VMware ESXi 6.7	Non-RAID (Embedded SATA)	4.2.1	4.3.1
	RAID 0/1/10 No Cache	4.2.4	4.3.4
	RAID 0/1/10 2GB Cache	4.2.5	
	RAID 5/6/50/60 2GB Cache	4.2.9	
	RAID 5/6/50/60 4GB Cache	4.2.10	
Red Hat Enterprise Linux 7	Non-RAID (Embedded SATA)	4.2.1	4.3.1
	RAID 0/1/10 No Cache	4.2.3	4.3.4
	RAID 0/1/10 1GB Cache	4.2.5	
	RAID 5/6/50/60 1GB Cache	4.2.7	
	RAID 5/6/50/60 2GB Cache	4.2.8	

NOTE:

- Up to four drives can be installed when you choose the Embedded SATA non-RAID controller.
- 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, SATA HDDs SAS SSDs, SATA SSD (ME), and SATA SSD (VE) 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.

4.1.2 3.5-inch Drive



Operating System	Supported RAID configuration		Supported HDD/SSD
	RAID and Cache	Section	
VMware ESXi 6.0	Non-RAID (Embedded SATA)	4.2.11	4.3.5
	RAID 0/1/10 No Cache	4.2.13	
	RAID 5/6/50/60 2GB Cache	4.2.18	
Windows Server 2012 Windows Server 2012 R2 Windows Server 2016	Non-RAID (Embedded SATA)	4.2.11	4.3.5
	RAID 0/1 (Embedded SATA RAID)	4.2.12	
	RAID 0/1/10 No Cache	4.2.14	4.3.6
	RAID 0/1/10 2GB Cache	4.2.16	
	RAID 5/6/50/60 2GB Cache	4.2.19	
	RAID 5/6/50/60 4GB Cache	4.2.20	
VMware ESXi 6.5	Non-RAID (Embedded SATA)	4.2.11	4.3.5
	RAID 0/1/10 No Cache	4.2.14	
	RAID 0/1/10 2GB Cache	4.2.16	4.3.6
	RAID 5/6/50/60 2GB Cache	4.2.19	
	RAID 5/6/50/60 4GB Cache	4.2.20	
VMware ESXi 6.7	Non-RAID (Embedded SATA)	4.2.11	4.3.5
	RAID 0/1/10 No Cache	4.2.14	
	RAID 0/1/10 2GB Cache	4.2.15	4.3.6
	RAID 5/6/50/60 2GB Cache	4.2.19	
	RAID 5/6/50/60 4GB Cache	4.2.20	
Red Hat Enterprise Linux 7	Non-RAID (Embedded SATA)	4.2.11	4.3.5
	RAID 0/1/10 No Cache	4.2.13	
	RAID 0/1/10 1GB Cache	4.2.15	4.3.6
	RAID 5/6/50/60 1GB Cache	4.2.17	
	RAID 5/6/50/60 2GB Cache	4.2.18	

NOTE:

- All hard drives within a RAID array should be of the same capacity.

4.1.3 M.2 SATA SSD

The M.2 SATA SSD can be used for boot drive only. See the table below for the system configuration of M.2 SATA SSD and support for the mixed installation of M.2 SATA SSDs and internal hard drives.

Operating System	M.2 SATA SSD configuration		Support for the mixed installation of M.2 SATA SSD and internal hard drives.
	RAID and Cache	Section	
VMware ESXi 6.5 VMware ESXi 6.7	RAID 0/1/10 No Cache	4.2.23	Not supported
	RAID 0/1/10 2GB Cache	4.2.24	
Windows Server 2012 Windows Server 2012 R2 Windows Server 2016	RAID 0/1 (Embedded SATA RAID)	4.2.21	Supported: Optional RAID controller is required to install internal hard drives.
	RAID 0/1/10 No Cache	4.2.23	Not supported
	RAID 0/1/10 2GB Cache	4.2.24	
Red Hat Enterprise Linux 7 VMware ESXi 6.0	RAID 0/1/10 No Cache	4.2.22	Not supported

4.2 Required Components for RAID Configuration

4.2.1 Embedded SATA non-RAID Controller for 2.5-inch Drives

Category	Product Name / Description	Part Number
Storage Controller	Embedded SATA Controller 4 x 6Gb/s SATA	(Standard)
Cable	Internal SAS/SATA Cable 1 x Mini SAS HD to 1 x Mini SAS HD, 1 set	(Standard)
Drive Cage	2.5-inch Drive Cage 8 x 2.5-inch Hot-plug hard drive bays	(Standard)

NOTE:

- Hot plug insertion/removal is not supported with the embedded SATA non-RAID controller.

4.2.2 Embedded SATA RAID Controller for 2.5-inch Drives

Category	Product Name / Description	Part Number
Storage Controller	Embedded SATA Controller 4x 6Gb/s SATA, RAID 0/1/10 capable	(Standard)
Cable	Internal SAS/SATA Cable 1 x Mini SAS HD to 1 x Mini SAS HD, 1 set	(Standard)
Drive Cage	2.5-inch Drive Cage 8 x 2.5-inch Hot-plug hard drive bays	(Standard)

NOTE

- Embedded SATA RAID controller is supported only on limited OS. For more details, please see [OS Support Matrix for PCI Cards and Embedded Controllers](#).
- All hard drives within a RAID array should be of the same capacity.

4.2.3 RAID 0/1 Controller without Cache for 2.5-inch Drives

Category	Product Name / Description	Part Number
Storage Controller Required	RAID Controller (RAID 0/1) Broadcom MegaRAID SAS 9341-8i RAID 0/1/10, non-cache, Int. 8, PCIe 3.0 x8, SAS 12Gb/s, SATA 6Gb/s	N8103-188
Cable	Internal SAS/SATA Cable 1 x Mini SAS HD to 1 x Mini SAS HD, 1 set	(Standard)
	Internal SAS/SATA Cable 1 x Mini SAS HD to 1 x Mini SAS HD, 1 set, for 5th - 8th hard drives	K410-348(00)
Drive Cage	2.5-inch Drive Cage 8 x 2.5-inch hot plug drive bays	(Standard)

NOTE:

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

4.2.4 RAID 0/1 Controller without Cache for 2.5-inch Drives

Category	Product Name / Description	Part Number
Storage Controller Required	RAID Controller (RAID 0/1) Avago(LSI) MegaRAID SAS 944N-8i RAID 0/1/10, non-cache, Int. 8, PCIe 3.0 x8, SAS 12Gb/s, SATA 6Gb/s	N8103-205
Cable	Internal SAS/SATA Cable 1 x Mini SAS HD to 1 x Mini SAS HD, 1 set	(Standard)
	Internal SAS/SATA Cable 1 x Mini SAS HD to 1 x Mini SAS HD, 1 set, for 5th - 8th hard drives	K410-348(00)
Drive Cage	2.5-inch Drive Cage 8 x 2.5-inch hot plug drive bays	(Standard)

NOTE:

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

4.2.5 RAID 0/1 Controller with 1 GB Cache for 2.5-inch Drives

Category	Product Name / Description	Part Number
Storage Controller Required	RAID Controller (1GB, RAID 0/1) Avago(LSI) MegaRAID SAS 9362-8i RAID 0/1/10, 1GB, Int. 8, PCIe 3.0 x8, SAS 12Gb/s, SATA 6Gb/s	N8103-176A
Flash Backup Recommended	Flash Backup Unit for Avago(LSI) MegaRAID SAS 9362-8i 650mm Cable for Flash Backup Unit included	N8103-181
Cable	Internal SAS/SATA Cable 1 x Mini SAS HD to 1 x Mini SAS HD, 1 set	(Standard)
	Internal SAS/SATA Cable 1 x Mini SAS HD to 1 x Mini SAS HD, 1 set, for 5th - 8th hard drives	K410-348(00)
Drive Cage	2.5-inch Drive Cage 8 x 2.5-inch hot plug drive bays	(Standard)

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 SSD and SAS SSDs can be mixed.

