# QuickSpecs

Overview

The Flexible Advantage STarter base systems for the HP 9000 rp7440 Server allow for faster configurations due to the semi configured system bundles. Configurations built from FAST base systems will have substantially lower prices than systems built from the parts.

HP 9000 rp7440 Server FAST Configurable Bundles

| Product Number (Includes base chassis and power supplies)	Number of PA 8900 cores	Number of Cell Boards in bundle	Number of Core I/O Cards in bundle
AD026A	4 (2P/4C)	1	1
AB027A	8 (4P/8C)	1	1
AD028A	12 (6P/12C)	2	1
AB029A	16 (8P/16C)	2	1

HP 9000 rp7440 Server System Overview-Front View
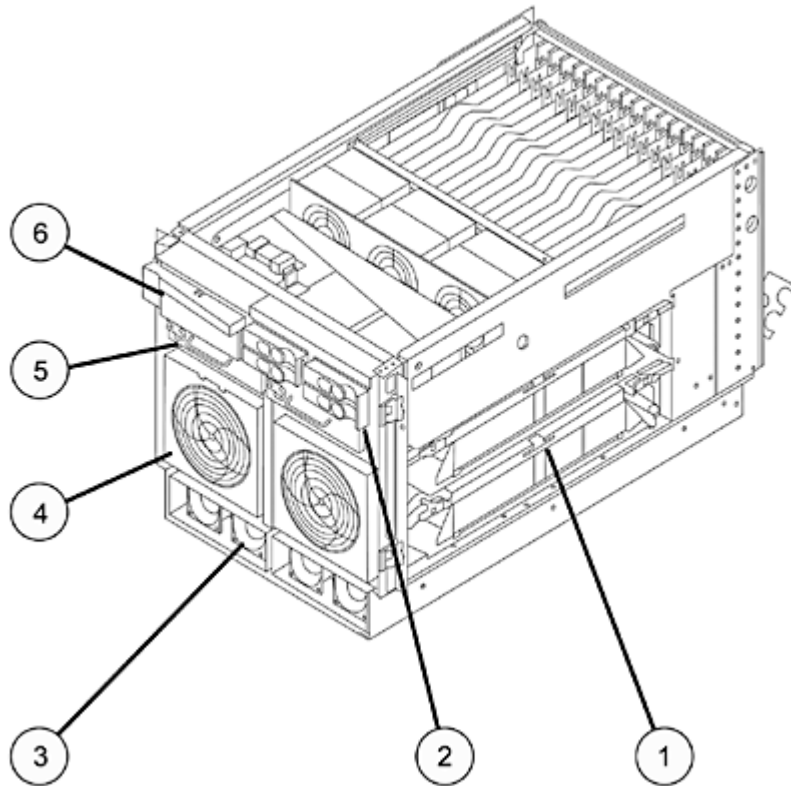
1. Cell Boards (2)
2. Hot-plug Disks (4)
3. 2N Redundant Hot-swap System Power (2)
4. N+1 Redundant Hot-swap Fans (2)
5. 2 Redundant PCI Power Supplies
6. Removable Media DVD or DAT

Overview

HP 9000 rp7440 Server System Overview-Rear View
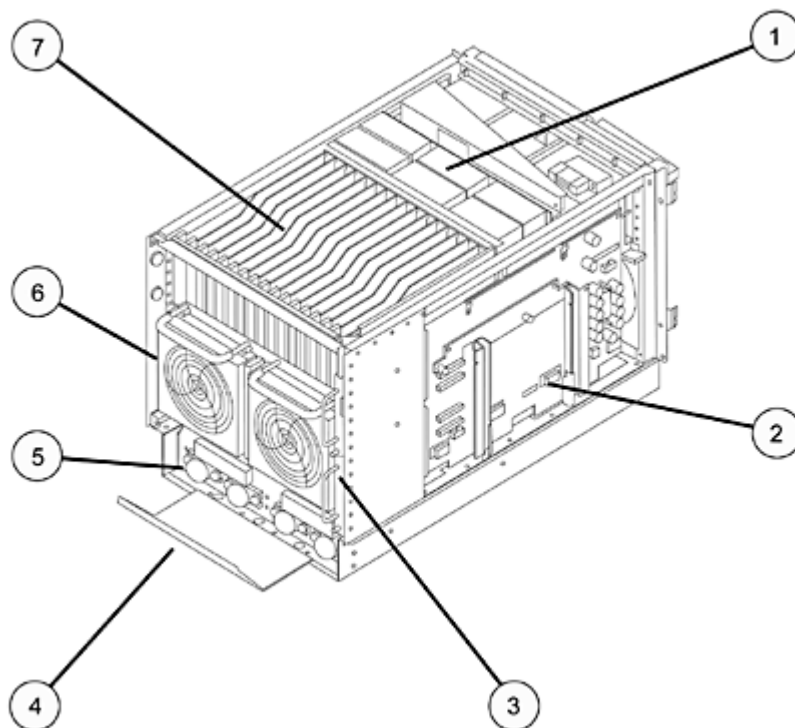
1. N+1 PCI Cooling Fans
2. System Backplane (right side)
3. Core I/O
4. Power Cord Retention Bracket

5. Dual-grid 2N Redundant Power Inputs
6. Hot-swap Redundant Fans
7. 15 Hot-plug PCI-X Slots

Standard Features

Minimum System	• One active core in a Dual core PA-8900 1.068-GHz processor (1P/2C) • One processor per cell board • One cell board • 2 GB memory (1 pair of 1-GB DIMMs) • One core I/O (included; not configurable) • Two power cords • Seven hot plug 33-/66-/133-/266-MHz 64 bit PCI-X slots-with adaptive signaling technology
Maximum Server Capacities	• Eight Dual core PA-8900 1.068-GHz processors (8P/16C) • Four processors per cell board • Two cell boards • 128 GB memory (16 pairs of 4-GB DIMMs) • Two core I/O • Four power cords, providing 2N power and dual grid support • Four internal hot plug LVD SCSI disks • One half height removable media bay. Configure with one DVD+RW or one DAT (or optionally, two slimline DVD devices) • 15 hot plug 33-/66-/133-/266-MHz 64 bit PCI-X slots with adaptive signaling technology (14 with second core IO)
Standard System Features	• Operating system support: HP UX 11i v1, HP UX 11i v2 and HP UX 11i v3 • One External Ultra320 LVD SCSI channel (a second Ultra320 SCSI port is available if a Smart Array card is used to access internal disk drives) • Four internal SCSI controllers • Two GbE LAN ports (with auto speed sensing) • Management Processor technology with Integrated LAN console • 100Base T LAN port for LAN console • Rackmountable into HP 19 inch cabinets (factory or field integration) • Rackmountable into some third party cabinets • One or Two hardware partitions (nPartitions) • Factory integration of CPUs, memory, disk drives, removable media drives, and I/O cards • HP site planning and installation • One year warranty with next business day on site service response • Owner's Guide and General Usage media set

