

# NEC Express5800/R110h-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.

## Contents

<b>TECHNICAL SPECIFICATION .....</b>	<b>3</b>
Key Features.....	3
Specification.....	3
<b>EXTERNAL VIEWS .....</b>	<b>9</b>
Front and Rear Views .....	9
Dimensions (mm).....	11
<b>CONFIGURATION DIAGRAM .....</b>	<b>12</b>
<b>EXPANSION SLOTS .....</b>	<b>13</b>
<b>SERVER CONFIGURATION .....</b>	<b>14</b>
<b>1 Base Models.....</b>	<b>14</b>
<b>2 Processor .....</b>	<b>14</b>
<b>3 Memory .....</b>	<b>15</b>
<b>4 Internal Hard Disk Drives .....</b>	<b>16</b>
4.1 RAID Configuration.....	16
4.2 Required Components for RAID Configuration .....	18
4.3 Supported Drives.....	23
<b>5 Optical Drive.....</b>	<b>26</b>
<b>6 PCI Card.....</b>	<b>26</b>
6.1 Network Interface Controller.....	26
6.2 External Storage Controller .....	28
6.3 Graphics Accelerator .....	28
6.4 Serial Port Adapter .....	28
<b>7 Other Add-in Components.....</b>	<b>29</b>
7.1 Cooling Fan Kit.....	29
7.2 Trusted Platform Module Kit.....	29
7.3 Internal Flash Memory.....	29
7.4 High temperature resistant Kit.....	29
7.5 Flash FDD.....	30
<b>8 Add-on Components .....</b>	<b>30</b>
8.1 17-inch LCD Console Drawer .....	30
8.2 KVM Switch .....	31
8.3 Server Management License.....	31
<b>REFERENCES.....</b>	<b>32</b>
Boot Mode Setting .....	32
Server Management .....	33
Endurance of SSD.....	34
OS Support Matrix for PCI Cards and Embedded Controllers .....	35
Supported PCI cards and Installable Slots.....	36
Secure Boot Mode.....	38
Copyright Notice and Liability Disclaimer.....	39
<b>REVISION HISTORY .....</b>	<b>40</b>

# Technical Specification

## Key Features

- High performance with the latest Intel® Xeon® processor E3-1200 v5 product family
- Up to 64 GB of high speed DDR4-2133 memory
- High energy efficiency with intelligent fan control, power capping feature and 80 PLUS® Platinum or Gold power supply
- Full manageability by integrated EXPRESSSCOPE Engine 3

## Specification

### 2.5-inch Drive Model

(1/2)

Model		R110h-1		
Part Number		N8100-2337F		
Processor	Type	Intel® Pentium® Processor G4400	Intel® Xeon® Processor E3-1220 v5	Intel® Xeon® Processor E3-1230 v5
	Clock Speed	3.30 GHz	3.00 GHz	3.40 GHz
	Number of Processor	1		
	Cache	3 MB	8 MB	
	Cores and Threads	2C / 2T	4C / 4T	4C / 8T
Chipset		Intel® C236 Chipset		
Memory	Type	DDR4-2133 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 : 14.4 TB (8 x 1.8 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 <sup>1</sup> ) 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 <sup>2</sup>		
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)		
Interfaces (Continued)		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)	117 VA / 116 Watt	125 VA / 124 Watt	
	(Max. Config, Operating)	286 VA / 284 Watt	324 VA / 322 Watt	356 VA / 353 Watt
Acoustic Noise	Minimum Config.	36 dB	49 dB	

Model		R110h-1	
(Sound Pressure Level) <sup>3</sup>	Maximum Config.	38 dB	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), 20 to 80% Non-Operating: -10° to 55° C / 14° to 131° F, 20 to 80%	
Regulatory and Safety		FCC, c-UL, CE, CB, RoHS, WEEE, BSMI, CCC	
Operating Systems and Virtualization Software		Microsoft® Windows Server® 2008 R2 Standard Microsoft® Windows Server® 2008 R2 Enterprise Microsoft® Windows Server® 2012 Standard Microsoft® Windows Server® 2012 Datacenter Microsoft® Windows Server® 2012 R2 Standard Microsoft® Windows Server® 2012 R2 Datacenter Red Hat Enterprise Linux 6.7 or later (x86_64) <sup>4</sup> Red Hat Enterprise Linux 7.2 or later <sup>4</sup> VMware ESXi 5.5 Update 3 <sup>5</sup> VMware ESXi 6.0 Update 1 <sup>5</sup>	

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

(2/2)

<b>Model</b>		<b>R110h-1</b>		
<b>Part Number</b>		N8100-2337F		
<b>Processor</b>	<b>Type</b>	Intel® Xeon® Processor E3-1240L v5	Intel® Xeon® Processor E3-1260L v5	Intel® Xeon® Processor E3-1270 v5
	<b>Clock Speed</b>	2.10 GHz	2.90 GHz	3.60 GHz
	<b>Number of Processor</b>	1		
	<b>Cache</b>	8 MB		
	<b>Cores and Threads</b>	4C / 8T		
<b>Chipset</b>		Intel® C236 Chipset		
<b>Memory</b>	<b>Type</b>	DDR4-2133 ECC Unbuffered DIMM		
	<b>Standard Capacity</b>	0 GB	0 GB	0 GB
	<b>Maximum Capacity</b>	64 GB (4 x 16 GB)	64 GB (4 x 16 GB)	64 GB (4 x 16 GB)
<b>Internal Storage</b>	<b>Standard Capacity</b>	0 GB		
	<b>Maximum Capacity</b>	SATA HDD: 16 TB (8 x 2 TB) SAS HDD : 14.4 TB (8 x 1.8 TB) SATA SSD 12.8 TB (8 x 1.6 TB) SAS SSD 3.2 TB (8 x 400 GB)		
	<b>Disk Controller</b>	SATA : 6 Gb/s (Integrated) SATA/SAS : 6/12 Gb/s (Optional)		
	<b>RAID</b>	SATA : RAID 0/1/10 (Standard <sup>1</sup> ) SATA/SAS : RAID 0/1/5/6/10/50/60 (Optional)		
	<b>Hot Plug</b>	Supported		
	<b>Optical Disk Drive</b>	Optional		
	<b>Optical Drive Bays</b>	1		
	<b>Disk Drive Bays</b>	8		
<b>Expansion Slots</b>		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		
<b>Video</b>	<b>Controller (VRAM)</b>	Integrated in Server Management Controller (32MB)		
	<b>Resolution / Color</b>	1600 x 1200 / 16.7M <sup>2</sup>		
<b>Interfaces</b>		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)		
<b>Server Management</b>		EXPRESSSCOPE Engine 3		
<b>Redundant Fan</b>		Optional, non-hot plug		
<b>Power Supply</b>		2 450 Watt 80 PLUS® Gold certified Hot plug PSU 100-240 VAC ± 10% 50 / 60 Hz ± 3 Hz		
<b>Power Consumption</b>	<b>(Max. Config, Idling)</b>	116 VA / 115 Watt	118 VA / 117 Watt	126VA / 125Watt
	<b>(Max. Config, Operating)</b>	274 VA / 272 Watt	306 VA / 303 Watt	358VA / 356Watt
<b>Acoustic Noise (Sound Pressure Level) <sup>3</sup></b>	<b>Minimum Config.</b>	49 dB		
	<b>Maximum Config.</b>	49 dB		
<b>Dimensions (W x D x H)</b>		444.0 x 615.2 x 43.6 mm / 17.5 x 24.2 x 1.7 in (1U)		
<b>Model</b>		<b>R110h-1</b>		
<b>Weight (Minimum / Maximum)</b>		10 kg / 17.5 kg, 22.05 lbs. / 38.58 lbs.		
<b>Temperature, Relative Humidity (non-condensing)</b>		Operating: 5° to 40° C / 41° to 104° F (Standard) or 5° to 45° C / 41° to 113° F (Optional), 20 to 80% Non-Operating: -10° to 55° C / 14° to 131° F, 20 to 80%		
<b>Regulatory and Safety</b>		FCC, c-UL, CE, CB, RoHS, WEEE, BSMI, CCC		
<b>Operating Systems and Virtualization Software</b>		Microsoft® Windows Server® 2008 R2 Standard Microsoft® Windows Server® 2008 R2 Enterprise Microsoft® Windows Server® 2012 Standard Microsoft® Windows Server® 2012 Datacenter Microsoft® Windows Server® 2012 R2 Standard		

Microsoft® Windows Server® 2012 R2 Datacenter  
 Red Hat Enterprise Linux 6.7 or later (x86\_64)<sup>4</sup>  
 Red Hat Enterprise Linux 7.2 or later<sup>4</sup>  
 VMware ESXi 5.5 Update 3  
 VMware ESXi 6.0 Update 1

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

### 3.5-inch Drive Model

(1/2)

Model		R110h-1		
Part Number		N8100-2334F, N8100-2335F		
Processor	Type	Intel® Pentium® Processor G4400	Intel® Xeon® Processor E3-1220 v5	Intel® Xeon® Processor E3-1230 v5
	Clock Speed	3.30 GHz	3.00 GHz	3.40 GHz
	Number of Processor	1		
	Cache	3 MB	8 MB	
	Cores and Threads	2C / 2T	4C / 4T	4C / 8T
Chipset		Intel® C236 Chipset		
Memory	Type	DDR4-2133 ECC Unbuffered DIMM		
	Standard Capacity	0 GB	0 GB	0 GB
	Maximum Capacity	64 GB (4 x 16 GB)	64 GB (4 x 16 GB)	64 GB (4 x 16 GB)
Internal Storage	Standard Capacity	0 GB		
	Maximum Capacity	SATA : 40 TB (4 x 10 TB)		
	Disk Controller	SATA : 6Gb/s (Integrated)		
	RAID	SATA : RAID 0/1/10 (Standard <sup>1</sup> ), RAID 5/6 (Optional)		
	Hot Plug	Supported		
	Optical Disk Drive	Optional		
	Optical Drive Bays	1		
Expansion Slots		4		
Video		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 <sup>2</sup>		
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)	116VA / 115 Watt		
	(Max. Config, Operating)	268VA / 266Watt	307VA / 305Watt	338VA / 336Watt
Acoustic Noise (Sound Pressure Level) <sup>3</sup>	Minimum Config.	36 dB	49 dB	
	Maximum Config.	38 dB	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), 20 to 80%		

## SYSTEM CONFIGURATION GUIDE – NEC Express5800/R110h-1

<b>Model</b>	<b>R110h-1</b>
	Non-Operating: -10° to 55° C / 14° to 131° F, 20 to 80%
<b>Regulatory and Safety</b>	FCC, c-UL, CE, CB, RoHS, WEEE, BSMI, CCC
<b>Operating Systems and Virtualization Software</b>	Microsoft® Windows Server® 2008 R2 Standard Microsoft® Windows Server® 2008 R2 Enterprise Microsoft® Windows Server® 2012 Standard Microsoft® Windows Server® 2012 Datacenter Microsoft® Windows Server® 2012 R2 Standard Microsoft® Windows Server® 2012 R2 Datacenter Red Hat Enterprise Linux 6.7 or later (x86_64) <sup>4</sup> Red Hat Enterprise Linux 7.2 or later <sup>4</sup> VMware ESXi 5.5 Update 3 <sup>5</sup> VMware ESXi 6.0 Update 1 <sup>5</sup>

<sup>1</sup> Embedded SATA RAID controller is supported only on limited operating systems.