4.2.6 RAID 0/1 Controller with 2 GB Cache for 2.5-inch Drives

Category	Product Name / Description	Part Number
Storage Controller Required	RAID Controller (2GB, RAID 0/1, WT/WB) Avago(LSI) MegaRAID SAS 946N-8i RAID 0/1/10, 2GB, Int. 8, PCIe 3.0 x8, SAS 12Gb/s, SATA 6Gb/s	N8103-206
	RAID Controller (2GB, RAID 0/1, WT) Avago(LSI) MegaRAID SAS 945N-8i RAID 0/1/10, 2GB, Int. 8, PCIe 3.0 x8, SAS 12Gb/s, SATA 6Gb/s	N8103-210
Flash Backup Recommended	Flash Backup Unit for Avago(LSI) MegaRAID SAS 946N-8i 550mm Cable for Flash Backup Unit included	N8103-209
	NOTE: It can not be connected to N8103-210 RAID Controller	
Cable	Internal SAS/SATA Cable 1 x Mini SAS HD to 1 x Mini SAS HD, 1 set	(Standard)
	Internal SAS/SATA Cable 1 x Mini SAS HD to 1 x Mini SAS HD, 1 set, for 5th - 8th hard drives	K410-348(00)
Drive Cage	2.5-inch Drive Cage 8 x 2.5-inch hot plug drive bays	(Standard)

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 SSD and SAS SSDs can be mixed.

4.2.7 RAID 5/6 Controller with 1 GB Cache for 2.5-inch Drives

Category	Product Name / Description	Part Number
Storage Controller Required	RAID Controller (1GB, RAID 0/1/5/6) Avago(LSI) MegaRAID SAS 9362-8i RAID0/1/5/6/10/50/60, 1GB, Int. 8, PCIe 3.0 x8, SAS 12Gb/s, SATA 6Gb/s	N8103-177A
Flash Backup Recommended	Flash Backup Unit for Avago(LSI) MegaRAID SAS 9362-8i 650mm Cable for Flash Backup Unit included	N8103-181
Cable	Internal SAS/SATA Cable 1 x Mini SAS HD to 1 x Mini SAS HD, 1 set	(Standard)
	Internal SAS/SATA Cable 1 x Mini SAS HD to 1 x Mini SAS HD, 1 set, for 5th - 8th hard drives	K410-348(00)
Drive Cage	2.5-inch Drive Cage 8 x 2.5-inch hot plug drive bays	(Standard)

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 SSD and SAS 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.

4.2.8 RAID 5/6 Controller with 2 GB Cache for 2.5-inch Drives

Category	Product Name / Description	Part Number
Storage Controller Required	RAID Controller (2GB, RAID 0/1/5/6) Broadcom MegaRAID SAS 9362-8i RAID0/1/5/6/10/50/60, 2GB, Int. 8, PCIe 3.0 x8, SAS 12Gb/s, SATA 6Gb/s	N8103-178A
Flash Backup Recommended	Flash Backup Unit for Broadcom MegaRAID SAS 9362-8i 650mm Cable for Flash Backup Unit included	N8103-181
Cable	Internal SAS/SATA Cable 1 x Mini SAS HD to 1 x Mini SAS HD, 1 set	(Standard)
	Internal SAS/SATA Cable 1 x Mini SAS HD to 1 x Mini SAS HD, 1 set, for 5th - 8th hard drives	K410-348(00)
Drive Cage	2.5-inch Drive Cage 8 x 2.5-inch hot plug drive bays	(Standard)

NOTE:

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

4.2.9 RAID 5/6 Controller with 2 GB Cache for 2.5-inch Drives

Category	Product Name / Description	Part Number
Storage Controller Required	RAID Controller (2GB, RAID 0/1/5/6, WT/WB) Avago(LSI) MegaRAID SAS 946N-8i RAID0/1/5/6/10/50/60, 2GB, Int. 8, PCIe 3.0 x8, SAS 12Gb/s, SATA 6Gb/s	N8103-207
	RAID Controller (2GB, RAID 0/1/5/6, WT) Avago(LSI) MegaRAID SAS 945N-8i RAID0/1/5/6/10/50/60, 2GB, Int. 8, PCIe 3.0 x8, SAS 12Gb/s, SATA 6Gb/s	N8103-211
Flash Backup Recommended	Flash Backup Unit for Avago(LSI) MegaRAID SAS 946N-8i 550mm Cable for Flash Backup Unit included	N8103-209
	NOTE: It can not be connected to N8103-211 RAID Controller	
Cable	Internal SAS/SATA Cable	(Standard)

	1 x Mini SAS HD to 1 x Mini SAS HD, 1 set	
	Internal SAS/SATA Cable	K410-348(00)
	1 x Mini SAS HD to 1 x Mini SAS HD, 1 set, for 5th - 8th hard drives	
Drive Cage	2.5-inch Drive Cage	(Standard)
	8 x 2.5-inch hot plug drive bays	

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 SSD and SAS 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.

4.2.10 RAID 5/6 Controller with 4 GB Cache for 2.5-inch Drives

Category	Product Name / Description	Part Number
Storage Controller Required	RAID Controller (4GB, RAID 0/1/5/6) Avago(LSI) MegaRAID SAS 946N-8i RAID0/1/5/6/10/50/60, 4GB, Int. 8, PCIe 3.0 x8, SAS 12Gb/s, SATA 6Gb/s	N8103-208
Flash Backup Recommended	Flash Backup Unit for Avago(LSI) MegaRAID SAS 946N-8i 550mm Cable for Flash Backup Unit included	N8103-209
Cable	Internal SAS/SATA Cable 1 x Mini SAS HD to 1 x Mini SAS HD, 1 set	(Standard)
	Internal SAS/SATA Cable 1 x Mini SAS HD to 1 x Mini SAS HD, 1 set, for 5th - 8th hard drives	K410-348(00)
Drive Cage	2.5-inch Drive Cage 8 x 2.5-inch hot plug drive bays	(Standard)

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 SSD and SAS 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.

4.2.11 Embedded SATA non-RAID Controller for 3.5-inch Drives

Category	Product Name / Description	Part Number
Storage Controller	Embedded SATA Controller 4 x 6Gb/s SATA	(Standard)
Cable	Internal SAS/SATA Cable 1 x Mini SAS HD to 4 x Single SATA, 1 set	(Standard)
Drive Cage	3.5-inch Drive Cage 4 x 3.5-inch Hot-plug hard drive bays	(Standard)

NOTE:

- Hot plug insertion/removal is not supported with the embedded SATA non-RAID controller.

4.2.12 Embedded SATA RAID Controller for 3.5-inch Drives

Category	Product Name / Description	Part Number
Storage Controller	Embedded SATA Controller 4x 6Gb/s SATA, RAID 0/1/10 capable	(Standard)
Cable	Internal SAS/SATA Cable 1 x Mini SAS HD to 4 x Single SATA, 1 set	(Standard)
Drive Cage	3.5-inch Drive Cage 4 x 3.5-inch Hot-plug hard drive bays	(Standard)

NOTE:

- Embedded SATA RAID controller is supported only on limited OS. For more details, please see [OS Support Matrix for PCI Cards and Embedded Controllers](#).
- All hard drives within a RAID array should be of the same capacity.