Standard Features

High Availability	- N+1 Hot swap cooling - Redundant and hot swap power supplies - Cell Hot plug - Hot plug disks 2N power inputs (redundant line cords/dual power grid support) - On line memory page deallocation - ECC protected SyncDRAM memory - Full parity protection of data and address buses - On chip CPU cache with ECC protection - Memory "chip spare", "chip kill" like (double chip spare will be supported 3 to 6 months after release) - Dynamic Processor resilience and deallocation (CPU deallocation on failure) - On line addition and replacement of PCI I/O cards - UPS power management - Management Processor Failover (requires server to have two MP installed) - Three independent Ultra320 buses to internal disks for mirroring across disks and controllers - Journal file system (HP-UX) - Auto reboot - On line diagnostics and system health monitor

Security	- Separate console LAN port for system management - Password protection on console port - Disablement of remote console ports

Internet Server Functions	- Internet server (inetd) - Domain name server - Routing (OSPF, BIND, RIP, EGP, HELLO, gateD) - Network Time Protocol

Client Configuration Services	Automatic configuration for printers, PCs, workstations, and X terminals (DHCP, Bootp, tftp, rbootp)

Optional Web Services	- Netscape Communication Server - Netscape Navigator

Email	- Mail, MailX, ELM - Sendmail, MIME, SMTP, ESMTP

Remote Access Services	Telnet, ftp, anonymous ftp server

Configuration

Configuration	The HP 9000 rp7440 Server is a symmetrical multiprocessing (SMP) server supporting up to eight high performance dual core HP PA RISC PA 8900 (1.068 GHz, 64 MB cache, 533 MHz FSB). The HP 9000 rp7440 is based on the HP sx2000 chipset.

The rp7440 can be configured as a single SMP server or divided into two smaller, hardware partitioned (nPars), logical servers. |

Cell Boards	A minimum of one and a maximum of two cells can be ordered in an HP 9000 rp7440 Server. Each cell can be purchased with up to four active dual core HP PA 8900 processors or in combination with Instant Capacity processors.

The HP 9000 rp7440 and rp8440 Servers share the same cell board. These same cell boards can be upgraded to be used in HP Integrity rx7640 and rx8640 Servers for in-box upgrades. The rp7410/rp7420/rx7620 cell boards cannot be carried forward to the rp7440 server. |

Cell Details	4 processor slots (supporting up to eight processor cores) - HP sx2000 cell controller 16 DDR-2 Memory DIMM slots - DC DC Power converters - Manageability and Processor Dependent Hardware Circuitry

Cell Board Configuration Rules	- Cell boards are ordered individually - Minimum: 1 cell board - Maximum: 2 cell boards - Cell slot 1 must be loaded first

Dual core HP PA-RISC PA-8900 Processors Details	1.068 GHz - Level 2 cache: 64 MB - Level 2 cache: .0.75 MB instr + 0.75 MB data - Single bit cache error correction 44 bit physical addressing 64 bit virtual addressing 4 GB maximum page size

Processor Configuration Rules	- The HP PA-RISC PA-8900 processors have two processors core per processor module. - There must be at least one active processors core (non iCAP) on each active cell board. - Activation of iCAP processors cores can be done one core at a time customers may order and upgrade the PA-8900 processor in increments of at least one core (in this case the other core in a processor must be iCAP). - On each cell board, processors must be installed in the following sequence 0, 2, 1, 3

Configuration

Memory Configuration   The memory DIMMs used in the HP 9000 rp7440 Server are sold in pairs and are custom designed by HP. Each DIMM contains DDR II chips with full ECC protection. DIMM sizes of 1 GB, 2 GB, and 4 GB are supported. Each HP 9000 rp7440 Server cell board supports up to 16 DIMMs with 16 GB/s of peak memory bandwidth. HP 9000 rp7410/rp7420/rx7620 memory modules cannot be carried forward to the rp7440 server. The HP 9000 rp7440 and HP 9000 rx8640 servers share the same 2 GB, 4 GB, and 8 GB memory products.

4 HP 9000 rp7440 Server Memory DIMMs

Pair Size (Product)	rp7440 Product Numbers	HP 9000 rp7440 Server Maximum Capacity Using 1 DIMM Size	DIMM Size
2 GB	AB453A	32 GB	1024 MB
4 GB	AB454A	64 GB	2048 MB
8 GB	AB455A	128 GB	4096 MB

Memory Loading Rules

- Memory must be installed in pairs (2 DIMMs of equal size)
  Memory is available in three densities: 2 GB (2×1024MB), 4 GB (2×2048MB) and 8 GB (2×4096MB).
- Minimum memory is 2 GB per cell
- Larger DIMMs must be loaded first across a cell, followed by progressively smaller DIMM sizes.
- Maximum memory per system is 128 GB-using sixteen 4GB DIMM pairs per system.
- On each cell board, Memory Pairs must be installed in the following order:
  (0A, 0B), (1A, 1B), (2A, 2B), (3A, 3B), (4A, 4B), (5A, 5B), (6A, 6B), (7A, 7B)
- DIMM mixing other than recommended configurations is supported as long as the memory loading rules are followed

rp7440 Recommended Memory Configurations

Memory per Cell (GBs)	Number of DIMMs			Quad Echelon							
	1 GB	2 GB	4 GB	2	1	3	0	2	1	3	0
				OA, OB	1A, 1B	2A, 2B	3A, 3B	4A, 4B	5A, 5B	6A, 6B	7A, 7B
2	2			1 GB							
4	4			1 GB	1 GB						
8	6			1 GB	1 GB	1 GB	1 GB				
16	16			1 GB	1 GB	1 GB	1 GB	1 GB	1 GB	1 GB	1 GB
24	8	8		2 GB	2 GB	2 GB	2 GB	1 GB	1 GB	1 GB	1 GB
32		16		2 GB	2 GB	2 GB	2 GB	2 GB	2 GB	2 GB	2 GB
48		8	8	4 GB	4 GB	4 GB	4 GB	2 GB	2 GB	2 GB	2 GB
64			16	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB

Configuration

Performance Tuning Guidelines

- For best performance, a cell should be configured with a multiple of eight DIMMs or four pairs (although the server will execute properly with an odd number of pairs). It takes eight DIMMs to populate both memory buses. Populating only one of the two memory buses on a cell board will deliver only half the peak memory bandwidth.
- Load memory equally across the available cell boards.