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

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

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

<sup>5</sup> Supported on Xeon processor systems only.

(2/2)

<b>Model</b>	<b>R110h-1</b>			
<b>Part Number</b>	N8100-2334F, N8100-2335F			
<b>Processor</b>	<b>Type</b>	Intel® Xeon® Processor E3-1240L v5	Intel® Xeon® Processor E3-1260L v5	Intel® Xeon® Processor E3-1270 v5
	<b>Clock Speed</b>	2.10 GHz	2.90 GHz	3.60 GHz
	<b>Number of Processor</b>	1		
	<b>Cache</b>	8 MB		
	<b>Cores and Threads</b>	4C / 8T		
<b>Chipset</b>	Intel® C236 Chipset			
<b>Memory</b>	<b>Type</b>	DDR4-2133 ECC Unbuffered DIMM		
	<b>Standard Capacity</b>	0 GB	0 GB	0 GB
	<b>Maximum Capacity</b>	64 GB (4 x 16 GB)	64 GB (4 x 16 GB)	64 GB (4 x 16 GB)
<b>Internal Storage</b>	<b>Standard Capacity</b>	0 GB		
	<b>Maximum Capacity</b>	SATA : 40 TB (4 x 10 TB)		
	<b>Disk Controller</b>	SATA : 6Gb/s (Integrated)		
	<b>RAID</b>	SATA : RAID 0/1/10 (Standard <sup>1</sup> ), RAID 5/6 (Optional)		
	<b>Hot Plug</b>	Supported		
	<b>Optical Disk Drive</b>	Optional		
	<b>Optical Drive Bays</b>	1		
	<b>Disk Drive Bays</b>	4		
<b>Expansion Slots</b>	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			
<b>Video</b>	<b>Controller (VRAM)</b>	Integrated in Server Management Controller (32MB)		
	<b>Resolution / Color</b>	1600 x 1200 / 16.7M <sup>2</sup>		
<b>Interfaces</b>	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)			
<b>Server Management</b>	EXPRESSSCOPE Engine 3			
<b>Redundant Fan</b>	Optional, non-hot plug			
<b>Power Supply</b>	1 400 Watt 80 PLUS® Platinum certified non-Hot plug PSU			

**SYSTEM CONFIGURATION GUIDE – NEC Express5800/R110h-1**

		2 450 Watt 80 PLUS® Gold certified Hot plug PSU 100-240 VAC ± 10% 50 / 60 Hz ± 3 Hz		
<b>Power Consumption</b>	<b>(Max. Config, Idling)</b>	115VA / 114Watt	114VA / 114Watt	115VA / 114Watt
	<b>(Max. Config, Operating)</b>	259VA / 257Watt	290VA / 288Watt	341VA / 338Watt
<b>Acoustic Noise (Sound Pressure Level)<sup>3</sup></b>	<b>Minimum Config.</b>	49 dB		
	<b>Maximum Config.</b>	49 dB		
<b>Dimensions (W x D x H)</b>		444.0 x 615.2 x 43.6 mm / 17.5 x 24.2 x 1.7 in (1U)		
<b>Weight (Minimum / Maximum)</b>		10 kg / 17.5 kg, 22.05 lbs. / 38.58 lbs.		
<b>Temperature, Relative Humidity (non-condensing)</b>		Operating: 5° to 40° C / 41° to 104° F (Standard) or 5° to 45° C / 41° to 113° F (Optional), 20 to 80% Non-Operating: -10° to 55° C / 14° to 131° F, 20 to 80%		
<b>Regulatory and Safety</b>		FCC, c-UL, CE, CB, RoHS, WEEE, BSMI, CCC		
<b>Operating Systems and Virtualization Software</b>		Microsoft® Windows Server® 2008 R2 Standard Microsoft® Windows Server® 2008 R2 Enterprise Microsoft® Windows Server® 2012 Standard Microsoft® Windows Server® 2012 Datacenter Microsoft® Windows Server® 2012 R2 Standard Microsoft® Windows Server® 2012 R2 Datacenter Red Hat Enterprise Linux 6.7 or later (x86_64) <sup>4</sup> Red Hat Enterprise Linux 7.2 or later <sup>4</sup> VMware ESXi 5.5 Update 3 VMware ESXi 6.0 Update 1		

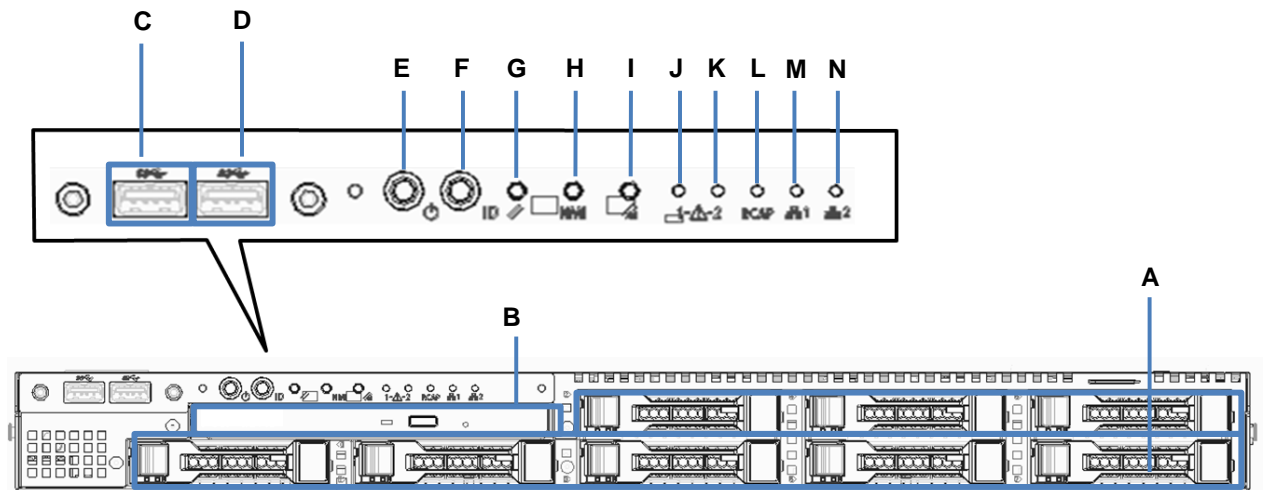
<sup>1</sup> Embedded SATA RAID controller is supported only on limited operating systems.  
<sup>2</sup> Maximum resolution available via EXPRESSSCOPE Engine 3 remote console is 1280 x 1024 / 65K colors.  
<sup>3</sup> Noise emission was measured in accordance with ISO 7779, at 25°C. The actual value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