4.2.13 RAID 0/1 Controller with 0 MB Cache for 3.5-inch Drives

Category	Product Name / Description	Part Number
Storage Controller <i>Required</i>	RAID Controller (RAID 0/1) Broadcom MegaRAID SAS 9341-8i RAID 0/1/10, Non-cache, Int. 8, PCIe 3.0 x8, SAS 12Gb/s, SATA 6Gb/s	N8103-188
Cable	Internal SAS/SATA Cable 1 x Mini SAS HD to 4 x Single SATA, 1 set	(Standard)
Drive Cage	3.5-inch Drive Cage 4 x 3.5-inch hot plug drive bays	(Standard)

NOTE:

- All hard drives within a RAID array should be of the same capacity.

4.2.14 RAID 0/1 Controller with 0 MB Cache for 3.5-inch Drives

Category	Product Name / Description	Part Number
Storage Controller <i>Required</i>	RAID Controller (RAID 0/1) Avago(LSI) MegaRAID SAS 944N-8i RAID 0/1/10, Non-cache, Int. 8, PCIe 3.0 x8, SAS 12Gb/s, SATA 6Gb/s	N8103-205
Cable	Internal SAS/SATA Cable 1 x Mini SAS HD to 4 x Single SATA, 1 set	(Standard)
Drive Cage	3.5-inch Drive Cage 4 x 3.5-inch hot plug drive bays	(Standard)

4.2.15 RAID 0/1 Controller with 1 GB Cache for 3.5-inch Drives

Category	Product Name / Description	Part Number
Storage Controller <i>Required</i>	RAID Controller (1GB, RAID 0/1) Avago(LSI) MegaRAID SAS 9362-8i RAID 0/1/10, 1GB, Int. 8, PCIe 3.0 x8, SAS 12Gb/s, SATA 6Gb/s	N8103-176A
Flash Backup <i>Recommended</i>	Flash Backup Unit for Avago(LSI) MegaRAID SAS 9362-8i 650mm Cable for Flash Backup Unit included	N8103-181
Cable	Internal SAS/SATA Cable 1 x Mini SAS HD to 4 x Single SATA, 1 set	(Standard)
Drive Cage	3.5-inch Drive Cage 4 x 3.5-inch hot plug drive bays	(Standard)

4.2.16 RAID 0/1 Controller with 2 GB Cache for 3.5-inch Drives

Category	Product Name / Description	Part Number
Storage Controller <i>Required</i>	RAID Controller (2GB, RAID 0/1, WT/WB) Avago(LSI) MegaRAID SAS 946N-8i RAID 0/1/10, 2GB, Int. 8, PCIe 3.0 x8, SAS 12Gb/s, SATA 6Gb/s	N8103-206
	RAID Controller (2GB, RAID 0/1, WT) Avago(LSI) MegaRAID SAS 945N-8i RAID 0/1/10, 2GB, Int. 8, PCIe 3.0 x8, SAS 12Gb/s, SATA 6Gb/s	N8103-210
Flash Backup <i>Recommended</i>	Flash Backup Unit for Avago(LSI) MegaRAID SAS 946N-8i 550mm Cable for Flash Backup Unit included	N8103-209
	NOTE: - It can not be connected to N8103-210 RAID Controller	
Cable	Internal SAS/SATA Cable 1 x Mini SAS HD to 4 x Single SATA, 1 set	(Standard)
Drive Cage	3.5-inch Drive Cage 4 x 3.5-inch hot plug drive bays	(Standard)

4.2.17 RAID 5/6 Controller with 1 GB Cache for 3.5-inch Drives

Category	Product Name / Description	Part Number
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Storage Controller Required	RAID Controller (1GB, RAID 0/1/5/6) Avago(LSI) MegaRAID SAS 9362-8i RAID0/1/5/6/10/50/60, 1GB, Int. 8, PCIe 3.0 x8, SAS 12Gb/s, SATA 6Gb/s	N8103-177A
Flash Backup Recommended	Flash Backup Unit for Avago(LSI) MegaRAID SAS 9362-8i 650mm Cable for Flash Backup Unit included	N8103-181
Cable	Internal SAS/SATA Cable 1 x Mini SAS HD to 4 x Single SATA, 1 set	(Standard)
Drive Cage	3.5-inch Drive Cage 4 x 3.5-inch hot plug drive bays	(Standard)

4.2.18 RAID 5/6 Controller with 2 GB Cache for 3.5-inch Drives

Category	Product Name / Description	Part Number
Storage Controller Required	RAID Controller (2GB, RAID 0/1/5/6) Broadcom MegaRAID SAS 9362-8i RAID0/1/5/6/10/50/60, 2GB, Int. 8, PCIe 3.0 x8, SAS 12Gb/s, SATA 6Gb/s	N8103-178A
Flash Backup Recommended	Flash Backup Unit for Broadcom MegaRAID SAS 9362-8i 650mm Cable for Flash Backup Unit included	N8103-181
Cable	Internal SAS/SATA Cable 1 x Mini SAS HD to 4 x Single SATA, 1 set	(Standard)
Drive Cage	3.5-inch Drive Cage 4 x 3.5-inch hot plug drive bays	(Standard)

NOTE:

- All hard drives within a RAID array should be of the same capacity.

4.2.19 RAID 5/6 Controller with 2 GB Cache for 3.5-inch Drives

Category	Product Name / Description	Part Number
Storage Controller Required	RAID Controller (2GB, RAID 0/1/5/6, WT/WB) Avago(LSI) MegaRAID SAS 946N-8i RAID0/1/5/6/10/50/60, 2GB, Int. 8, PCIe 3.0 x8, SAS 12Gb/s, SATA 6Gb/s	N8103-207
	RAID Controller (2GB, RAID 0/1/5/6, WT) Avago(LSI) MegaRAID SAS 945N-8i RAID0/1/5/6/10/50/60, 2GB, Int. 8, PCIe 3.0 x8, SAS 12Gb/s, SATA 6Gb/s	N8103-211
Flash Backup Recommended	Flash Backup Unit for Avago(LSI) MegaRAID SAS 946N-8i 550mm Cable for Flash Backup Unit included	N8103-209
	NOTE: - It can not be connected to N8103-211 RAID Controller	
Cable	Internal SAS/SATA Cable 1 x Mini SAS HD to 4 x Single SATA, 1 set	(Standard)
Drive Cage	3.5-inch Drive Cage 4 x 3.5-inch hot plug drive bays	(Standard)

4.2.20 RAID 5/6 Controller with 4 GB Cache for 3.5-inch Drives

Category	Product Name / Description	Part Number
Storage Controller Required	RAID Controller (4GB, RAID 0/1/5/6) Avago(LSI) MegaRAID SAS 946N-8i RAID0/1/5/6/10/50/60, 4GB, Int. 8, PCIe 3.0 x8, SAS 12Gb/s, SATA 6Gb/s	N8103-208
Flash Backup Recommended	Flash Backup Unit for Avago(LSI) MegaRAID SAS 946N -8i 550mm Cable for Flash Backup Unit included	N8103-209
Cable	Internal SAS/SATA Cable 1 x Mini SAS HD to 4 x Single SATA, 1 set	(Standard)