Memory Latencies

There are two types of memory latencies within the HP 9000 rp7440 Server:

1. Memory latency **within** the cell refers to the case where an application either runs on a partition that consists of a single cell or uses cell local memory.
2. Memory latency **between** cells refers to the case where the partition consists of two cells and cell interleaved memory is used. In this case 50% of the addresses are to memory on the same cell as the requesting processor, and the other 50% of the addresses are to memory of the other cell.

The HP 9000 rp7440 Server average memory latency depends on the number of CPUs in the partition. Assuming that memory accesses are equally distributed across all cell boards and memory controllers within the partition, the average idle memory latency (load to use) is as show below:

Number of Processors Per Partition	Average Memory Latency
4 processor (single cell)	~185 ns
8 processor (two cell)	~249 ns

I/O Architecture

Components within the I/O subsystem are the I/O controllers, internal peripheral bay, and multifunction Core I/O. The figure below shows the basic block diagram of the I/O subsystem. The HP 9000 rp7440 Server I/O architecture utilizes industry standard PCI X buses in a unique design for maximum performance, scalability and reliability.

The HP 9000 rp7440 Server contains two master I/O controller chips located on the PCI X backplane. Each I/O controller contains 16 high performance, 12 bit wide links; these links connect to 18 slave I/O controller chips supporting the PCI card slots and core I/O. In the HP 9000 rp7440 Server, two links, one from each master controller, are routed through the system backplane and are dedicated to core I/O. The remaining 30 links are divided among the sixteen (133 MHz; 64 bit and 266 MHz; 64 bit) PCI X card slots, with each slot on a PCI bus by itself. This one card per bus architecture leads to greater I/O performance, better error containment, and higher availability.

Each controller chip is also directly linked to a host cell board. This means that both cell boards must be purchased in order to access all 15 available I/O card slots. (With only one cell board, access to seven slots is enabled.)

The HP 9000 rp7440 Server can be purchased with either one or two core I/O board sets. Each Core I/O product contains two boards, a MP/SCSI and a LAN/SCSI card. The core I/O boards provide console, Ultra320 SCSI, Gigabit LAN, and management processor functionality. If you opt for the second core I/O board set, it can be used to enable dual hard partitioning (nPars) in the HP 9000 rp7440 Server and to provide access to a second set of disk drives. Two cell boards and access to all I/O slots are available to the server with one core I/O board set.

The LAN/SCSI card provided with each Core I/O product occupies one of the sixteen PCI slots. Since there must always be at least one Core I/O board set, the HP 9000 rp7440 Server has fifteen available PCI X slots for expansion cards. If the second Core I/O product (board set) is purchased, there are fourteen remaining slots available for cards.

Configuration

The internal peripheral bay supports up to four low profile disks and one removable media device (one removable media device can be configured with one DVD+RW or one DAT (or optionally, two slimline DVD modules). The internal disks are electrically divided into two pairs. SCSI controller chips located on each core I/O board set supports each pair of internal disks. This means that you must have both core I/O board sets in order to access both halves of the peripheral bay.

PCI Backplane

Eight of sixteen I/O card slots are supported by dual high performance fat links. Each link is capable of ~2 GB/s of bandwidth. Six of the sixteen I/O card slots are supported by dual high-performance links. Each link is capable of providing 1060 of bandwidth. This means that half of HP 9000 rp7440 Server I/O slots are capable of sustained 2.12 GB/s. Aggregate I/O slot bandwidth is ~23 GB/s. In addition, because each I/O slot has a dedicated bus, any slot can be "hot plugged" or serviced without affecting other slots. The hot plug operation is very easy, and can be done with minimal training and effort.

Supported HP-UX I/O Cards

I/O Card	Product Number	First HP-UX Release / Boot Support	Connector Type(s)	Hot-Plug / Factory Integration	Max Cards / Max Ports
Mass Storage Host Bus Adapters					
PCI 1 port 2x Fibre Channel	A5158A	11.00 / No	Duplex SC	Yes / No	15 / 15
PCI 2GB Fibre Channel	A6795A	11.00 / Yes	LC	Yes / Yes	15 / 15
PCI 1 port 4-GB Fibre Channel	AB378A	11i/Yes	LC	Yes / Yes	15 / 15
PCI 2 port 4-GB Fibre Channel	AB379B	11i/Yes	LC	Yes / No	15 / 30
Dual channel Ultra320 SCSI Adapter	A7173A	11i/Yes	VHDCI	Yes / Yes	15 / 30
PCI-X 2 channel 2 GB/s Fibre Channel	A6826A	11i/Yes	LC (SFF)	Yes / Yes	15 / 30
PC- X 2 channel Smart Array 6402 128 MB	A9890A	11i/Yes	VHDCI	Yes / Yes	8/16
PCI-X 4 channel Smart Array 6404 256 MB	A9891A	11i/Yes	VHDCI	Yes / Yes	8/32
Local Area Network Interface Cards					
PCI X 1 port 10 GB Ethernet Fiber Adapter	AB287A	11i v2/Yes	Duplex LC	Yes / Yes	2 / 2
PCI X 4 port 1000Base T Gigabit Adapter	AB545A	11i v2/Yes	RJ-45	Yes / Yes	2/2
PCI X Dual port 1000Base SX	A7011A	11i v2/Yes	Duplex SC	Yes / Yes	15/60
PCI X Dual port 1000Base T	A7012A	11i v2/Yes	RJ-45	Yes / Yes	15 / 30
PCI X 1000Base SX	AD332A	11i v2/Yes	Duplex SC	Yes / Yes	15 / 30
PCI X 1000Base T	AD331A	11i v2/Yes	RJ-45	Yes / Yes	15 / 30
Multi-Function Cards (Mass Storage / LAN)					
PCI-X 4-GB Fibre Channel, 1000Base-T	AD193A	11i v1/yes	LC (SFF) /RJ-45	Yes / No	15 / 30
PCI-X 2 port 4-GB FC, 2 port 1000Base-T	AD194A	11i v1/yes	LC (SFF) /RJ-45	Yes / No	15 / 60
PCI-X 2-GB Fibre Channel, 1000Base-SX	A9782A	11i/Yes	LC (SFF)/LC GigE	Yes / Yes	15 / 30
PCI-X 2-GB Fibre Channel, 1000Base-T	A9784A	11i/Yes	1LC/1 RJ-45	Yes / Yes	15 / 30
PCI-X 2 port 2 GB FC/2 port 1 GB Ethernet	AB465A	11i v2/Yes	2 LC/2 RJ-45	Yes / Yes	15 / 60