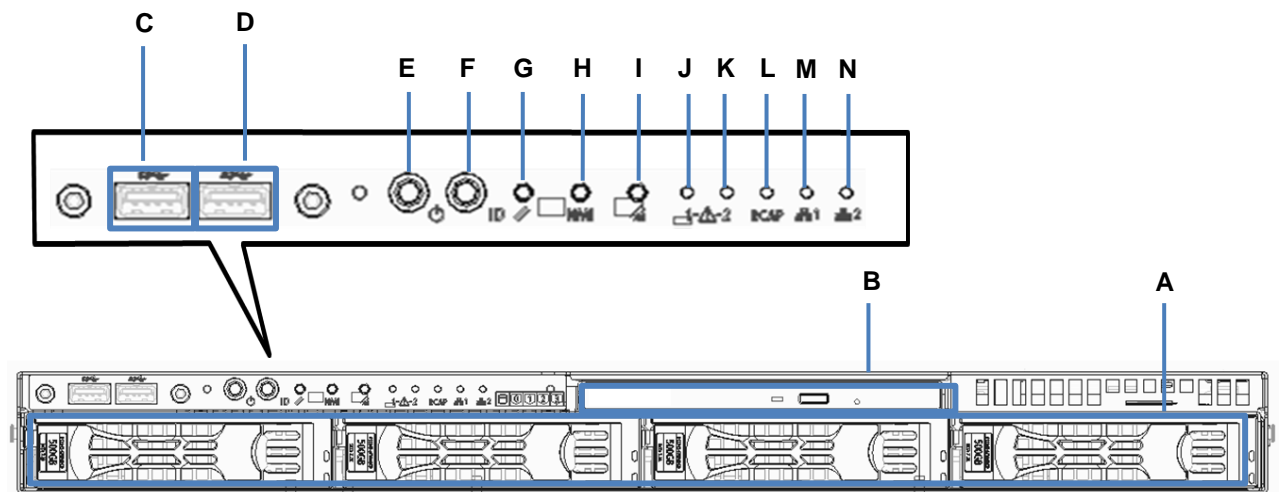
# External Views

## Front and Rear Views

### Front View for 2.5-inch Drive Model

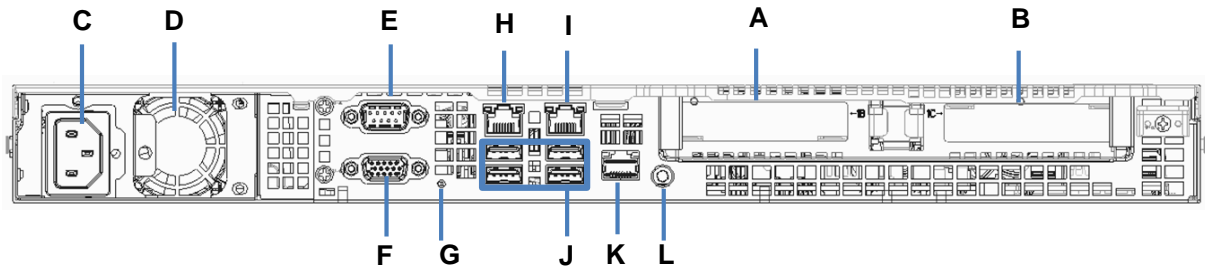


### Front View for 3.5-inch Drive Model

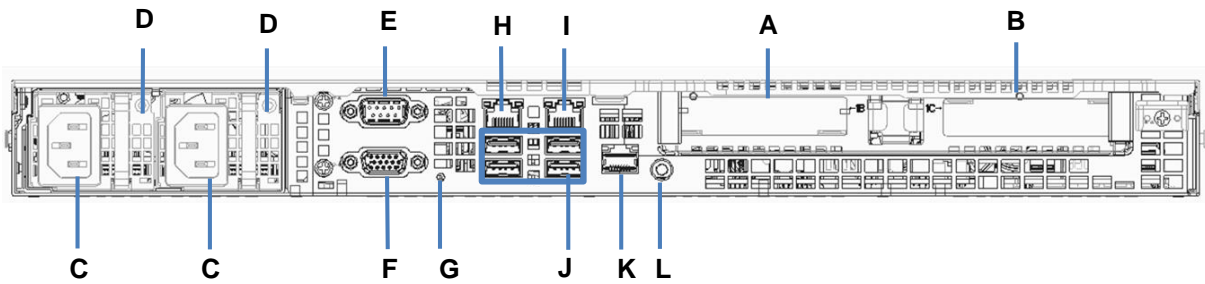


Legend			
A.	Drive Bays	H.	Dump (NMI) Switch
B.	Optical Drive Bay	I.	BMC Reset Button
C.	USB Connector	J.	System Status LED 1
D.	USB Connector	K.	System Status LED 2
E.	Power Button / Power LED	L.	Power Capping LED
F.	UID LED Button	M.	Data LAN 1 Activity LED
G.	Reset Button	N.	Data LAN 2 Activity LED

Rear View for Non-redundant PSU Configuration



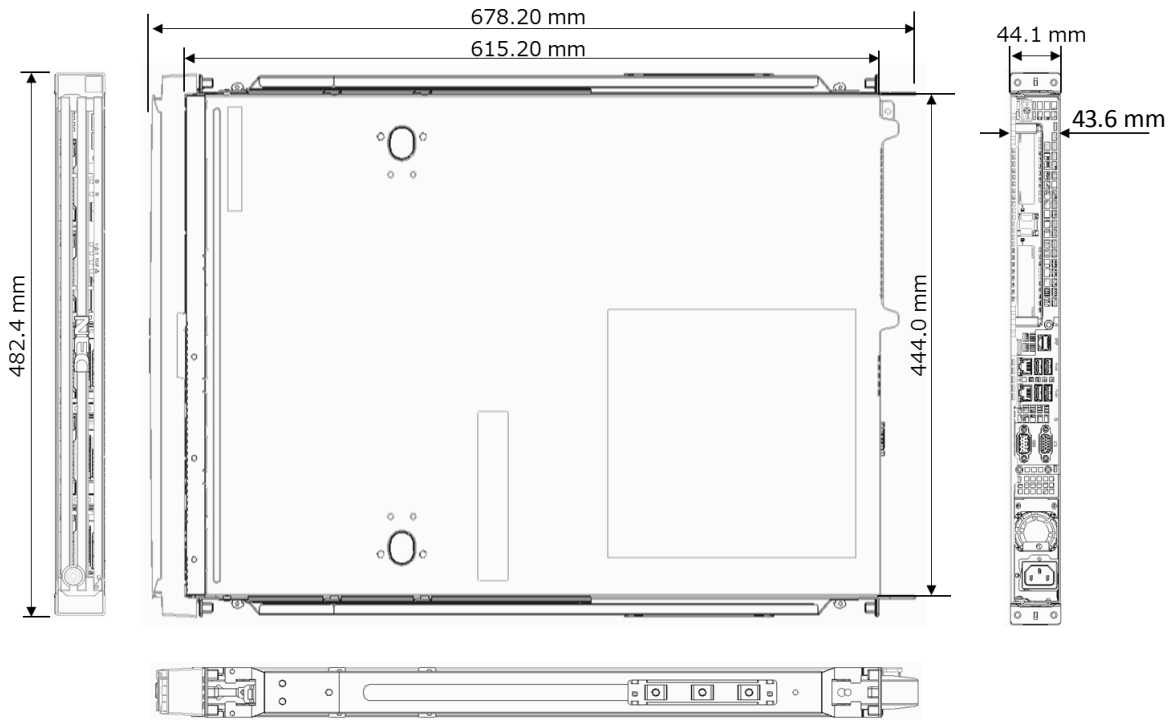
Rear View for Redundant PSU Configuration



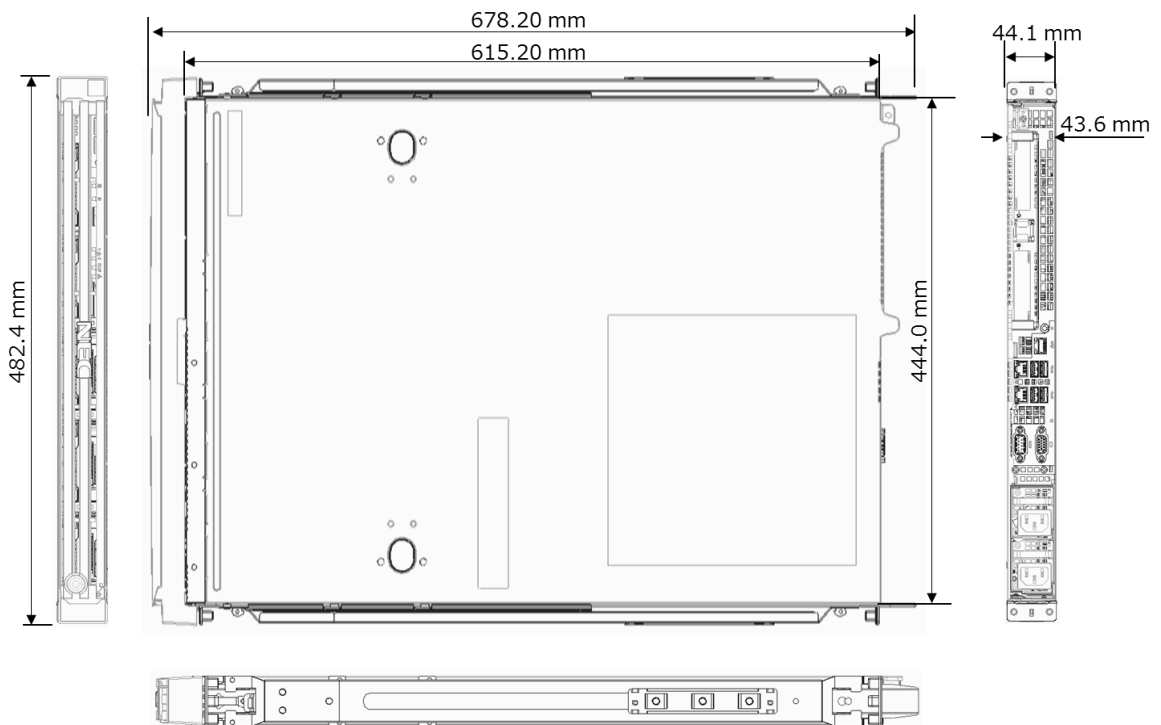
Legend	
A.	PCI Slot 1B
B.	PCI Slot 1C
C.	AC Inlet
D.	Power Unit
E.	Serial Port Connector
F.	VGA Connector
G.	Power LED
H.	Data LAN 1 Connector
I.	Data LAN 2 Connector
J.	USB 3.0 Connectors
K.	Management LAN Connector
L.	UID LED / Button