Drive Cage	3.5-inch Drive Cage 4 x 3.5-inch hot plug drive bays	(Standard)
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4.2.21 Embedded SATA RAID Controller for M.2 SATA SSD

Category	Product Name / Description	Part Number
Storage Controller	Embedded SATA Controller 4x 6Gb/s SATA, RAID 0/1/10 capable	(Standard)
Cable	Internal SAS/SATA Cable 1 x Mini SAS HD to 2 x Single SATA, 1 set	K410-365(00)
Installation Kit	Dual M.2 SATA Drive Installation Kit M.2 PCIe SSD adapter, 2 x M.2 socket	N8118-307
Drive 2 slots available	120GB M.2 SATA SSD 1 x 120GB M.2 SATA SSD, 6Gb/s, 512n sector	N8150-736

4.2.22 RAID 0/1 Controller with 0 MB Cache for M.2 SATA SSD

Category	Product Name / Description	Part Number
Storage Controller Required	RAID Controller (RAID 0/1) Broadcom MegaRAID SAS 9341-8i RAID 0/1/10, Non-cache, Int. 8, PCIe 3.0 x8, SAS 12Gb/s, SATA 6Gb/s	N8103-188
Cable	Internal SAS/SATA Cable 1 x Mini SAS HD to 2 x Single SATA, 1 set	K410-365(00)
Installation Kit	Dual M.2 SATA Drive Installation Kit M.2 PCIe SSD adapter, 2 x M.2 socket	N8118-307
Drive 2 slots available	120GB M.2 SATA SSD 1 x 120GB M.2 SATA SSD, 6Gb/s, 512n sector	N8150-736

4.2.23 RAID 0/1 Controller with 0 MB Cache for M.2 SATA SSD

Category	Product Name / Description	Part Number
Storage Controller Required	RAID Controller (RAID 0/1) Avago(LSI) MegaRAID SAS 944N-8i RAID 0/1/10, Non-cache, Int. 8, PCIe 3.0 x8, SAS 12Gb/s, SATA 6Gb/s	N8103-205
Cable	Internal SAS/SATA Cable 1 x Mini SAS HD to 2 x Single SATA, 1 set	K410-365(00)
Installation Kit	Dual M.2 SATA Drive Installation Kit M.2 PCIe SSD adapter, 2 x M.2 socket	N8118-307
Drive 2 slots available	120GB M.2 SATA SSD 1 x 120GB M.2 SATA SSD, 6Gb/s, 512n sector	N8150-736

4.2.24 RAID 0/1 Controller with 2 GB Cache for M.2 SATA SSD

Category	Product Name / Description	Part Number
Storage Controller Required	RAID Controller (2GB, RAID 0/1, WT/WB) Avago(LSI) MegaRAID SAS 946N-8i RAID 0/1/10, 2GB, Int. 8, PCIe 3.0 x8, SAS 12Gb/s, SATA 6Gb/s	N8103-206
	RAID Controller (2GB, RAID 0/1, WT) Avago(LSI) MegaRAID SAS 945N-8i RAID 0/1/10, 2GB, Int. 8, PCIe 3.0 x8, SAS 12Gb/s, SATA 6Gb/s	N8103-210
Flash Backup Recommended	Flash Backup Unit for Avago(LSI) MegaRAID SAS 946N-8i 550mm Cable for Flash Backup Unit included	N8103-209
	NOTE: - It can not be connected to N8103-210 RAID Controller	
Cable	Internal SAS/SATA Cable 1 x Mini SAS HD to 2 x Single SATA, 1 set	K410-365(00)
Installation Kit	Dual M.2 SATA Drive Installation Kit M.2 PCIe SSD adapter, 2 x M.2 socket	N8118-307
Drive 2 slots available	120GB M.2 SATA SSD 1 x 120GB M.2 SATA SSD, 6Gb/s, 512n sector	N8150-736

4.3 Supported Drives

4.3.1 2.5-inch Drives (1)

Category	Product Name / Description		Part Number
Drive 4 slots available	SATA HDD	500GB 7.2K Hot Plug 2.5-inch SATA HDD 1 x 500 GB SATA HDD, 2.5-inch, 6Gb/s, 7,200 rpm, 512n sector	N8150-488
		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	N8150-489
		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	N8150-527

NOTE:

- Hot plug insertion/removal is not supported with the embedded SATA non-RAID controller.

4.3.2 2.5-inch Drives (2)

Category	Product Name / Description		Part Number
Drive 4 slots available	SATA HDD	500GB 7.2K Hot Plug 2.5-inch SATA HDD 1 x 500 GB SATA HDD, 2.5-inch, 6Gb/s, 7,200 rpm, 512n sector	N8150-488
		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	N8150-489
		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	N8150-527
	SATA SSD (ME)	200GB Hot Plug 2.5-inch SATA SSD 1 x 200 GB SATA SSD, MLC, 2.5-inch, 6b/s, 512n sector, ME	N8150-1711
		400GB Hot Plug 2.5-inch SATA SSD 1 x 400 GB SATA SSD, MLC, 2.5-inch, 6b/s, 512n sector, ME	N8150-780
		800GB Hot Plug 2.5-inch SATA SSD 1 x 800 GB SATA SSD, MLC, 2.5-inch, 6b/s, 512n sector, ME	N8150-781
	SATA SSD (VE)	200GB Hot Plug 2.5-inch SATA SSD 1 x 200 GB SATA SSD, 2.5-inch, 6b/s, 512n sector, VE	N8150-1714
		400GB Hot Plug 2.5-inch SATA SSD 1 x 400 GB SATA SSD, 2.5-inch, 6b/s, 512n sector, VE	N8150-1715
		800GB Hot Plug 2.5-inch SATA SSD 1 x 800 GB SATA SSD, 2.5-inch, 6b/s, 512n sector, VE	N8150-784
		1.6TB Hot Plug 2.5-inch SATA SSD 1 x 1.6 TB SATA SSD, 2.5-inch, 6b/s, 512n sector, VE	N8150-785

4.3.3 2.5-inch Drives (3)

Category	Product Name / Description		Part Number	
Drive Standard : 4 slots available Max : 8 slots available For 3.5-inch drive : 2 slots available	SAS HDD (512n)	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	N8150-479	
		450GB 10K Hot Plug 2.5-inch SAS HDD 1 x 450 GB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512n sector	N8150-480	
		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	N8150-481	
		900GB 10K Hot Plug 2.5-inch SAS HDD 1 x 900 GB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512n sector	N8150-482	
		1.2TB 10K Hot Plug 2.5-inch SAS HDD 1 x 1.2TB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512n sector	N8150-483	
		300GB 15K Hot Plug 2.5-inch SAS HDD 1 x 300 GB SAS HDD, 2.5-inch, 12Gb/s, 15,000 rpm, 512n sector	N8150-485	
		450GB 15K Hot Plug 2.5-inch SAS HDD 1 x 450 GB SAS HDD, 2.5-inch, 12Gb/s, 15,000 rpm, 512n sector	N8150-486	
		600GB 15K Hot Plug 2.5-inch SAS HDD 1 x 600 GB SAS HDD, 2.5-inch, 12Gb/s, 15,000 rpm, 512n sector	N8150-518	
		SATA HDD (512n)	500GB 7.2K Hot Plug 2.5-inch SATA HDD 1 x 500 GB SATA HDD, 2.5-inch, 6Gb/s, 7,200 rpm, 512n sector	N8150-488
			1TB 7.2K Hot Plug 2.5-inch SATA HDD	N8150-489