Configuration

PCI-X 2 port 1000Base T/2 port Ultra320 SCSI	AB290A	11i/Yes	2 LC GigE/2 RJ-45	Yes / Yes	15 / 60
Wide Area Network Interface Cards					
2 port Programmable Serial Interface (PSI) X.25 / Frame Relay / SDLC	J3525A	11.00 / No	RS-530, RS-232, V.35, RS-449 or X.21	Yes / Yes	15 / 30
Additional Interface Cards					
PCI 8 port Terminal Multiplexer	A6748A	11.00 / No	RS-232	Yes / No	15 / 120
PCI 64 port Terminal Multiplexer	A6749A	11.00 / No	RS-232 or RS-422	Yes / No	15 / 960
PCI Hyperfabric2 Fiber Adapter	A6386A	11.00 / No	LC Duplex	Yes / Yes	4 / 4

External Server Storage Connectivity

HP has the broadest, most robust server and storage line up in the industry, providing exactly the right fit for every need. Refer to the Storage Server matrix found in the introductory section of Chapter 4 to see a matrix that highlights which storage device, server and operating system is interoperable.

Integrated Multi-function Core I/O

The HP 9000 rp7440 Server chassis supports up to two core I/O board sets. Each board set contains two cards (MP/SCSI and LAN/SCSI), which are installed in different locations. MP/SCSI cards are installed along the right rear vertical edge of the chassis. The LAN/SCSI cards are installed in the PCI card bay. The first core I/O board set will support up to two cell boards in the server and all I/O slots. For support of two hard partitions or for support of the third and fourth integrated disk drive, a second core I/O board set is required in the host system.

HP 9000 rp7410/rp7420/rx7620 Core I/O cards cannot be carried forward to the HP 9000 rp7440 server.

Both Core I/O board sets are identical. The "primary" and "secondary" Core I/O LAN/SCSI board is supported by a 530 MB/s link. In addition, in the "primary" core I/O, a SCSI controller from both the LAN/SCSI board and MP/SCSI board each support a single internal disk drive

Each HP 9000 rp7440 Server core I/O board set provides the following features:

● **Management Processor:** The management processor (MP), located on each MP/SCSI card, is a dedicated processor that simplifies and extends system management, and also enhances serviceability. The MP minimizes or eliminates the need for the system administrator to be physically at the system to perform tasks such as diagnostics, system management, or even hard resets. The MP in the rp7440 can be configured to failover to a secondary MP (again provided two core I/O board sets are installed). Here are some of the features enabled by the HP 9000 rp7440 Server management processor:
  ○ System management over the Internet or Intranet (telnet or web)
  ○ System console redirection
  ○ Console mirroring
  ○ System configuration for automatic restart
  ○ Viewing history log of system events
  ○ Viewing history log of console activity
  ○ Setting MP inactivity timeout thresholds
  ○ Remote system control
  ○ Remote power cycle (except for MP housekeeping power)
  ○ Viewing system status

Configuration

    ○ Event notification to system console, e mail, pager, and/or HP Response Centers
    ○ Automatic hardware protection of critical environmental problems
    ○ Access to management interface and console(s) on LAN failure (modem required)
    ○ Remote resetting of hardware partitions
    ○ Forward progress indicator (Virtual front panel)
    ○ Out of band Manageability and PDC firmware update
    ○ Configure manageability and console security
    ○ SSL

- **External Management/Console LAN port:** 10/100Base-T LAN port using an RJ-45 connector.
- **One External SCSI ports:** Ultra320 LVD SCSI port for connections to mass storage or media. (A second U320 external port only available when internal drive off of LAN/SCSI is connected to Smart Array).
- Two External 1 GbE LAN ports.
- **Access to internal peripheral bay:** The HP 9000 rp7440 Server internal peripheral bay is located at the top front of the system chassis. The peripheral bay holds up to four low profile hot plug disks and one half height removable media device (one half height bay supports two devices in the case of optional slim line DVDs). Each HP 9000 rp7440 Server core I/O board set contains dual channel Ultra320 SCSI controller chips that support the SCSI devices in the internal peripheral bay. Each core I/O board set supports two internal disks. It is important to note that separate controllers and SCSI busses manage the two disks supported by the primary and secondary core I/O set (This is a change from the previous architecture in sx1000 based servers). If use of more than two internal disks is needed, the HP 9000 rp7440 Server will require both core I/O sets.

Core I/O Loading Rules

- Minimum of one Core I/O board set (primary) must be purchased with each HP 9000 rp7440 Server
- Load the Primary (1) MP/SCSI board into slot 1 and the LAN SCSI board into I/O cabinet 1 (slot 8).
- MP/SCSI slot 0 and I/O cabinet 0 corresponds to Cell Board slot 0. MP/SCSI slot 1 and I/O cabinet 1 corresponds to Cell Board slot 1.
- A cell board must be installed in slot 0 to enable use of Core I/O 0. Likewise, a cell board must be installed in slot 1 to enable use of Core I/O 1.
- Access to two internal disk drives and one half height removable media bay is enabled with the installation of the first Core I/O board set (Primary).
- The optional second Core I/O board set (secondary) must be ordered to enable hardware partitioning
- The optional second Core I/O board set (secondary) must be ordered to enable access to the third/fourth internal disks.
- The optional second core I/O board set (secondary) must be ordered to enable using the optional slim line DVDs.

Internal Disk Drives   HP 9000 rp7440 Server supports up to four internal low profile hot plug disk drives.