## Dimensions (mm)

### With non-Hot plug PSU

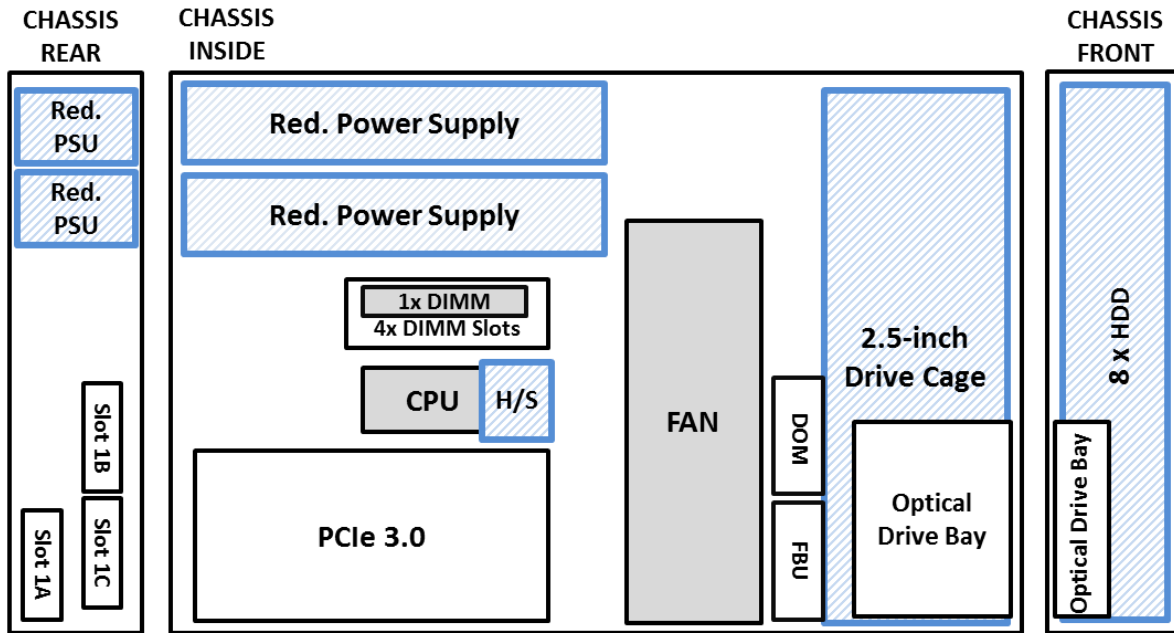


### With Hot plug PSU



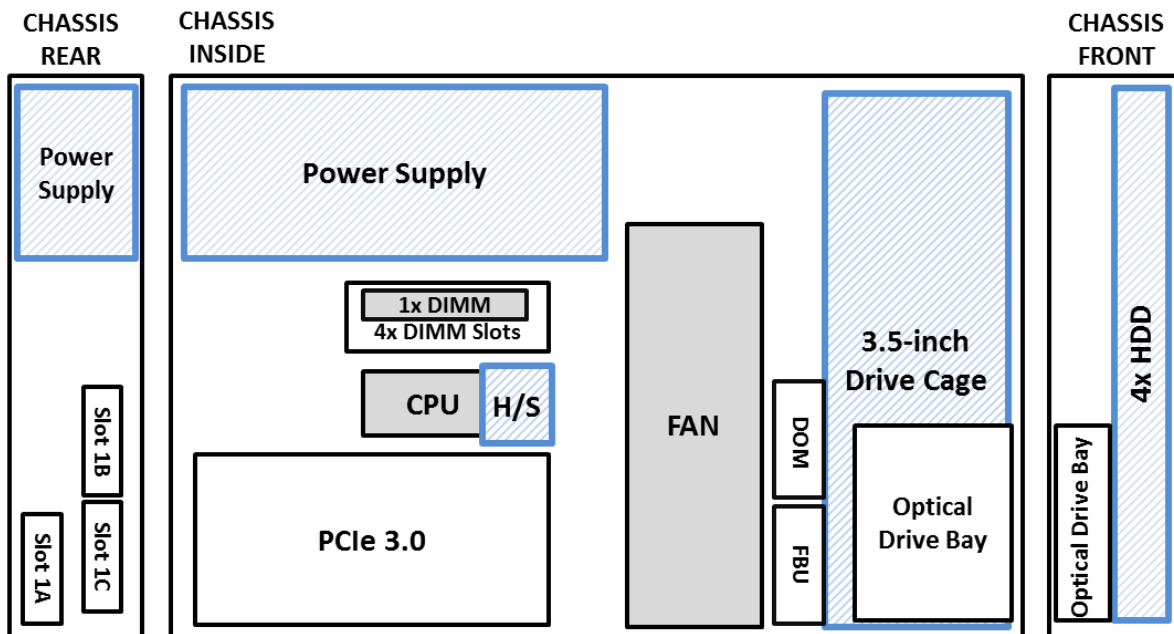
# Configuration Diagram

## 2.5-inch Drive Model



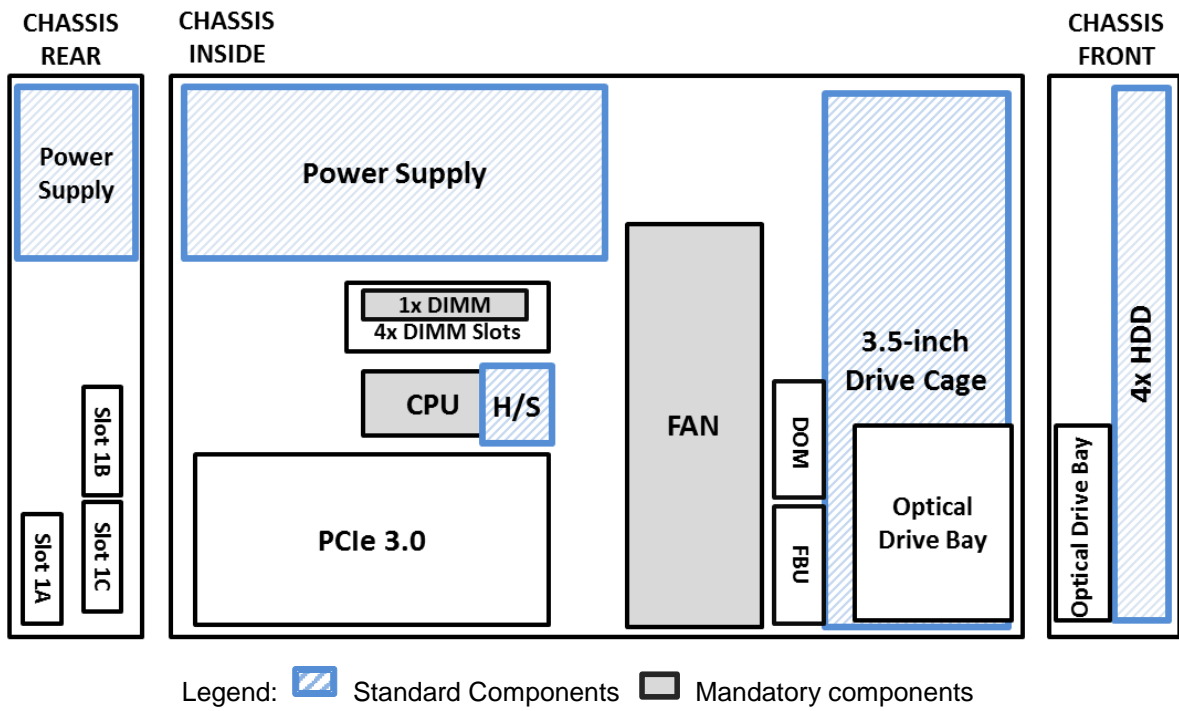
Legend: Standard Components Mandatory components

## 3.5-inch Drive Model (Non-redundant PSU)

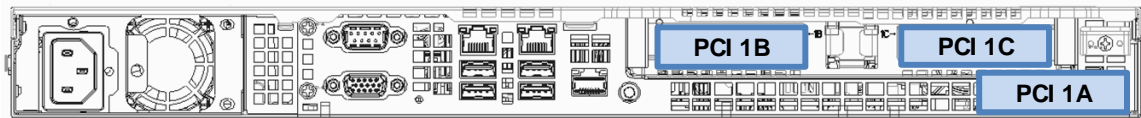


Legend: Standard Components Mandatory components

### 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
<b>NEC Express5800/R110h-1</b> 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	N8100-2334F
<b>NEC Express5800/R110h-1</b> No CPU, no RAM, no 3.5-inch HDD, no Cooling FAN, no ODD Including: 3.5-inch Drive Cage, 2 x 500 Watt hot plug power supply, Front bezel	N8100-2335F
<b>NEC Express5800/R110h-1</b> No CPU, no RAM, no 2.5-inch HDD, no Cooling FAN, no ODD Including: 2.5-inch Drive Cage, 2 x 500 Watt hot plug power supply, Front bezel,	N8100-2337F

**NOTE:**

- The base model must be ordered with a processor kit, a memory kit, a cooling fan kit, and internal hard drive cable
- For Windows Server 2008 R2 installation, EXPRESSBUILDER DVD is required.

## 2 Processor

**Available sockets: 1**

Category	Product Name / Description	Part Number
<b>Processors</b> Required	<b>Pentium G4400 Processor Kit</b> Intel® Pentium® Processor G4400 (3.30 GHz, 2C/2T, 3 MB)	N8101-939F
	<b>Xeon E3-1220 v5 Processor Kit</b> Intel® Xeon® Processor E3-1220 v5 (3.00 GHz, 4C/4T, 8 MB)	N8101-941F
	<b>Xeon E3-1230 v5 Processor Kit</b> Intel® Xeon® Processor E3-1230 v5 (3.40 GHz, 4C/8T, 8 MB)	N8101-942F
	<b>Xeon E3-1240L v5 Processor Kit</b> Intel® Xeon® Processor E3-1240L v5 (2.10 GHz, 4C/8T, 8 MB)	N8101-943F
	<b>Xeon E3-1260L v5 Processor Kit</b> Intel® Xeon® Processor E3-1260L v5 (2.90 GHz, 4C/8T, 8 MB)	N8101-944F
	<b>Xeon E3-1270 v5 Processor Kit</b> Intel® Xeon® Processor E3-1270 v5 (3.60 GHz, 4C/8T, 8 MB)	N8101-945F

**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
<b>4GB DDR4-2133 UNB Memory Kit</b> 1 x 4GB Unbuffered ECC DIMM, DDR4-2133	N8102-656F
<b>8GB DDR4-2133 UNB Memory Kit</b> 1 x 8GB Unbuffered ECC DIMM, DDR4-2133	N8102-657F
<b>16GB DDR4-2133 UNB Memory Kit</b> 1 x 16GB Unbuffered ECC DIMM, DDR4-2133	N8102-658F

#### 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™ 5.5 and VMware ESXi™ 6.0

#### 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.

Maximum Memory Size Supported by Operating Systems	Maximum Available Memory	
Microsoft Windows Server 2008 R2 Standard <sup>1</sup>	<b>32 GB</b>	<b>32 GB</b>
Microsoft Windows Server 2008 R2 Enterprise <sup>1</sup>	<b>2 TB</b>	<b>64 GB</b>
Microsoft Windows Server 2012 Standard <sup>1</sup>	<b>4 TB</b>	<b>64 GB</b>
Microsoft Windows Server 2012 Datacenter <sup>1</sup>		
Microsoft Windows Server 2012 R2 Standard <sup>1</sup>		
Microsoft Windows Server 2012 R2 Datacenter <sup>1</sup>		
Red Hat Enterprise Linux 6 (x86_64)	<b>6 TB</b>	<b>64 GB</b>
Red Hat Enterprise Linux 7		
VMware ESXi 5.5 <sup>2</sup>	<b>4 TB</b>	<b>64 GB</b>
VMware ESXi 6.0 <sup>3</sup>	<b>6 TB</b>	<b>64 GB</b>

<sup>1</sup> The maximum available memory size of Hyper-V systems are below:

- Windows Server 2008 R2 Standard : 32 GB
- Windows Server 2008 R2 Enterprise : 1TB
- Windows Server 2012, Windows Server 2012 R2 : 4 TB

<sup>2</sup> Up to 1TB of main memory is available to each virtual machine.