	1 x 1 TB SATA HDD, 2.5-inch, 6Gb/s, 7,200 rpm, 512n sector	
	2TB 7.2K Hot Plug 2.5-inch SATA HDD	N8150-527
	1 x 2 TB SATA HDD, 2.5-inch, 6Gb/s, 7,200 rpm, 512n sector	
SAS SSD (eMLC)	200GB Hot Plug 2.5-inch SAS SSD	N8150-721
	1 x 200 GB SAS SSD, eMLC, 2.5-inch, 12Gb/s, 512n sector	
	400GB Hot Plug 2.5-inch SAS SSD	N8150-722
	1 x 400 GB SAS SSD, eMLC, 2.5-inch, 12Gb/s, 512n sector	
SATA SSD (ME)	200GB Hot Plug 2.5-inch SATA SSD	N8150-1711
	1 x 200 GB SATA SSD, MLC, 2.5-inch, 6b/s, 512n sector, ME	
	400GB Hot Plug 2.5-inch SATA SSD	N8150-780
	1 x 400 GB SATA SSD, MLC, 2.5-inch, 6b/s, 512n sector, ME	
	800GB Hot Plug 2.5-inch SATA SSD	N8150-781
	1 x 800 GB SATA SSD, MLC, 2.5-inch, 6b/s, 512n sector, ME	
SATA SSD (VE)	200GB Hot Plug 2.5-inch SATA SSD	N8150-1714
	1 x 200 GB SATA SSD, 2.5-inch, 6b/s, 512n sector, VE	
	400GB Hot Plug 2.5-inch SATA SSD	N8150-1715
	1 x 400 GB SATA SSD, 2.5-inch, 6b/s, 512n sector, VE	
	800GB Hot Plug 2.5-inch SATA SSD	N8150-784
	1 x 800 GB SATA SSD, 2.5-inch, 6b/s, 512n sector, VE	
	1.6TB Hot Plug 2.5-inch SATA SSD	N8150-785
	1 x 1.6 TB SATA SSD, 2.5-inch, 6b/s, 512n sector, VE	

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 SAS SSDs, SATA SSD (ME), and SATA SSD (LE) 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.

4.3.4 2.5-inch Drives (4)

Category	Product Name / Description	Part Number
Drive Standard :4 slots available Max : 8 slots available	SAS HDD (512n) 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	N8150-479
	450GB 10K Hot Plug 2.5-inch SAS HDD 1 x 450 GB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512n sector	N8150-480
	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	N8150-481
	900GB 10K Hot Plug 2.5-inch SAS HDD 1 x 900 GB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512n sector	N8150-482
	1.2TB 10K Hot Plug 2.5-inch SAS HDD 1 x 1.2TB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512n sector	N8150-483
	300GB 15K Hot Plug 2.5-inch SAS HDD 1 x 300 GB SAS HDD, 2.5-inch, 12Gb/s, 15,000 rpm, 512n sector	N8150-485
	450GB 15K Hot Plug 2.5-inch SAS HDD 1 x 450 GB SAS HDD, 2.5-inch, 12Gb/s, 15,000 rpm, 512n sector	N8150-486
	600GB 15K Hot Plug 2.5-inch SAS HDD 1 x 600 GB SAS HDD, 2.5-inch, 12Gb/s, 15,000 rpm, 512n sector	N8150-518
	SAS HDD (512e) 1.8TB 10K Hot Plug 2.5-inch SAS HDD 1x 1.8TB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512e sector	N8150-541
	2.4TB 10K Hot Plug 2.5-inch SAS HDD 1x 2.4TB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512e sector	N8150-599
	NOTE: - It can not be connected to the N8103-178/-188 RAID controller.	
	900GB 15K Hot Plug 2.5-inch SASHDD 1x 900 GB SAS HDD, 2.5-inch, 12Gb/s, 15,000 rpm, 512e sector	N8150-586
SATA HDD (512n)	500GB 7.2K Hot Plug 2.5-inch SATA HDD 1 x 500 GB SATA HDD, 2.5-inch, 6Gb/s, 7,200 rpm, 512n sector	N8150-488
	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	N8150-489
	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	N8150-527
SAS SSD (eMLC)	200GB Hot Plug 2.5-inch SAS SSD 1 x 200 GB SAS SSD, eMLC, 2.5-inch, 12Gb/s, 512n sector	N8150-721

	400GB Hot Plug 2.5-inch SAS SSD 1 x 400 GB SAS SSD, eMLC, 2.5-inch, 12Gb/s, 512n sector	N8150-722
SATA SSD (ME)	200GB Hot Plug 2.5-inch SATA SSD 1 x 200 GB SATA SSD, MLC, 2.5-inch, 6b/s, 512n sector, ME	N8150-1711
	400GB Hot Plug 2.5-inch SATA SSD 1 x 400 GB SATA SSD, MLC, 2.5-inch, 6b/s, 512n sector, ME	N8150-780
	800GB Hot Plug 2.5-inch SATA SSD 1 x 800 GB SATA SSD, MLC, 2.5-inch, 6b/s, 512n sector, ME	N8150-781
SATA SSD (VE)	200GB Hot Plug 2.5-inch SATA SSD 1 x 200 GB SATA SSD, 2.5-inch, 6b/s, 512n sector, VE	N8150-1714
	400GB Hot Plug 2.5-inch SATA SSD 1 x 400 GB SATA SSD, 2.5-inch, 6b/s, 512n sector, VE	N8150-1715
	800GB Hot Plug 2.5-inch SATA SSD 1 x 800 GB SATA SSD, 2.5-inch, 6b/s, 512n sector, VE	N8150-784
	1.6TB Hot Plug 2.5-inch SATA SSD 1 x 1.6 TB SATA SSD, 2.5-inch, 6b/s, 512n sector, VE	N8150-785

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 (512n), SAS 10K HDDs (512e), SAS 15K HDDs, SATA HDDs SAS SSDs, SATA SSD (ME), and SATA SSD (LE) can be mixed.
- For 512e sector HDD, the supported operating systems of virtual machines on Hyper-V are:
 - Windows Server 2008 R2 SP1 or later
 - Windows 7 SP1 or later
- 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.

4.3.5 3.5-inch Drives (1)

Category	Product Name / Description		Part Number
Drive 4 slots available	SATA HDD	500GB 7.2K Hot Plug 3.5-inch SATA HDD 1 x 500 GB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 512n sector	N8150-524
		1TB 7.2K Hot Plug 3.5-inch SATA HDD 1 x 1 TB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 512n sector	N8150-504
		2TB 7.2K Hot Plug 3.5-inch SATA HDD 1 x 2 TB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 512n sector	N8150-505
		3TB 7.2K Hot Plug 3.5-inch SATA HDD 1 x 3 TB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 512n sector	N8150-506
		4TB 7.2K Hot Plug 3.5-inch SATA HDD 1 x 4 TB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 512n sector	N8150-507

NOTE:

- Hot plug insertion/removal is not supported with the embedded SATA non-RAID controller.