Internal Disk Drive Specifications

Configuration

Product Number	Disk Capacity	Rotational speed	Average seek time (read/write)	Sustained Bandwidth
AD146A	36 GB	15,000 RPM	3.6 msec (read); 3.9 msec (write)	75 MB/s
AD147A	73 GB	15,000 RPM	3.6 msec (read); 3.9 msec (write)	75 MB/s
AD148A	146 GB	10,000 RPM	4.7 msec (read); 5.2 msec (write)	69 MB/s
AD149A	300 GB	10,000 RPM	4.7 msec (read); 5.2 msec (write)	69 MB/s
AD210A	146 GB	15,000 RPM	3.6 msec (read); 3.9 msec (write)	75 MB/s
AD265A	300 GB	15,000 RPM	3.6 msec (read); 3.9 msec (write)	75 MB/s

HP 9000 rp7410/rp7420/rx7620 disk drives can be carried forward to the HP 9000 rp7440 server.

For HP-UX:

- Supported by Mirrordisk/UX across disk drives, controllers, and core I/O boards
- Must order the second Core I/O board set to support more than two internal disk drives

Internal Removable Media
- HP 9000 rp7440 Server contains one half height removable media bay, which will support either a DVD+RW or DAT 72 drive or two slimline DVD+RW drives. Removable media drives are not hot plug capable.
- DVD+RW drive provides enhanced features while preserving backward read compatibility with CD ROM. Data transfer rates of up to 6.75 MB/s are achieved with the DVD format; 4.8 MB/s can be achieved with the CD format.
- A DVD drive is required for all OpenVMS and Windows configurations.
- DAT drive has a maximum storage capacity of 72 GB with a peak transfer rate of 21.6 GB/hour compressed.
- HP 9000 rp7410/rp7420/rx7620 removable media drives can be carried forward to the HP 9000 rp7440 server

Internal Removable Media Specifications

Product Number	Device	Capacity	Data transfer rate
AB351B*	DVD+RW		
AB400A	DAT	72 GB	
AD013A**	Two slimline DVD+RW		

*NOTE: Third party software (not included with AB351B) is required to support DVD write capability with Windows.
**NOTE: The slimline DVDs require the second core I/O set.

I/O Configuration Rules The following table summarizes previously mentioned configuration rules pertaining to usage of I/O slots and internal peripherals.

	Minimum Requirement	
Configuration	Minimum Number of Cells	Minimum Number of Core I/Os
>7 I/O card slots or access to both I/O card bays	2	1
>2 internal disks or access to both pairs of disks	2	2
1 Internal half height Removable Media	1	1
2 Hard Partitions	2	2
2 internal slim line DVDs	2	2

Configuration

External Storage

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AC/DC Power

DC Power Supplies
The HP 9000 rp7440 Server comes with two power supplies that provided dual grid (2N) protection. The hot swap design allows for the replacement of a failed power supply without interrupting server operation. All four power cords must be utilized to fully enable power supply hot swap. HP 9000 rp7410/rp7420/rx7620 DC power supplies can be carried forward to the HP 9000 rp7440 server.

PCI Power Supplies
PCI power supply is now a redundant N+1 design. One PCI power supply failure will not affect the I/O bay since the remaining PCI power supply will power both I/O bays (this is an upgrade from the sx1000 based systems). PCI power supplies are hot swap capable (this is an upgrade from the sx1000 based systems). HP 9000 rp7410/rp7420/rx7620 PCI Power Supplies cannot be carried forward to the HP 9000 rp7440 server.

AC Power
The HP 9000 rp7440 Server contains four C20 power receptacle ports located at the bottom rear bulkhead. A minimum of two power cords must be used to maintain normal operation of the HP 9000 rp7440 Server. A second set of two cords can be added to improve system availability by protecting, for example, against power grid failures, accidentally tripped circuit breakers, or a failed power supply. The HP 9000 rp7440 Server hardware is capable of receiving AC input from two different AC power sources. The objective is to maintain full equipment functionality when operating from power source A and power source B or A alone or B alone. This capability is called "fault tolerant power compliance."

Although many HP 9000 rp7440 Server configurations can be sufficiently powered from a single 16 /20 amp branch circuit, the optimum configuration is to use one 16 amp (minimum) branch circuit per power cord. Due to the variety of 16/20 plugs used throughout the world, the HP 9000 rp7440 Server Ordering Guide offers a choice of plug options.

The drawing below represents the power receptacle ports on the HP 9000 rp7440 Server. If only two power cords are used, they must be plugged into either A0 and B0, or A1 and B1. Following this rule will ensure that both power supplies are being used under normal conditions.

Configuration

AC Power Consumption   The HP 9000 rp7440 Server power consumption will vary greatly depending on the hardware configuration and the input line voltages supplied at customer sites. Because of the disparity of line voltages throughout the world it's best to represent power consumption in VA (Volt Amperes). With power consumption being of high concern throughout the world, it's necessary to specify consumption in a couple of different ways.

- **Maximum Theoretical Power** or "Maximum Configuration" (input power at the AC input expressed as volt amps to take into account power factor correction)-The calculated sum of the maximum worst case power consumption for every subsystem in the server. This number will never be exceeded by a functioning server for any combination of hardware and software under any conditions.
- **Marked Electrical Power** (input power at the AC input expressed as volt amps)-The server Marked Electrical Power is the rating given on the chassis label and represents the input power required for facility AC power planning and wiring requirements. This number represents the expected maximum power consumption for the server based on the power rating of the bulk power supplies. This number can safely be used to size AC circuits and breakers for the system under all conditions.
- **Typical Maximum Power**, User Expected Maximum Power, or "Typical Configuration" (expressed as volt amps)-The measured maximum worst case power consumption. This number represents the larges power consumption that HP engineers were able to produce for the server with any combination of hardware under laboratory conditions using aggressive software applications designed specifically to work the system at maximum load. This number can safely be used to compute thermal loads and power consumption for the system under all conditions.

For further power consumption details, see the HP 9000 rp7440 Installation manual.

Configuration   HP 9000 rp7440 Server Fully Loaded Configuration

- 8 dual core HP PA RISC PA 8900 processors
- 64 GB of memory
- 14 PCI cards
- 2 cell boards
- 4 internal hard drives
- 1 DVD drive
- 2 core I/O board sets
- 2 bulk power supplies.
- Typical maximum power: 2120 VA (2078 W) (10.6 A @ 200 VAC across two cords)
- Marked Electrical for the server: 2640 VA (12A @ 220 VAC across two cords)
- Marked Electrical per line cord: 1320VA (6A @ 220 VAC across each cord)
- Maximum Theoretical Power: 3130 VA (3092 W)

HP 9000 rp7440 Server Average Configuration

- 4 dual core HP PA RISC PA 8900 processors
- 10 GB of memory
- 5 PCI cards
- 2 cell boards
- 2 internal hard drives
- 1 DVD drive
- 1 core I/O board set
- 2 bulk power supplies.
- Typical power consumption: 1100 VA (5.5 A @ 200 VAC across two cords)

Configuration

Power Distribution Units   60 amp Power Distribution Unit-

- AF916A (NA/JPN) and AF917A (International)-supported in 10K G2 rack
- E7683A (US) and E7684A (International)-supported in Rack System E

Customers who prefer the fewest higher amperage connections from their AC line current source to the HP 9000 rp7440 Server can use the 60 amp power distribution unit (PDU). The AF916A and AF917A PDUs contain 12 C19 outlets. The E7683A and E7684A PDUs contain 8 C19 outlets. For more details on PDUs, please see PDU sales collateral. This PDU is sold separately and can be ordered with any HP server solution.