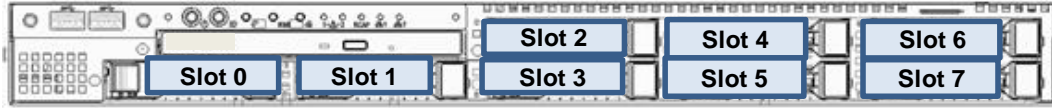
<sup>3</sup> Up to 4TB of main memory is available to each virtual machine.

## 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



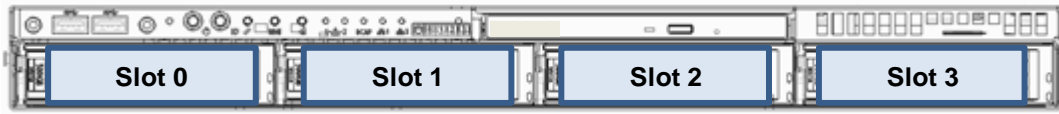
Operating System	Supported RAID configuration		Supported HDD/SSD
	RAID and Cache	Section	
Windows Server 2008 R2 VMware ESXi 5.5 VMware ESXi 6	Non-RAID (Embedded SATA)	4.2.1	4.3.1
	RAID 0/1 (Embedded SATA RAID) (WS2008R2 only)	4.2.2	4.3.2
	RAID 0/1/10 No Cache	4.2.3	4.3.3
	RAID 0/1/10 1GB Cache	4.2.4	
	RAID 5/6/50/60 1GB Cache	4.2.5	
	RAID 5/6/50/60 2GB Cache	4.2.6	
Windows Server 2012 Windows Server 2012 R2	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	4.2.3	4.3.4
	RAID 0/1/10 1GB Cache	4.2.4	
	RAID 5/6/50/60 1GB Cache	4.2.5	
	RAID 5/6/50/60 2GB Cache	4.2.6	
Red Hat Enterprise Linux 6 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	4.2.4	
	RAID 5/6/50/60 1GB Cache	4.2.5	
	RAID 5/6/50/60 2GB Cache	4.2.6	

**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	
Windows Server 2008 R2 VMware ESXi 5.5 VMware ESXi 6	Non-RAID (Embedded SATA)	4.2.7	4.3.5
	RAID 0/1 (Embedded SATA RAID) (WS2008R2 only)	4.2.8	
	RAID 0/1/10 No Cache	4.2.9	
	RAID 0/1/10 1GB Cache	4.2.10	
	RAID 5/6/50/60 1GB Cache	4.2.11	
	RAID 5/6/50/60 2GB Cache	4.2.12	
Windows Server 2012 Windows Server 2012 R2	Non-RAID (Embedded SATA)	4.2.7	4.3.5
	RAID 0/1 (Embedded SATA RAID)	4.2.8	
	RAID 0/1/10 No Cache	4.2.9	4.3.6
	RAID 0/1/10 1GB Cache	4.2.10	
	RAID 5/6/50/60 1GB Cache	4.2.11	
	RAID 5/6/50/60 2GB Cache	4.2.12	
Red Hat Enterprise Linux 6 Red Hat Enterprise Linux 7	Non-RAID (Embedded SATA)	4.2.7	4.3.5
	RAID 0/1/10 No Cache	4.2.9	4.3.6
	RAID 0/1/10 1GB Cache	4.2.10	
	RAID 5/6/50/60 1GB Cache	4.2.11	
	RAID 5/6/50/60 2GB Cache	4.2.12	

**NOTE:**

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

## 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	<b>Embedded SATA Controller</b> 4 x 6Gb/s SATA	(Standard)
Cable	<b>Internal SAS/SATA Cable</b> 1 x Mini SAS HD to 1 x Mini SAS HD, 1 set	(Standard)
Drive Cage	<b>2.5-inch Drive Cage</b> 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	<b>Embedded SATA Controller</b> 4x 6Gb/s SATA, RAID 0/1/10 capable	(Standard)
Cable	<b>Internal SAS/SATA Cable</b> 1 x Mini SAS HD to 1 x Mini SAS HD, 1 set	(Standard)
Drive Cage	<b>2.5-inch Drive Cage</b> 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
<b>Storage Controller</b> <b>Required</b>	<b>RAID Controller (RAID 0/1)</b> Avago(LSI) 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	<b>Internal SAS/SATA Cable</b> 1 x Mini SAS HD to 1 x Mini SAS HD, 1 set	(Standard)
	<b>Internal SAS/SATA Cable</b> 1 x Mini SAS HD to 1 x Mini SAS HD, 1 set, for 5th - 8th hard drives	K410-348(00)
Drive Cage	<b>2.5-inch Drive Cage</b> 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 with 1 GB Cache for 2.5-inch Drives

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

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

Category	Product Name / Description	Part Number
<b>Storage Controller</b> Required	<b>RAID Controller (1GB, RAID 0/1/5/6)</b> 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	N8103-177
<b>Flash Backup</b> Recommended	<b>Flash Backup Unit</b> for Avago(LSI) MegaRAID SAS 9362-8i 650mm Cable for Flash Backup Unit included	N8103-181
<b>Cable</b>	<b>Internal SAS/SATA Cable</b> 1 x Mini SAS HD to 1 x Mini SAS HD, 1 set	(Standard)
	<b>Internal SAS/SATA Cable</b> 1 x Mini SAS HD to 1 x Mini SAS HD, 1 set, for 5th - 8th hard drives	K410-348(00)
<b>Drive Cage</b>	<b>2.5-inch Drive Cage</b> 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.

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

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

#### 4.2.7 Embedded SATA non-RAID Controller for 3.5-inch Drives

Category	Product Name / Description	Part Number
<b>Storage Controller</b>	<b>Embedded SATA Controller</b> 4 x 6Gb/s SATA	(Standard)
<b>Cable</b>	<b>Internal SAS/SATA Cable</b> 1 x Mini SAS HD to 4 x Single SATA, 1 set	(Standard)
<b>Drive Cage</b>	<b>3.5-inch Drive Cage</b> 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.

#### 4.2.8 Embedded SATA RAID Controller for 3.5-inch Drives

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

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

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

**NOTE:**

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

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

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

**NOTE:**

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

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

Category	Product Name / Description	Part Number
<b>Storage Controller Required</b>	<b>RAID Controller (1GB, RAID 0/1/5/6)</b> 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	N8103-177
<b>Flash Backup Recommended</b>	<b>Flash Backup Unit</b> for Avago(LSI) MegaRAID SAS 9362-8i 650mm Cable for Flash Backup Unit included	N8103-181
<b>Cable</b>	<b>Internal SAS/SATA Cable</b> 1 x Mini SAS HD to 4 x Single SATA, 1 set	(Standard)
<b>Drive Cage</b>	<b>3.5-inch Drive Cage</b> 4 x 3.5-inch hot plug drive bays	(Standard)

**NOTE:**

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

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

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

**NOTE:**

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

## 4.3 Supported Drives

### 4.3.1 2.5-inch Drives (1)

Category		Product Name / Description	Part Number
Drive 4 slots available	SATA HDD	<b>500GB 7.2K Hot Plug 2.5-inch SATA HDD</b> 1 x 500 GB SATA HDD, 2.5-inch, 6Gb/s, 7,200 rpm, 512n sector	N8150-488
		<b>1TB 7.2K Hot Plug 2.5-inch SATA HDD</b> 1 x 1 TB SATA HDD, 2.5-inch, 6Gb/s, 7,200 rpm, 512n sector	N8150-489
		<b>2TB 7.2K Hot Plug 2.5-inch SATA HDD</b> 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	<b>500GB 7.2K Hot Plug 2.5-inch SATA HDD</b> 1 x 500 GB SATA HDD, 2.5-inch, 6Gb/s, 7,200 rpm, 512n sector	N8150-488
		<b>1TB 7.2K Hot Plug 2.5-inch SATA HDD</b> 1 x 1 TB SATA HDD, 2.5-inch, 6Gb/s, 7,200 rpm, 512n sector	N8150-489
		<b>2TB 7.2K Hot Plug 2.5-inch SATA HDD</b> 1 x 2 TB SATA HDD, 2.5-inch, 6Gb/s, 7,200 rpm, 512n sector	N8150-527
	SATA SSD (ME)	<b>200GB Hot Plug 2.5-inch SATA SSD</b> 1 x 200 GB SATA SSD, MLC, 2.5-inch, 6b/s, 512n sector, ME	N8150-725
		<b>400GB Hot Plug 2.5-inch SATA SSD</b> 1 x 400 GB SATA SSD, MLC, 2.5-inch, 6b/s, 512n sector, ME	N8150-726
		<b>800GB Hot Plug 2.5-inch SATA SSD</b> 1 x 800 GB SATA SSD, MLC, 2.5-inch, 6b/s, 512n sector, ME	N8150-727
	SATA SSD (VE)	<b>200GB Hot Plug 2.5-inch SATA SSD</b> 1 x 200 GB SATA SSD, MLC, 2.5-inch, 6b/s, 512n sector, VE	N8150-732
		<b>400GB Hot Plug 2.5-inch SATA SSD</b> 1 x 400 GB SATA SSD, MLC, 2.5-inch, 6b/s, 512n sector, VE	N8150-733
		<b>800GB Hot Plug 2.5-inch SATA SSD</b> 1 x 800 GB SATA SSD, MLC, 2.5-inch, 6b/s, 512n sector, VE	N8150-734
		<b>1.6TB Hot Plug 2.5-inch SATA SSD</b> 1 x 1.6 TB SATA SSD, MLC, 2.5-inch, 6b/s, 512n sector, VE	N8150-735