4.3.6 3.5-inch Drives (2)

Category	Product Name / Description		Part Number
Drive 4 slots available	SATA HDD (512n)	500GB 7.2K Hot Plug 3.5-inch SATA HDD 1 x 500 GB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 512n sector	N8150-524
		1TB 7.2K Hot Plug 3.5-inch SATA HDD 1 x 1 TB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 512n sector	N8150-504
		2TB 7.2K Hot Plug 3.5-inch SATA HDD 1 x 2 TB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 512n sector	N8150-505
		3TB 7.2K Hot Plug 3.5-inch SATA HDD 1 x 3 TB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 512n sector	N8150-506
		4TB 7.2K Hot Plug 3.5-inch SATA HDD 1 x 4 TB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 512n sector	N8150-507
		6TB 7.2K Hot Plug 3.5-inch SATA HDD 1 x 6 TB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 512e sector	N8150-540
	SATA HDD (512e)	8TB 7.2K Hot Plug 3.5-inch SATA HDD 1 x 8 TB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 512e Sector	N8150-528
		10TB 7.2K Hot Plug 3.5-inch SATA HDD 1 x 10 TB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 512e Sector	N8150-543
		12TB 7.2K Hot Plug 3.5-inch SATA HDD 1 x 12 TB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 512e Sector	N8150-600

NOTE:

- It can not be connected to the N8103-178/-188 RAID controller.

NOTE:

- All drives within a RAID array should be of the same capacity.
- For 512e sector HDD, the supported operating systems of virtual machines on Hyper-V are:
 - Windows Server 2008 R2 SP1 or later
 - Windows 7 SP1 or later

5 Optical Drive

Category	Product Name / Description	Part Number
Internal 1 slot available	Internal Slim DVD-ROM drive Slim DVD-ROM drive DVD read speed: 8x (DVD-ROM / DVD-R / DVD-RW) CD read speed: 24x (CD-ROM / CD-R/RW)	N8151-134
	Internal DVD Super Multi Drive Slim DVD Super Multi drive, not including writing software DVD Read speed: 8x (DVD-R / DVD-RW / DVD-R DL / DVD+R / DVD+RW / DVD+R DL / DVD-ROM) DVD-RAM read speed: 5x CD read speed: 24x (CD-ROM / CD-R/RW) NOTE: - Not supported for Linux or VMware.	N8151-135F
External	External DVD Dual drive DVD Dual drive, Bus powered, 1.5A required, not including writing software	N8160-101F

NOTE:

- An optical drive is required for maintenance and OS installation.
- Up to 1 optical drive can be connected.

6 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.

7 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.

7.1 Network Interface Controller

Category	Product Name / Description		Part Number
Adapter	GbE	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	N8104-151
		Quad Port 1000BASE-T Adapter Broadcom ® BCM5719 Gigabit Ethernet Controller PCIe 2.0 x4	N8104-152
		NOTE: - Network cables with RJ-45 plug covers cannot be used.	
	10GbE	10GBASE SFP+ Adapter (SFP+/2ch) QLogic® NetXtreme II BCM57810 10G SFP+ Dual Port Network Interface Card PCIe 2.0 x8	N8104-149
		NOTE: - N8104-129 SFP+ Module is required to connect with an optical cable. - Up to two SFP+ Modules can be installed. - Up to two adapters can be installed.	
		Dual Port 10GBASE-T Adapter Intel X550-BT2 PCIe 3.0 x4	N8104-157
SFP+ Module		SFP+ Module (10G-SR) 1 x SFP+ Module for N8104-149	N8104-129

NIC Teaming feature - NIC Teaming and bonding features

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

Windows Server 2012 or later and Linux support teaming with bonding function supported by OS.

Network Interface	Team	Operating Systems
1GbE NIC Embedded 1GbE NIC and N8104-150/-151/-152	Up to four teams per one system Up to four ports per one team	Windows Server 2012 Windows Server 2012 R2 Windows Server 2016 Red Hat Enterprise Linux 7
10GbE NIC N8104-149	Up to two teams per one system Up to two ports per one team	Windows Server 2012 Windows Server 2012 R2 Windows Server 2016 Red Hat Enterprise Linux 7
10GbE NIC N8104-157	Up to one teams per one system Up to two ports per one team	Windows Server 2012 Windows Server 2012 R2 Windows Server 2016 Red Hat Enterprise Linux 7

NOTE:

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

Using iSCSI

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

Category	Network Interface	Operating Systems
1GbE	Embedded 1GbE NIC/ N8104-150/-151/-152	Windows Server 2012, Windows Server 2012 R2, Windows Server 2016, Red Hat Enterprise Linux 7, VMware
10GbE	N8104-149	Windows Server 2012, Windows Server 2012 R2, Windows Server 2016, Red Hat Enterprise Linux 7, VMware
	N8104-157	Windows Server 2012, Windows Server 2012 R2, Windows Server 2016, Red Hat Enterprise Linux 7, VMware

NOTE:

- NIC Teaming feature is not supported on iSCSI interfaces.

7.2 External Storage Controller

7.2.1 RAID Controller

Category	Product Name / Description	Part Number
Controller	RAID Controller (2GB, RAID0/1/5/6) Broadcom MegaRAID SAS 9380-8e RAID0/1/5/6/10/50/60, 2GB, Ext. 8, PCIe 3.0 x8, SAS 12Gb/s, SATA 6Gb/s, Flash Backup Unit included	N8103-179

NOTE:

- 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.
- It is recommended to set RAID array configuration drives less than eight in order to minimize the risk of becoming multiple hard drives failure.

7.2.2 Fibre Channel / SAS Controller

Category	Product Name / Description	Part Number
Fibre Channel	Fibre Channel Controller (1ch) Emulex LightPulse LPe1250-F8 Host Bus Adapter 8Gb/s, Optical, PCIe 2.0 x8	N8190-159
	Fibre Channel Controller (2ch) Emulex LightPulse LPe12002-M8 Host Bus Adapter 8Gb/s, Optical, PCIe 2.0 x8	N8190-160
	Fibre Channel Controller (1ch) QLogic QLE2690-SR-CK Host Bus Adapter 16Gb/s, Optical, PCIe 3.0 x8	N8190-161
	Fibre Channel Controller (2ch) QLogic QLE2692-SR-CK Host Bus Adapter 16Gb/s, Optical, PCIe 3.0 x8	N8190-162
SAS	SAS Controller LSI SAS9300-8e Host Bus Adapter 12Gb/s SAS, ext. 8(SFF-8644 x2), PCIe 3.0 x8	N8103-184

7.3 Graphics Accelerator

Product Name / Description	Part Number
Graphics Accelerator NVIDIA NVS 315, PCI Express 2.0 (x16) 1x DVI-VGA connector, DMS-59-DVI-I branch cable included	N8105-48

NOTE:

- The standard VGA connector cannot be used when this option is installed.
- The remote KVM feature is not supported when this option is installed.

7.4 Serial Port Adapter

Product Name / Description	Part Number
Serial port adapter Serial port fixed to PCI bracket	N8117-01A

NOTE:

- Up to one Serial Port Adapter can be installed.

8 Other Add-in Components

8.1 Cooling Fan Kit

Product Name / Description	Part Number
Non-redundant Fan Kit Non-hot plug cooling fan for R110i-1	N8181-115F
Redundant Fan Kit Non-hot plug cooling fan for R110i-1	N8181-111F

NOTE:

- The redundant fan kit is necessary to operate the server at temperatures over 40°C with N8181-146F High temperature resistant Kit

NOTE:

- One of the fan kits must be installed.

8.2 Trusted Platform Module Kit

Product Name / Description	Part Number
Trusted Platform Module Kit TPM 2.0 module	N8115-23A

NOTE:

- Supported for Windows Server 2012 or later only.