The maximum amperage is 60 amps through the entire PDU and 20 amps per breaker. Both limits must be met. Each 60 amp PDU can support up to four HP 9000 rp7440 servers if the PDU is not mounted in the same rack. Up to three HP 9000 rp7440 servers can be supported if the PDU is mounted within the same rack

For redundant power inputs, the second set of cords is added. If the second PDU is plugged into a second grid this configuration provides protection against:

- Losing power from a single power grid
- Accidental tripping of one or two circuit breakers
- Accidental disconnect of a single PDU power cord
- Accidental disconnect of up to four (two from each system) system power cords

30 amp Power Distribution Unit-

- 252663 D74 (NA/JPN) and 252663 B33 (International)-supported for 10K G2 rack
- E7681A (North America/JPN) and E7682A (International)-supported with Rack System E

A 30 amp Power Distribution Unit (PDU) is also supported with HP 9000 rp7440 Server. Rack configurations consisting of peripherals and only one HP 9000 rp7440 Server will likely be best supported with the 30 amp PDU. This PDU is sold separately and can be ordered with any HP server solution.

Unlike the 60 amp PDU, each 30 amp PDU can only support one HP 9000 rp7440 Server. The following configuration guidelines apply when using the 30 amp PDU:

- A0 and A1 or B0 and B1 cords should never be plugged into the same PDU
- Use two 30 amp PDUs to achieve input power redundancy (plugging A0/A1 and B0/B1 into separate PDUs).
- Ordering tools will not force the purchase of a second PDU for input power redundancy. A second PDU must be manually selected if redundant input power is desired.

Configuration

Partitioning

A hardware partition corresponds roughly to a single, standalone system. Each HP 9000 rp7440 Server can be subdivided into two partitions, each containing one cell that has minimal shared resources with the other cell (partition). Special programmable hardware in the cells defines the boundaries of a partition in such a way that the isolation is enforced from the actions of other partitions. Each partition runs its own independent instance of the operating system (HP UX 11i v1, v2 and v3) . Applications cannot span partitions since each partition runs its own instance of the OS, essentially functioning as a stand alone server. However, different partitions may be executing the same or different revisions of an operating system, or they may be executing different operating systems altogether, with OS availability.

Each partition has its own independent CPUs, memory and I/O resources consisting of the resources of the cells that make up the partition. Resources may be removed from one partition and added to another without having to physically manipulate the hardware just by using commands that are part of the System Management interface. With a future release of HP UX, using the related capabilities of dynamic reconfiguration (e.g. on line addition, on line removal), new resources may be added to a partition and failed modules may be removed and replaced while the partition continues in operation.

Partitioning the resources of the complex in this way makes it easy to run multiple application environments on the same physical system; you can allocate physical resources and tune the operating system running on each partition depending on the needs of the application (or the most important application) you intend to run on it. Alternatively, you can configure the HP 9000 rp7440 Server as a single partition, allowing all the resources to be focused on a single set of tasks, for example a large online transaction processing application.

You can increase or reduce the processing power of a partition by adding or deleting cells (at this release, you must shut down the operating system running on the affected partition(s) before moving cells, and before configuration changes will take effect). Though the OS might include commands for some configuration tasks, HP recommends you use the Partition Manager (parmgr) to configure partitions.

The current release of HP 9000 rp7440 Server supports hardware partitioning. Hardware based partition configuration changes may require a reboot of the partition depending upon the configuration change. The reboot of the partition only affects the partition that is being reconfigured. The other partition defined in the chassis is not affected and will continue to execute without interruption. In a future HP UX release, dynamic hard partitions will be supported. Dynamic partitions imply that partition configuration changes do not require a reboot of the partition.

The HP 9000 rp7440 Server can be divided into two independent hardware partitions. In a partitioned configuration, system resources such as cell boards, I/O slots, core I/O, and disks, are evenly split between the two partitions (the removable media device is dedicated to partition 1). There is no flexibility to otherwise divide these components. For example, it is not possible to include 12 I/O slots in partition 0 and 4 I/O slots in partition 1; the split must be even.

The table below summarizes the resource split between hardware partitions.

	Cells (required)	I/O slots	Core I/O (required)	Disk/Media Bays
Partition 0	Cell 0	7	1	2/0
Partition 1	Cell 1	7	1	2/1

Configuration

Software Partitioning

HP 9000 rp7440 servers support virtual partitioning (vPars) to the single processor level similar to support on HP 9000 servers with HP-UX 11i v1. With vPars, a user will be able to support up to four separate virtual partitions each with an instance of HP-UX within each hard partition. VPars will provide many of the features of nPars but without the electrical isolation and support for hardware failures that nPars provides.

HP System Insight Manager

HP Systems Insight Manager (SIM) is the central point of administration for management applications that address the Integrity rp7440 and rp8440 server's management requirements. HP SIM delivers powerful monitoring and control, notifying the administrator of potential hardware or software problems before they occur. It also provides inventory reporting capabilities that dramatically reduce the time and effort required to track server assets. HP SIM provides secure communications as well as role based security to make certain that its powerful capabilities are kept secure from unauthorized users.