### 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)	<b>300GB 10K Hot Plug 2.5-inch SAS HDD</b> 1 x 300 GB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512n sector	N8150-479
		<b>450GB 10K Hot Plug 2.5-inch SAS HDD</b> 1 x 450 GB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512n sector	N8150-480
		<b>600GB 10K Hot Plug 2.5-inch SAS HDD</b> 1 x 600 GB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512n sector	N8150-481
		<b>900GB 10K Hot Plug 2.5-inch SAS HDD</b> 1 x 900 GB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512n sector	N8150-482
		<b>1.2TB 10K Hot Plug 2.5-inch SAS HDD</b> 1 x 1.2TB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512n sector	N8150-483
		<b>300GB 15K Hot Plug 2.5-inch SAS HDD</b> 1 x 300 GB SAS HDD, 2.5-inch, 12Gb/s, 15,000 rpm, 512n sector	N8150-485
		<b>450GB 15K Hot Plug 2.5-inch SAS HDD</b> 1 x 450 GB SAS HDD, 2.5-inch, 12Gb/s, 15,000 rpm, 512n sector	N8150-486
		<b>600GB 15K Hot Plug 2.5-inch SAS HDD</b> 1 x 600 GB SAS HDD, 2.5-inch, 12Gb/s, 15,000 rpm, 512n sector	N8150-518
		<b>500GB 7.2K Hot Plug 2.5-inch SATA HDD</b> 1 x 500 GB SATA HDD, 2.5-inch, 6Gb/s, 7,200 rpm, 512n sector	N8150-488
		SATA HDD	

(512n)	<b>1TB 7.2K Hot Plug 2.5-inch SATA HDD</b>	N8150-489
	1 x 1 TB SATA HDD, 2.5-inch, 6Gb/s, 7,200 rpm, 512n sector	
	<b>2TB 7.2K Hot Plug 2.5-inch SATA HDD</b>	N8150-527
	1 x 2 TB SATA HDD, 2.5-inch, 6Gb/s, 7,200 rpm, 512n sector	
<b>SAS SSD (eMLC)</b>	<b>200GB Hot Plug 2.5-inch SAS SSD</b>	N8150-721
	1 x 200 GB SAS SSD, eMLC, 2.5-inch, 12Gb/s, 512n sector	
	<b>400GB Hot Plug 2.5-inch SAS SSD</b>	N8150-722
	1 x 400 GB SAS SSD, eMLC, 2.5-inch, 12Gb/s, 512n sector	
<b>SATA SSD (ME)</b>	<b>200GB Hot Plug 2.5-inch SATA SSD</b>	N8150-725
	1 x 200 GB SATA SSD, MLC, 2.5-inch, 6b/s, 512n sector, ME	
	<b>400GB Hot Plug 2.5-inch SATA SSD</b>	N8150-726
	1 x 400 GB SATA SSD, MLC, 2.5-inch, 6b/s, 512n sector, ME	
	<b>800GB Hot Plug 2.5-inch SATA SSD</b>	N8150-727
	1 x 800 GB SATA SSD, MLC, 2.5-inch, 6b/s, 512n sector, ME	
<b>SATA SSD (VE)</b>	<b>200GB Hot Plug 2.5-inch SATA SSD</b>	N8150-732
	1 x 200 GB SATA SSD, MLC, 2.5-inch, 6b/s, 512n sector, VE	
	<b>400GB Hot Plug 2.5-inch SATA SSD</b>	N8150-733
	1 x 400 GB SATA SSD, MLC, 2.5-inch, 6b/s, 512n sector, VE	
	<b>800GB Hot Plug 2.5-inch SATA SSD</b>	N8150-734
	1 x 800 GB SATA SSD, MLC, 2.5-inch, 6b/s, 512n sector, VE	
	<b>1.6TB Hot Plug 2.5-inch SATA SSD</b>	N8150-735
	1 x 1.6 TB SATA SSD, MLC, 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.
- The 2.5-inch SAS/SATA SSDs have limited lifetime. Refer to [Endurance of SSD](#) for details.

### 4.3.4 2.5-inch Drives (4)

Category	Product Name / Description	Part Number
Drive Standard :4 slots available Max : 8 slots available	<b>SAS HDD (512n)</b> <b>300GB 10K Hot Plug 2.5-inch SAS HDD</b>	N8150-479
	1 x 300 GB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512n sector	
	<b>450GB 10K Hot Plug 2.5-inch SAS HDD</b>	N8150-480
	1 x 450 GB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512n sector	
	<b>600GB 10K Hot Plug 2.5-inch SAS HDD</b>	N8150-481
	1 x 600 GB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512n sector	
	<b>900GB 10K Hot Plug 2.5-inch SAS HDD</b>	N8150-482
	1 x 900 GB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512n sector	
	<b>1.2TB 10K Hot Plug 2.5-inch SAS HDD</b>	N8150-483
	1 x 1.2TB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512n sector	
	<b>300GB 15K Hot Plug 2.5-inch SAS HDD</b>	N8150-485
	1 x 300 GB SAS HDD, 2.5-inch, 12Gb/s, 15,000 rpm, 512n sector	
	<b>450GB 15K Hot Plug 2.5-inch SAS HDD</b>	N8150-486
	1 x 450 GB SAS HDD, 2.5-inch, 12Gb/s, 15,000 rpm, 512n sector	
	<b>600GB 15K Hot Plug 2.5-inch SAS HDD</b>	N8150-518
	1 x 600 GB SAS HDD, 2.5-inch, 12Gb/s, 15,000 rpm, 512n sector	
<b>SAS HDD (512e)</b>	<b>1.8TB 10K Hot Plug 2.5-inch SAS HDD</b>	N8150-541
	1x 1.8TB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512e sector	
<b>SATA HDD (512n)</b>	<b>500GB 7.2K Hot Plug 2.5-inch SATA HDD</b>	N8150-488
	1 x 500 GB SATA HDD, 2.5-inch, 6Gb/s, 7,200 rpm, 512n sector	
	<b>1TB 7.2K Hot Plug 2.5-inch SATA HDD</b>	N8150-489
	1 x 1 TB SATA HDD, 2.5-inch, 6Gb/s, 7,200 rpm, 512n sector	
	<b>2TB 7.2K Hot Plug 2.5-inch SATA HDD</b>	N8150-527
	1 x 2 TB SATA HDD, 2.5-inch, 6Gb/s, 7,200 rpm, 512n sector	
<b>SAS SSD (eMLC)</b>	<b>200GB Hot Plug 2.5-inch SAS SSD</b>	N8150-721
	1 x 200 GB SAS SSD, eMLC, 2.5-inch, 12Gb/s, 512n sector	
	<b>400GB Hot Plug 2.5-inch SAS SSD</b>	N8150-722
	1 x 400 GB SAS SSD, eMLC, 2.5-inch, 12Gb/s, 512n sector	
<b>SATA</b>	<b>200GB Hot Plug 2.5-inch SATA SSD</b>	N8150-725



<b>SSD (ME)</b>	1 x 200 GB SATA SSD, MLC, 2.5-inch, 6b/s, 512n sector, ME	
	<b>400GB Hot Plug 2.5-inch SATA SSD</b>	N8150-726
	1 x 400 GB SATA SSD, MLC, 2.5-inch, 6b/s, 512n sector, ME	
	<b>800GB Hot Plug 2.5-inch SATA SSD</b>	N8150-727
	1 x 800 GB SATA SSD, MLC, 2.5-inch, 6b/s, 512n sector, ME	
	<b>SATA SSD (VE)</b>	
<b>200GB Hot Plug 2.5-inch SATA SSD</b>	N8150-732	
1 x 200 GB SATA SSD, MLC, 2.5-inch, 6b/s, 512n sector, VE		
<b>400GB Hot Plug 2.5-inch SATA SSD</b>	N8150-733	
1 x 400 GB SATA SSD, MLC, 2.5-inch, 6b/s, 512n sector VE		
<b>800GB Hot Plug 2.5-inch SATA SSD</b>	N8150-734	
1 x 800 GB SATA SSD, MLC, 2.5-inch, 6b/s, 512n sector, VE		
<b>1.6TB Hot Plug 2.5-inch SATA SSD</b>	N8150-735	
1 x 1.6 TB SATA SSD, MLC, 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 (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.
- The 2.5-inch SAS/SATA SSDs have limited lifetime. Refer to [Endurance of SSD](#) for details.

### 4.3.5 3.5-inch Drives (1)

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

**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
<b>Drive 4 slots available</b>	<b>SATA HDD (512n)</b>	<b>500GB 7.2K Hot Plug 3.5-inch SATA HDD</b>	N8150-524
		1 x 500 GB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 512n sector	
		<b>1TB 7.2K Hot Plug 3.5-inch SATA HDD</b>	N8150-504
		1 x 1 TB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 512n sector	
		<b>2TB 7.2K Hot Plug 3.5-inch SATA HDD</b>	N8150-505
		1 x 2 TB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 512n sector	
		<b>3TB 7.2K Hot Plug 3.5-inch SATA HDD</b>	N8150-506
		1 x 3 TB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 512n sector	
		<b>4TB 7.2K Hot Plug 3.5-inch SATA HDD</b>	N8150-507
		1 x 4 TB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 512n sector	
	<b>SATA HDD (512e)</b>	<b>6TB 7.2K Hot Plug 3.5-inch SATA HDD</b>	N8150-540
		1 x 6 TB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 512e sector	
		<b>8TB 7.2K Hot Plug 3.5-inch SATA HDD</b>	N8150-528
		1 x 8 TB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 512e Sector	
		<b>10TB 7.2K Hot Plug 3.5-inch SATA HDD</b>	N8150-543
		1 x 10 TB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 512e Sector	

**NOTE:**

- All drives within a RAID array should be of the same capacity.
- Embedded SATA RAID Controller does not support RAID 10 configured with 2 TB, 3 TB, and 4 TB HDDs.