NOTE:

- The kit is not available in China.
- The kit is not removable after attachment.
- "TPM Support" in BIOS setup menu must be activated prior to use of this kit.
- 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.

8.3 Internal Flash Memory

Available socket: 1

Product Name / Description	Part Number
VMware ESXi Base Kit Internal USB flash memory to install VMware ESXi system	N8106-013

NOTE:

- The kit does not include VMware ESXi installation media and license.

8.4 High temperature resistant Kit

Product Name / Description	Part Number
High temperature resistant Kit Required for high temperature operation over 40°C (up to 45°C)	N8181-146F

NOTE:

- Supported for non-hot plug power supply model only.
- To apply this option, there are some configuration limitations below.

Required System Configuration:

- N8181-111F Redundant Fan Kit is required.
- Up to 3 hard drives.
- Any of N8103-181 (Flash Backup Unit), N8103-179 (RAID Controller (2GB, RAID0/1/5/6)), N8151-134 (Internal Slim DVD-ROM drive) or N8151-135F (Internal DVD Super Multi Drive) must not be installed.

9 Add-on Components

9.1 17-inch LCD Console Drawer

Category		Product Name / Description	Part Number
Drawer w/ KVM	Drawer	17-inch LCD Console Drawer (8 port) 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 (1 port) 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
	Keypad	Keyboard Unit (JP) JP 108-keys Keyboard with 10-key for N8143-108F 17inch LCD Console Drawer (1 port)	N8143-109
		Keyboard Unit (UK) UK 104-keys Keyboard with 10-key, for N8143-108F 17inch LCD Console Drawer (1 port)	N8143-111

9.2 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)

9.3 Server Management License

The server integrates the EXPRESSSCOPE Engine 3 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.	N8115-04

NOTE:

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

References

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	UEFI	Enabled
Windows Server 2012 R2	UEFI	Enabled
Windows Server 2016	UEFI	Enabled
Red Hat Enterprise Linux 7	UEFI	Enabled
VMware ESXi 6.0	UEFI	Enabled
VMware ESXi 6.5	UEFI	Enabled
VMware ESXi 6.7	UEFI	Enabled

Server Management

The EXPRESSSCOPE Engine 3, 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/fan/voltage/power consumption/System FAN/degeneration(memory)	✓	✓
	Hardware configuration information collection	✓	✓
	Hardware event log collection	✓	✓
Boot monitoring	BIOS/POST stall, Booting, OS stall, shutdown	✓ ²	✓ ²
Alerting	HW error, Boot error and OS panic (by SNMP, E-Mail)	✓	✓
Remote KVM (via LAN)	POST/BIOS setup, ROM utility	✓ ¹	✓
	Panic screen, Boot screen	✓ ^{1,3}	✓
	CUI-based screen (OS console)	✓ ^{1,4}	✓
	GUI-based screen (OS console)	-	✓
	Remote KVM Video Record	-	✓
Remote control (via LAN)	Remote reset/power on-off/ dump	✓	✓
	Remote Power Capping	✓	✓
	BIOS/BMC FW update	✓	✓
	Remote BIOS setup(partial configuration only)	✓	✓
	OS shutdown	✓ ²	✓ ²
	Remote media (CD/DVD/FD/USB)	-	✓
	CLP (Command Line Protocol) (DMTF compliant)	✓	✓
	Remote control via Web browser (multi user login at the same time)	✓	✓
Maintenance	Scheduling (without UPS, require NEC ESMPRO Manager)	✓ ²	✓ ²
	BIOS setting by using XML file	✓	✓
	EXPRESSSCOPE® Profile key (Backup/restore BIOS/BMC setup information)	✓	✓
Others	Set automatic IP address via DNS/DHCP	✓	✓
	LDAP/Active Directory verification/user control	✓	✓
	Clock synchronization of main unit and the RTC	✓	✓
	Access log collection	✓	✓
Industry Standard	IPMI support	2.0	2.0

¹ The optional serial port is not available for the feature.

² The feature is not supported on VMware ESXi systems.

³ Monitoring boot screens is not supported on VMware systems.

⁴ In VMware systems, only the direct console user interface is supported.

OS Support Matrix for PCI Cards and Embedded Controllers

Part Number	Product Name	WS 2016	WS 2012 R2	WS 2012	RHEL 7	ESXi 6.7	ESXi 6.5	ESXi 6.0
-	Embedded SATA non-RAID Controller	✓	✓	✓	✓	✓	✓	✓
-	Embedded SATA RAID Controller	✓	✓	✓	-	-	-	-
-	Embedded 1GbE NIC	✓	✓	✓	✓	✓	✓	✓
N8103-188	RAID controller (RAID0/1)	✓	✓	✓	✓	-	✓	✓
N8103-176A	RAID controller (1GB, RAID0/1)	-	-	-	✓	-	-	-
N8103-177A	RAID controller (1GB, RAID 0/1/5/6)	-	-	-	✓	-	-	-
N8103-178A	RAID Controller (2GB, RAID 0/1/5/6)	-	-	-	✓	-	-	-
N8103-205	RAID Controller (2GB, RAID 0/1/5/6)	✓	✓	✓	-	✓	✓	-
N8103-206	RAID Controller (2GB, RAID 0/1, WT/WB)	✓	✓	✓	-	✓	✓	-
N8103-207	RAID Controller (2GB, RAID 0/1/5/6, WT/WB)	✓	✓	✓	-	✓	✓	-
N8103-208	RAID Controller (4GB, RAID 0/1/5/6)	✓	✓	✓	-	✓	✓	-
N8103-210	RAID Controller (2GB, RAID 0/1, WT)	✓	✓	✓	-	✓	✓	-
N8103-211	RAID Controller (2GB, RAID 0/1/5/6, WT)	✓	✓	✓	-	✓	✓	-
N8105-48	Graphics Accelerator	✓	✓	✓	-	-	-	-
N8190-162	Fibre Channel Controller (2ch)	✓	✓	✓	✓	✓	✓	✓
N8190-161	Fibre Channel Controller (1ch)	✓	✓	✓	✓	✓	✓	✓
N8103-179	RAID Controller (2GB, RAID0/1/5/6)	✓	✓	✓	✓	✓	✓	✓
N8103-184	SAS Controller	-	✓	✓	✓	✓	✓	✓
N8104-157	Dual Port 10GBASE-T Adapter	✓	✓	✓	✓	✓	✓	✓
N8104-149	10GBASE SFP+ Adapter (SFP+/2ch)	✓	✓	✓	✓	✓	✓	✓
N8190-160	Fibre Channel Controller (2ch)	✓	✓	✓	✓	✓	✓	✓
N8190-159	Fibre Channel Controller (1ch)	✓	✓	✓	✓	✓	✓	✓
N8104-152	Quad Port 1000BASE-T Adapter	✓	✓	✓	✓	✓	✓	✓
N8104-151	Dual Port 1000BASE-T Adapter	✓	✓	✓	✓	✓	✓	✓
N8104-150	1000BASE-T Adapter	✓	✓	✓	✓	✓	✓	✓