HP-UX

- Ignite UX addresses the need for HP-UX system administrators to perform fast deployment for one or many servers. It provides the means for creating and reusing standard system configurations, enables replication of systems, permits post installation customizations, and is capable of both interactive and unattended operating modes.
- Software Distributor UX (SD UX) is the HP-UX administration toolset used to deliver and maintain HP-UX operating systems and layered software applications. Delivered as part of HP-UX, SD UX can help you manage your HP-UX operating system, patches, and application software on HP 9000 servers.
- System Management Homepage (SMH) is used to manage accounts for users and groups, perform auditing and security operations, and handle disk and file system management and peripheral device management. HP Systems Insight Manager allows these tasks to be distributed to multiple systems and delegated using role based security.
- HP-UX Kernel Configuration is used for self optimizing kernel changes. The new HP-UX Kernel Configuration tool allows users to tune both dynamic and static kernel parameters quickly and easily from a Web based GUI to optimize system performance. This tool also sets kernel parameter alarms that notify you when system usage levels exceed thresholds.
- Partition Manager creates and manages nPars for high end servers. After the partitions are created, the systems running on those partitions can be managed consistently with all the other tools integrated into SIM.
- HP-UX 11i Webmin based Admin is a Web based system management framework that allows a wide variety of open source Webmin system management modules to be plugged in. HP supports this tool for the configuration of the HP-UX 11i Apache based Web Server and the HP-UX 11i Tomcat based Servlet Engine.
- HP-UX Bastille is a security hardening/lockdown tool that enhances the security of an HP-UX 11i UNIX host. It accommodates the various degrees of hardening required of servers used for webs, applications, and databases.
- Security Patch Check efficiently improves systems security by performing analysis of file sets and patches installed on an HP-UX 11i system and generating a report of recommended security patches.
- System Inventory Manager is for change and asset management. It enables you to easily collect, store, and manage inventory and configuration information for HP-UX-based servers. It provides an easy to use, web based interface, superior performance, and comprehensive reporting capabilities.
- Event Monitoring Service (EMS) keeps the administrator of multiple systems aware of system operation throughout the cluster, and it notifies the administrator of potential hardware or software problems before they occur. HP Systems Insight Manager can launch the EMS interface and configure EMS monitors for any node or node group that belongs to the cluster, resulting in

Configuration

increased reliability and reduced downtime.

- HP Process Resource Manager (PRM) controls the resources that processes use during peak system load. PRM can manage the allocation of processor, memory resources, and disk bandwidth. It allows administrators to run multiple mission critical applications on a single system, improve response time for critical users and applications, allocate resources on shared servers based on departmental budget contributions, provide applications with total resource isolation, and dynamically change configuration at any time-even under load.
- HP-UX Workload Manager (WLM) provides automatic processor resource allocation and application performance management based on prioritized service level objectives (SLOs). In addition, WLM allows administrators to set real memory and disk bandwidth entitlements (guaranteed minimums) to fixed levels in the configuration. The use of workload groups and SLOs improves response time for critical users, allows system consolidation, and helps manage user expectations for performance.
- HP OpenView Operations Agent provides a fully integrated, single pane of glass management solution for systems, networks, applications, and databases. A powerful ability to monitor, filter, correlate, and respond to events enables IT organizations to establish central management control over their managed environments and improve overall availability and reliability.
- HP OpenView Performance Agent monitors and analyzes the performance of systems and applications to compare SLOs with actual application performance, and it enables real time performance monitoring as well as action on alarm.
- HP OpenView GlancePlus is a powerful system monitoring and diagnostic tool that provides online performance information, examination of system activities, identification, and resolution of performance bottlenecks, and system fine tuning.
- HP OpenView Data Protector (Omniback II) provides reliable, high performance data protection for enterprise wide heterogeneous environments without impacting system or application performance. It centralizes and automates backup and recovery operations and tracks file versions and media to enable swift recovery of information.
- HP OpenView Network Node Manager (NNM) management station runs on Itanium 2 based HP-UX servers. NNM provides a powerful network management solution that includes concise, in depth views of network devices and their status in an intuitive graphical format. NNM helps network managers evaluate network performance, pinpoint problem sources, and proactively manage their networks and network availability.

All other HP OpenView management tools, such as HP OpenView Operations, Service Desk, and Service Reporter, will be able to collect and process information from the agents running on HP 9000 servers with HP-UX.

Instant Capacity (iCAP)

For a complete description of how to configure Instant Capacity (iCAP), please refer to
http://h18004.www1.hp.com/products/quickspecs/11723_div/11723_div.HTML

Configuration

Racking

The HP 9000 rp7440 Server was designed to provide industry leading performance density and availability when ordered in a racked configuration. At 10 EIA units (17.5 inches), four HP 9000 rp7440 servers can be mounted into a single HP two meter cabinet (HP 10K G2 Universal rack).

The HP 9000 rp7440 Server industrial design and packaging was designed to allow easy and quick access to all of the system's components. The most frequently handled devices, removable media and disks, are directly accessible at the system's front. By removing the front bezel, hot swap fans, hot swap power supplies, and PCI power supplies can be completely serviced. At the rear, core I/O and more hot swap fans are directly accessible. For access to all other components, the rack mounted HP 9000 rp7440 Server comes with rack sliders.

These rack sliders enables the HP 9000 rp7440 Server to be slid forward out of the HP cabinet for servicing of internal components such as fans, cell boards, and I/O cards, while the system is still running. The sliders also allows for servicing or replacement of any FRU (field replaceable unit) without removing the chassis from the cabinet. The HP 9000 rp7440 Server industrial design and slider strategy enables access and removal of any FRU within 15 minutes or less. This design feature minimizes the downtime associated with system upgrades in the rare event of a component failure. Also included with ever rack mounted HP 9000 rp7440 Server is a cable management arm (CMA) The CMA neatly secures data cables and prevents cables from becoming entangled while servicing of the system.

UPS

Management of local UPSs for the rp7440 and rx8640 is now through a LAN port on the core I/O card. Management of UPSs by the predecessor, rx7620 and rx8620 servers was through a serial port on the core I/O. The serial port is not available on the rp7440 and rx8640 servers. Therefore, when upgrading or adding rp7440 and rx8640 servers to your environment and using local UPSs (as opposed to datacenter wide UPSs), make sure there is a LAN management card available on the local UPS.

HP 10000 and 9000 Racks (These racks are the pre merger Compaq racks)

The HP 9000 and HP 9000 servers are supported for field installs into these racks. Factory integration is not yet supported for HP 10000 and HP 9000 racks. Differing depth requirements of the HP 9000/HP 9000 racking kits preclude racking HP 9000/HP 9000 servers and HP ProLiant servers in the same racks.

Third-Party Racking

HP Servers are designed to maximize performance density when installed into HP Rack Systems. HP system Rack Systems maintain the high level of safety and reliability of HP Server solutions that customers have come to expect. Although HP strongly recommends racking servers in HP Rack Systems, it is recognizes that some customer circumstances may prohibit this. For those customers, HP has developed a set of guidelines that when followed, enables server installations into third party cabinets. It is extremely important that the guidelines be followed due to the wide variety of cabinets in the market place.