- 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
<b>Internal</b> 1 slot available	<b>Internal Slim DVD-ROM drive</b> 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
	<b>Internal DVD Super Multi Drive</b> 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) <b>NOTE:</b> - Not supported for Linux or VMware.	N8151-135F
<b>External</b>	<b>External DVD Super MULTI Drive</b> Slim DVD Super Multi drive, Bus powered, 1.5A required, 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) <b>NOTE:</b> - Windows Server 2008 R2 installation is not supported with this drive.	N8160-98F

**NOTE:**

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

## 6 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.

### 6.1 Network Interface Controller

Category	Product Name / Description	Part Number
<b>Adapter</b>	<b>GbE</b> <b>1000BASE-T Adapter</b> Broadcom ® BCM5718 Gigabit Ethernet Controller PCIe 2.0 x1	N8104-150
	<b>Dual Port 1000BASE-T Adapter</b> Broadcom ® BCM5718 Gigabit Ethernet Controller PCIe 2.0 x1	N8104-151
	<b>Quad Port 1000BASE-T Adapter</b> Broadcom ® BCM5719 Gigabit Ethernet Controller PCIe 2.0 x4 <b>NOTE:</b> - Network cables with RJ-45 plug covers cannot be used.	N8104-152

<b>10GbE</b>	<b>10GBASE SFP+ Adapter (SFP+/2ch)</b> Qlogic® NetXtreme II BCM57810 10G SFP+ Dual Port Network Interface Card PCIe 2.0 x8 <b>NOTE:</b> - 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. - N8104-129 SFP+ Module is required to connect with an optical cable.	N8104-149
	<b>Dual Port 10GBASE-T Adapter</b> Intel® Ethernet Controller X540 PCIe 2.0(x8)	N8104-153
	<b>Dual Port 10GBASE-T Adapter</b> Intel X550-BT2 PCIe 3.0 x4	N8104-157
<b>SFP+ Module</b>	<b>SFP+ Module (10G-SR)</b> 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 2008 R2 supports BASP (Broadcom Advanced Server Program) teaming while Windows Server 2012 or later and Linux support teaming with bonding function supported by OS.

Network Interface	Team	Operating Systems
<b>1GbE NIC</b> Embedded 1GbE NIC and N8104-150/-151/-152	Up to four teams per one system Up to four ports per one team	Windows Server 2008 R2 Windows Server 2012 Windows Server 2012 R2 Red Hat Enterprise Linux
<b>10GbE NIC</b> N8104-149	Up to two teams per one system Up to two ports per one team	Windows Server 2008 R2 Windows Server 2012 Windows Server 2012 R2 Red Hat Enterprise Linux
<b>10GbE NIC</b> N8104-153/-157	Up to one teams per one system Up to two ports per one team	Windows Server 2012 Windows Server 2012 R2 Red Hat Enterprise Linux

\* RHEL: Red Hat Enterprise Linux

### 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 2008 R2, Windows Server 2012, Windows Server 2012 R2, Red Hat Enterprise Linux 6, Red Hat Enterprise Linux 7, VMware
10GbE	N8104-149	Windows Server 2008 R2, Windows Server 2012, Windows Server 2012 R2, Red Hat Enterprise Linux 6, Red Hat Enterprise Linux 7, VMware
	N8104-153/-157	Windows Server 2012, Windows Server 2012 R2, Red Hat Enterprise Linux 6, Red Hat Enterprise Linux 7, VMware

### NOTE:

- NIC Teaming feature is not supported on iSCSI interfaces.

## 6.2 External Storage Controller

### 6.2.1 RAID Controller

Category	Product Name / Description	Part Number
Controller	<b>RAID Controller (2GB, RAID0/1/5/6)</b> Avago(LSI) 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.

### 6.2.2 Fibre Channel / SAS Controller

Category	Product Name / Description	Part Number
Fibre Channel	<b>Fibre Channel Controller (1ch)</b> Emulex LightPulse LPe1250-F8 Host Bus Adapter 8Gb/s, Optical, PCIe 2.0 x8	N8190-159
	<b>Fibre Channel Controller (2ch)</b> Emulex LightPulse LPe12002-M8 Host Bus Adapter 8Gb/s, Optical, PCIe 2.0 x8	N8190-160
	<b>Fibre Channel Controller (1ch)</b> Emulex LightPulse LPe16000B-M6 Host Bus Adapter 16Gb/s, Optical, PCIe 3.0 x8	N8190-157A
	<b>NOTE:</b> - One controller can be installed on Pentium processor systems.	
	<b>Fibre Channel Controller (2ch)</b> Emulex LightPulse LPe16002B-M6 Host Bus Adapter 16Gb/s, Optical, PCIe 3.0 x8	N8190-158A
<b>NOTE:</b> - The controller is supported only with Xeon processor.		
SAS	<b>SAS Controller</b> LSI SAS9212-4i4e Host Bus Adapter 6Gb/s SAS, Int. 4 / Ext. 4, 7-pin SATA / SFF-8088, PCIe 2.0 x8	N8103-142
	<b>SAS Controller</b> LSI SAS9300-8e Host Bus Adapter 12Gb/s SAS, ext. 8(SFF-8644 x2), PCIe 3.0 x8	N8103-184

## 6.3 Graphics Accelerator

Product Name / Description	Part Number
<b>Graphics Accelerator</b> 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.

## 6.4 Serial Port Adapter

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

**NOTE:**

- Up to one Serial Port Adapter can be installed.

## 7 Other Add-in Components

### 7.1 Cooling Fan Kit

Product Name / Description	Part Number
<b>Non-redundant Fan Kit</b> Non-hot plug cooling fan for R110h-1	N8181-115F
<b>Redundant Fan Kit</b> Non-hot plug cooling fan for R110h-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.

### 7.2 Trusted Platform Module Kit

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

**NOTE:**  
Supported for Windows Server 2012 and Windows Server 2012 R2 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.

### 7.3 Internal Flash Memory

Available socket: 1

Product Name / Description	Part Number
<b>VMware ESXi Base Kit</b> Internal USB flash memory to install VMware ESXi system	N8106-011

**NOTE:**

- The kit does not include VMware ESXi installation media and license.
- At least 5GB of memory is required for VMware ESXi 5.5/VMware ESXi 6.0.

### 7.4 High temperature resistant Kit

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

**NOTE:**

- Supported for N8100-2334F non-hot plug power supply model only.
- To apply this option, there are some configuration limitations below.

**Required System Configuration:**

- The power supply must be non-redundant power supply and 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.
- Windows Server 2008 R2 is not supported with this option.

## 7.5 Flash FDD

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

Product Name / Description	Part Number
<b>Flash FDD</b> 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.

## 8 Add-on Components

### 8.1 17-inch LCD Console Drawer

Category		Product Name / Description	Part Number
<b>Drawer w/ KVM</b>	<b>Drawer</b>	<b>17-inch LCD Console Drawer (8 port)</b> 17-inch LCD, US 83-keys Keyboard, Optical mouse, 8 port KVM switch, 1U height	N8143-106F
	<b>Cable</b>	<b>Switch Unit Connection Cable Set (USB, 1.8m)</b> 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)
		<b>Switch Unit Connection Cable Set (USB, 3m)</b> 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)
		<b>Switch Unit Connection Cable Set (USB, 5m)</b> 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)
<b>Drawer w/o KVM</b>	<b>Drawer</b>	<b>17inch LCD Console Unit 1U</b> 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
		<b>17inch LCD Console Drawer (1 port)</b> 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
	<b>Keypad</b>	<b>Keyboard Unit (JP)</b> JP 108-keys Keyboard with 10-key for N8143-108F 17inch LCD Console Drawer (1 port)	N8143-109
		<b>Keyboard Unit (UK)</b> UK 104-keys Keyboard with 10-key, for N8143-108F 17inch LCD Console Drawer (1 port)	N8143-111

## 8.2 KVM Switch

Category		Product Name / Description	Part Number
KVM Switch		<b>Server Switch Unit (8 server)</b> 1U USB 8 port KVM switch	N8191-14F
Cable	KVM	<b>Switch Unit Connection Cable Set (USB,1.8m)</b> 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)
		<b>Switch Unit Connection Cable Set (USB,3m)</b> 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)
		<b>Switch Unit Connection Cable Set (USB,3m)</b> 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	<b>Switch Unit Connection Cable 1.8 m</b> 1.8 m, 1 x 15-pin mini D-sub - 1x 15-pin mini D-Sub / 2x PS/2	K410-119(1A)

## 8.3 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
<b>Remote KVM and Media License Kit</b>	N8115-04
License for one server.	
Remote KVM and remote media are enabled regardless of OS status.	
Remote KVM:	
<ul style="list-style-type: none"> <li>- Displays a graphics console on the web browser of the remote terminal (PC/server).</li> <li>- Controls keyboard and mouse via the remote terminals' web browser</li> </ul>	
Remote media:	
<ul style="list-style-type: none"> <li>- Enables the user to use the CD / DVD / FD / Flash memory of the remote terminals (PC/server) as if accessing the local drives.</li> </ul>	

**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 2008 R2 (x64)	Legacy	Disabled
Windows Server 2012	UEFI	Enabled
Windows Server 2012 R2	UEFI	Enabled
Red Hat Enterprise Linux 6(x86_64)	UEFI	Enabled
Red Hat Enterprise Linux 7	UEFI	Enabled
VMware ESXi 5.5 Update3	Legacy	Disabled
VMware ESXi 6 Update1	Legacy	Disabled



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

<sup>1</sup> The optional serial port is not available for the feature.