Supported PCI cards and Installable Slots

Part Number	Product Name	Slots		
		1A	1B	1C
N8103-188	RAID controller (RAID0/1)	(1)	-	-
N8103-176A	RAID controller (1GB, RAID0/1)	(1)	-	-
N8103-177A	RAID controller (1GB, RAID 0/1/5/6)	(1)	-	-
N8103-178A	RAID Controller (2GB, RAID 0/1/5/6)	(1)	-	-
N8103-205	RAID Controller (2GB, RAID 0/1/5/6)	(1)	-	-
N8103-206	RAID Controller (2GB, RAID 0/1, WT/WB)	(1)	-	-
N8103-207	RAID Controller (2GB, RAID 0/1/5/6, WT/WB)	(1)	-	-
N8103-208	RAID Controller (4GB, RAID 0/1/5/6)	(1)	-	-
N8103-210	RAID Controller (2GB, RAID 0/1, WT)	(1)	-	-
N8103-211	RAID Controller (2GB, RAID 0/1/5/6, WT)	(1)	-	-
N8105-48	Graphics Accelerator	-	(1)	-
N8190-162	Fibre Channel Controller (2ch)	-	(1)	-
N8190-161	Fibre Channel Controller (1ch)	-	(1)	(2)
N8103-179	RAID Controller (2GB, RAID0/1/5/6)	-	(1)	(2)
N8103-184	SAS Controller	-	(1)	(2)
N8104-157	Dual Port 10GBASE-T Adapter	-	(1)	(2)
N8104-149	10GBASE SFP+ Adapter (SFP+/2ch)	-	(1)	(2)
N8190-160	Fibre Channel Controller (2ch)	-	(1)	(2)
N8190-159	Fibre Channel Controller (1ch)	-	(1)	(2)
N8104-152	Quad Port 1000BASE-T Adapter	-	-	(1)
N8104-151	Dual Port 1000BASE-T Adapter	-	(1)	(2)
N8104-150	1000BASE-T Adapter	-	(1)	(2)
N8118-307	Dual M.2 SATA Installation Kit	-	-	(1)
N8117-01A	Serial port adapter	-	(1)	(2)

- The number between parentheses shows the population priority (recommendation). For example, install N8103-206 in the slot #1 and N8104-152 in the slot #2 when you have those cards.
- There are PCI slot limitations depending on the processor and operating system. Please refer to the next page and be careful to choose a processor and PCI cards.

PCI slot limitations for VMware

- Do not install N8104-152 Quad Port 1000BASE-T Adapter when any of the following cards is installed.
 - N8104-157 Dual Port 10GBASE-T Adapter
 - N8104-149 10GBASE SFP+ Adapter (SFP+/2ch)
- For the configuration limitation for VMware ESXi, refer to the following documents.
 - VMware ESXi6.0
<https://www.vmware.com/pdf/vsphere6/r60/vsphere-60-configuration-maximums.pdf>
 - VMware ESXi6.5
<https://www.vmware.com/pdf/vsphere6/r65/vsphere-65-configuration-maximums.pdf>

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	UEFI	✓
Windows Server 2012 R2	UEFI	✓
Windows Server 2016	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 N8103-205
RAID controller (2GB, RAID0/1)	N8103-206 N8103-210
RAID controller (2GB, RAID0/1/5/6)	N8103-207 N8103-211
RAID controller (2GB, RAID0/1/5/6)	N8103-179
RAID controller (4GB, RAID0/1/5/6)	N8103-208

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

Revision History

Revision	Date	Description
8.0	March 28, 2019	<p>New products added:</p> <ul style="list-style-type: none"> RAID Controller (1GB, RAID 0/1) / N8103-176A RAID Controller (1GB, RAID 0/1/5/6) / N8103-177A RAID Controller (2GB, RAID 0/1/5/6) / N8103-178A <p>Discontinued product deleted:</p> <ul style="list-style-type: none"> RAID Controller (2GB, RAID 0/1/5/6) / N8103-178
7.0	December 28, 2018	<p>Discontinued product deleted:</p> <ul style="list-style-type: none"> RAID Controller (1GB, RAID 0/1) / N8103-176 RAID Controller (1GB, RAID 0/1/5/6) / N8103-177 <p>Others:</p> <ul style="list-style-type: none"> Supported 512e SATA drives on 3.5-inch drive configuration with the embedded SATA controller.
6.0	November 1, 2018	<p>New products added:</p> <ul style="list-style-type: none"> 200GB Hot Plug 2.5-inch SATA SSD / N8150-1711 200GB Hot Plug 2.5-inch SATA SSD / N8150-1714 400GB Hot Plug 2.5-inch SATA SSD / N8150-1715 <p>Discontinued product deleted:</p> <ul style="list-style-type: none"> 200GB Hot Plug 2.5-inch SATA SSD / N8150-779 200GB Hot Plug 2.5-inch SATA SSD / N8150-782 400GB Hot Plug 2.5-inch SATA SSD / N8150-783 <p>Others:</p> <ul style="list-style-type: none"> VMware ESXi 6.7 to the list of operating system supported Updated OS support matrix
5.0	June 25, 2018	<p>New products added:</p> <ul style="list-style-type: none"> RAID Controller (2GB, RAID 0/1/5/6) / N8103-205 RAID Controller (2GB, RAID 0/1, WT/WB) / N8103-206 RAID Controller (2GB, RAID 0/1/5/6, WT/WB) / N8103-207 RAID Controller (4GB, RAID 0/1/5/6) / N8103-208 RAID Controller (2GB, RAID 0/1, WT) / N8103-210 RAID Controller (2GB, RAID 0/1/5/6, WT) / N8103-211 Flash Backup Unit / N8103-209 900GB 15K Hot Plug 2.5-inch SAS HDD / N8150-586 2.4TB 10K Hot Plug 2.5-inch SAS HDD / N8150-599 12TB 7.2K Hot Plug 3.5-inch SATA HDD / N8150-600
4.0	December 22, 2017	<p>Others:</p> <ul style="list-style-type: none"> N8103-142 SAS Controller deleted
3.1	November 2, 2017	<p>Others:</p> <ul style="list-style-type: none"> Corrected the Rated output value of redundant power supply
3.0	August 24, 2017	<p>New products added:</p> <ul style="list-style-type: none"> 200GB Hot Plug 2.5-inch SATA SSD / N8150-779 400GB Hot Plug 2.5-inch SATA SSD / N8150-780 800GB Hot Plug 2.5-inch SATA SSD / N8150-781 200GB Hot Plug 2.5-inch SATA SSD / N8150-782 400GB Hot Plug 2.5-inch SATA SSD / N8150-783 800GB Hot Plug 2.5-inch SATA SSD / N8150-784 1.6TB Hot Plug 2.5-inch SATA SSD / N8150-785 <p>Discontinued product deleted:</p> <ul style="list-style-type: none"> 200GB Hot Plug 2.5-inch SATA SSD / N8150-725 400GB Hot Plug 2.5-inch SATA SSD / N8150-726 800GB Hot Plug 2.5-inch SATA SSD / N8150-727 200GB Hot Plug 2.5-inch SATA SSD / N8150-732 400GB Hot Plug 2.5-inch SATA SSD / N8150-733 800GB Hot Plug 2.5-inch SATA SSD / N8150-734 1.6TB Hot Plug 2.5-inch SATA SSD / N8150-735 <p>Others:</p> <ul style="list-style-type: none"> Removed the description of the Endurance of SSD
2.0	June 6, 2017	<p>New products added:</p> <ul style="list-style-type: none"> 120GB M.2 SATA SSD / N8150-736 Dual M.2 SATA Drive Installation Kit / N8118-307 Graphics Accelerator / N8105-48 <p>Others:</p> <ul style="list-style-type: none"> Removed support information related to Windows Server 2008 R2
1.0	April 19, 2017	Initial release