Upgrades

Upgrades	The rp7440 server is capable of in box upgrades from rp74xx Servers.
	You can also accomplish an upgrade by combining the purchase of a new server with trade up credits on the older server. Box swap upgrades may have the advantage of less upgrade down time.
	In box upgrades and box swap upgrades may have similar prices depending on the amount of memory and number of cell boards and processors that have to be upgraded.

Included in the In box
Upgrade Kit (AD057A)

- System Backplane-The HP 9000 rp7440 System backplane is a new design with the following feature modifications:
  - New high speed differential links
  - Redesign of the crossbar ASIC
  - Additional switch fabric on the backplane
  - Redesign of the backplane power subsystem
  - Redesign of the system clock infrastructure
  - New high speed, impedance controlled, board to board connectors will be used
- Mass Storage Backplane PCA- The mass storage subsystem upgrades from SCSI SE interconnect to U320.

Other Miscellaneous

- Nameplates and labels
- "Read Me" documents, Upgrade Guide, CD ROM
- Miscellaneous cables

Must Order Separately for
an In box Upgrade

- Processor-Customer won't be able to use their existing PA 8900 processors due to a faster FSB and different core frequency
- Cell boards- New Cell board design to support new chipset
- I/O Backplane-The I/O backplane must be ordered
- Memory DIMMs-The memory system uses Double Data Rate DRAMs (DDR II)
- Core I/O - U320 support
- Installation services

Material to be Reused in
an In box Upgrade

- Chassis
- System fans
- AC power distribution PCA
- DC power distribution PCA
- OL* PCA (I/O cards)
- Bulk power supplies
- Hard disk drives
- Removable media drives
- Supported I/O Cards (please refer to supported I/O card list)

Upgrading to HP Integrity

Customers can also upgrade their rp7440 server to a HP Integrity rx7640 Server using the AD056A product. This upgrade kit consists of the following:

- Nameplates and labels
- "Read Me" documents, Upgrade Guide, CD ROM
- Miscellaneous cables

For more information on upgrades, return credits and services products, please refer to the midrange upgrade guide on the Source/Partner Portal.

Technical Specifications

Server model number	rp7440			
	Number of dual core HP PA-8900 Processor cores	2-16		
	Chipset	HP sx2000		

Server product number	Base system	A9959A		
	Hardware Warranty	1 year next day on site		

Fast Bundles (all include base chassis and power supplies)	Product Number	Number of Processor cores	Number of Cell Boards in bundle	Number of core I/O Cards in bundle
	AD026A	2	1	1
	AB027A	4	1	1
	AD028A	6	2	1
	AB029A	8	2	1

Supported Processors	Dual core HP PA-8900 processors	L2 cache	64 MB
		Frequency	1.068 GHz

Memory	Memory slots	32 (16 per cell board)
	Minimum memory (pair: 2 DIMMs)	2 GB
	Maximum memory capacity	128 GB (64 GB per cell board)

Internal Disks	Maximum disk mechanisms	4
	Maximum disk capacity	1.2 TB
	Internal removable media (1 half height)	1 slot
	DVD+RW (1 half height device or 2 slimline devices)	
	DDS 72 DAT	72 GB

Technical Specifications

Core I/O (Items per core I/O set)	Ultra320 SCSI	2
		NOTE: Second SCSI port only available if Smart Array controller is used for internal disks.
	1 GbE (RJ 45 connector)	2
	10/100Base-T port (Management/Console LAN)	1
	RS 232 Management Console port	1

I/O Buses and Slots	Total hot plug PCI X Slots (266 MHz; 64 bits)	15
	8 Dual channel slots (2128 MB/s each)	
	6 Dual channel slots (1060 MB/s each)	
	2 Single channel (530 MB/s each)	

Maximum I/O Cards (See supported I/O table for specific products)	Mass Storage	15
	LAN	2-15
	WAN	15
	Multi-Function (Mass Storage / LAN)	15
	Additional Interface Cards	4-15

Electrical Characteristics	AC Input power	200-240V 50/60 Hz
	Hotswap Power supplies	2 total, included with base
	Redundant AC power inputs	2 required, 4 cords for 2N
	Typical maximum power dissipation for maximum processor, memory, disk, I/O configurations	2,078 VA (2,120 W) 10.39A @200VAC
	Marked Electrical per server	2640 VA (12A @ 220VAC)
	Marked Electrical per line cord	1320 VA (6A @ 220VAC)
	Power factor at full load	0.98 (approximately)

Technical Specifications

Site Preparation	kW rating for UPS loading	3.0
		NOTE: Represents theoretical maximum power/heat dissipation under worst case conditions, may increase with future upgrades.
	Site planning and installation included	Yes
	Depth (mm/inches)	762 mm/30 in
	Width (mm/inches)	482 mm/19 in
	Height (mm/inches/EIA) Racked	445 mm/17.5 in/10 units
	Weight (kg/lbs)	101.6 kg/224 lbs

Environmental Characteristics	Regulatory model	RSLVA 0102
	Acoustics (sound power) at 25°C	7.4 Bels LwA
	Acoustics (sound power) at 30°C	7.4 Bels LwA
	Acoustics (operator/bystander) at 24°C	58.4 dB LpA
	Operating Temperature (up to 5000 ft) 2	5° to 32°C (41° to 89°F)
	Non operating Temperature	-40° to 70°C (-40° to 158°F)
	Maximum rate of temperature change	20°C/hour
	Operating relative humidity	15% to 80%, non condensing, maximum web bulb = 26°C
	Non operating relative humidity	5% to 80%, non condensing
	Operating altitude above sea level	To 3.0 km (10,000 feet)
	Non operating altitude above sea level	To 4.5 km (15,000 feet)

NOTE: Maximum operating temperature range up to 1.524 km (5000 ft). For higher altitudes derate the max temperature by 1°C/350 meters (1000 ft) above 1.524 km (5000 ft).

Regulatory Compliance	Regulatory Model Number	RSVLA-0102
	Electromagnetic Interference	Complies with FCC Rules and Regulations, Part 15, as a Class A digital device. Manufacturer's Declaration to EN55022 Level A, VCCI Registered, Class 1, Korea RLL
	Safety	CSAus Certified, compliant with EN 60950

Technical Specifications