<sup>2</sup> The feature is not supported on VMware ESXi systems.

<sup>3</sup> Monitoring boot screens is not supported on VMware systems.

<sup>4</sup> In VMware systems, only the direct console user interface is supported.

## Endurance of SSD

The 2.5-inch SAS/SATA SSDs have limited lifetime, which can only be written a limited number of times before it fails.

The warranty period of SSD is the stated period of warranty or until the total bytes of written value (PBW) exceeds the limit value, whichever occurs first. It is recommended to check the total bytes of written value periodically.

Refer to the table below for the write endurance (PBW and DWPD), warranty period and monitoring tool.

### SSD Lifetime

Part Number	Product Name	PBW	DWPD	Period	Monitoring Tool
<b>SAS SSD</b>					
N8150-721	200GB Hot Plug 2.5-inch SAS SSD	3.6PBW	10 Times	3 Years	Universal RAID Utility, EXPRESSBUILDER (System Test and Diagnostics)
N8150-722	400GB Hot Plug 2.5-inch SAS SSD	7.3PBW	10 Times	3 Years	
<b>SATA SSD (Middle Endurance)</b>					
N8150-725	200GB Hot Plug 2.5-inch SATA SSD	3.6PBW	10 Times	3 Years	
N8150-726	400GB Hot Plug 2.5-inch SATA SSD	7.3PBW	10 Times	3 Years	
N8150-727	800GB Hot Plug 2.5-inch SATA SSD	14.6PBW	10 Times	3 Years	
<b>SATA SSD (Value Endurance)</b>					
N8150-732	200GB Hot Plug 2.5-inch SATA SSD	1.1PBW	3 Times	3 Years	
N8150-733	400GB Hot Plug 2.5-inch SATA SSD	3.0PBW	3 Times	3 Years	
N8150-734	800GB Hot Plug 2.5-inch SATA SSD	5.3PBW	3 Times	3 Years	
N8150-735	1.6TB Hot Plug 2.5-inch SATA SSD	10.7PBW	3 Times	3 Years	

- PBW(Peta-Bytes Write): Total amount of data that can be written into the SSD. 1PB=1,000TB.
- DWPD(Drive Writes per Day): Rewrite capacity of the SSD per day.
- Check the lifetime of SSD by monitoring tool regularly.
- It is recommended to replace the SSD before it reaches its end of life. For repurchase, please contact your sales representative.
- For detailed operating methods of monitoring tool, refer to the User's Guide.

## OS Support Matrix for PCI Cards and Embedded Controllers

Part Number	Product Name	WS 2012 R2	WS 2012	WS 2008 R2	RHEL 7	RHEL 6 x64	ESXi 6.0	ESXi 5.5
-	Embedded SATA non-RAID Controller	✓	✓	✓	✓	✓	✓	✓
-	Embedded SATA RAID Controller	✓	✓	-	-	-	-	-
-	Embedded 1GbE NIC	✓	✓	✓	✓	✓	✓	✓
N8103-188	RAID controller (RAID0/1)	✓	✓	✓	✓	✓	✓	✓
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)	✓	✓	✓	✓	✓	✓	✓
N8105-48	Graphics Accelerator	✓	-	-	-	-	-	-
N8190-158A	Fibre Channel Controller (2ch)	✓	✓	✓	✓	✓	✓	✓
N8190-157A	Fibre Channel Controller (1ch)	✓	✓	✓	✓	✓	✓	✓
N8103-179	RAID Controller (2GB, RAID0/1/5/6)	✓	✓	✓	✓	✓	✓	✓
N8103-184	SAS Controller	✓	✓	-	✓	✓	✓	✓
N8104-157	Dual Port 10GBASE-T Adapter	✓	✓	-	✓	✓	✓	✓
N8104-153	Dual Port 10GBASE-T Adapter	✓	✓	-	✓	✓	✓	✓
N8104-149	10GBASE SFP+ Adapter (SFP+/2ch)	✓	✓	✓	✓	✓	✓	✓
N8190-160	Fibre Channel Controller (2ch)	✓	✓	✓	✓	✓	✓	✓
N8190-159	Fibre Channel Controller (1ch)	✓	✓	✓	✓	✓	✓	✓
N8103-142	SAS Controller	✓	✓	✓	✓	✓	✓	✓
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)	-	-
N8103-176	RAID Controller (1GB, RAID 0/1)	(1)	-	-
N8103-177	RAID Controller (1GB, RAID 0/1/5/6)	(1)	-	-
N8103-178	RAID Controller (2GB, RAID 0/1/5/6)	(1)	-	-
N8105-48	Graphics Accelerator	-	(1)	-
N8190-158A	Fibre Channel Controller (2ch)	-	(1)	-
N8190-157A	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)
N8104-153	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)
N8103-142	SAS Controller	-	(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)
N8117-01A	Serial port adapter	-	(1)	(2)

- The number between parentheses shows the population priority (recommendation). For example, install N8103-176 in the slot #1 and N8104-153 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

See the table below for the limitations on installing PCI cards (due to the number of interrupts that can be processed in the system) depending on the installed processor.

Processor	RAID controller required	PCI slot limitations
<b>Pentium G4400</b>	Yes	<ul style="list-style-type: none"> <li>Do not install the following PCI cards. N8190-158A Fibre Channel Controller (2ch) N8190-157A Fibre Channel Controller (1ch) N8103-179 RAID Controller (2GB, RAID0/1/5/6) N8103-184 SAS Controller N8104-152 Quad Port 1000BASE-T Adapter</li> <li>Up to one card from the following can be installed. N8104-153 Dual Port 10GBASE-T Adapter N8104-149 10GBASE SFP+ Adapter (SFP+/2ch) N8104-151 Dual Port 1000BASE-T Adapter N8104-150 1000BASE-T Adapter</li> <li>No limitations for other cards.</li> </ul>
	No	<ul style="list-style-type: none"> <li>Do not install the following PCI cards. N8190-158A Fibre Channel Controller (2ch) N8190-157A Fibre Channel Controller (1ch)</li> <li>Up to one card from the following can be installed. N8103-179 RAID Controller (2GB, RAID0/1/5/6) N8103-184 SAS Controller N8104-152 Quad Port 1000BASE-T Adapter</li> <li>No limitations for other cards.</li> </ul>
<b>Xeon E3-1220v5</b>	Yes	<ul style="list-style-type: none"> <li>Do not install N8190-158A Fibre Channel Controller (2ch)</li> <li>Up to one card from the following can be installed. N8190-157A Fibre Channel Controller (1ch) N8103-179 RAID Controller (2GB, RAID0/1/5/6)</li> <li>No limitations for other cards.</li> </ul>
	No	<ul style="list-style-type: none"> <li>Do not install the following PCI cards when N8190-158A Fibre Channel Controller (2ch) is installed. N8190-157A Fibre Channel Controller (1ch) N8103-179 RAID Controller (2GB, RAID0/1/5/6) N8103-184 SAS Controller N8104-152 Quad Port 1000BASE-T Adapter</li> <li>No limitations when N8190-158A Fibre Channel Controller (2ch) is not installed.</li> </ul>
<b>Other processors</b>	-	No limitations

## PCI slot limitations for VMware

- Do not install N8104-152 Quad Port 1000BASE-T Adapter when any of the following cards is installed.  
N8104-153 Dual Port 10GBASE-T Adapter  
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 ESXi5.5

<https://www.vmware.com/pdf/vsphere5/r55/vsphere-55-configuration-maximums.pdf>

VMware ESXi6.0

<https://www.vmware.com/pdf/vsphere6/r60/vsphere-60-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	✓
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
RAID controller (2GB, RAID0/1/5/6)	N8103-179
Fibre Channel Controller (1ch)	N8190-157A
Fibre Channel Controller (2ch)	N8190-158A

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

## Revision History

Revision	Date	Description
5.0	January 26, 2017	<p><b>New products added:</b> 10TB 7.2K Hot Plug 3.5-inch SATA HDD / N8150-543 Trusted Platform Module Kit / N8115-23A</p> <p><b>Discontinued product deleted:</b> Trusted Platform Module Kit / N8115-23</p>
4.0	October 12, 2016	<p><b>New products added:</b> 6TB 7.2K Hot Plug 3.5-inch SATA HDD / N8150-540 1.8TB 10K Hot Plug 2.5-inch SAS HDD / N8150-541 Dual Port 10GBASE-T Adapter / N8104-157</p> <p><b>Discontinued product deleted:</b> 6TB 7.2K Hot Plug 3.5-inch SATA HDD / N8150-503 1.8TB 10K Hot Plug 2.5-inch SAS HDD / N8150-490</p> <p><b>Others:</b> Removed 4Kn sector HDD descriptions</p>
3.1	August 19, 2016	<p><b>Others:</b> Added PCI slot limitations.</p>
3.0	July 20, 2016	<p><b>New products added:</b> 8TB 7.2K Hot Plug 3.5-inch SATA HDD / N8150-528 External DVD Super Multi Drive / N8160-98F</p> <p><b>Discontinued product deleted:</b> External DVD Super MULTI Drive / N8160-97F</p> <p><b>Others:</b> Corrected the references of Supported HDD/SSD for 3.5-inch drive configuration.</p>
2.2	June 30, 2016	<p><b>Others:</b> Added N8105-48 in the "Supported PCI cards and Installable Slots" matrix.</p>
2.1	May 17, 2016	<p><b>Others:</b> Added DVD read speed information</p>
2.0	April 26, 2016	<p><b>New products added:</b> Graphics Accelerator N8105-48</p> <p><b>Others:</b> Added a note for Windows Server 2008 R2 installation Added a note for N8160-97F External DVD Super MULTI Drive Added a note for High temperature resistant Kit Added SATA SSDs for the RAID configuration for RAID 0/1 (Embedded SATA RAID) (4.3.2)</p>
1.1	February 2, 2016	Corrected typos and errors.
1.0	January 22, 2016	Initial release