IBM Power System S812 server offers solid foundation for critical workloads in departmental scale-out environments

Table of contents

At a glance

The IBM(R) Power(R) System S812 server is a powerful 1-socket server that ships with one or four activated cores and I/O configuration flexibility to meet small businesses' processing needs. The server features:

- The IBM POWER8(R) processor module configurations:
  - 1-core 3.026 GHz for IBM i
  - 4-core 3.026 GHz for AIX(R)
- Up to 64 GB of memory for 1-core S812 or up to 128 GB of memory for 4-core S812
- Choice of integrated storage backplane features:
  - Eight SFF-3 bays, DVD bay, and dual SAS controller with write cache
  - Twelve SFF-3 bays, DVD bay, and single SAS controller
  - Twelve SFF-3 bays, DVD bay, and split backplane two SAS controllers
- Expansion capabilities for the EXP24SX or EXP12SX Drawer for the 4-core S812
- Six low-profile, hot-swap PCIe Gen3 slots
- Integrated:
  - Service processor
  - EnergyScale™ technology
  - Hot-swap and redundant cooling
  - USB 3.0 and 2.0 ports
  - One system port with RJ45 connector
- Two hot-plug, redundant power supplies
- 19-inch rack-mounting hardware (2U)
- For IBM i, a maximum of 25 IBM i user entitlements

Overview

The Power System S812 server brings robust and solid business transaction processing with proven infrastructure for AIX and IBM i operating system environments. The S812 is a 1-socket, 2U system designed to meet compute

demands of larger deployments, for example, in retail space and as an entry point for noncompute-intense workloads that require high reliability and stability.

This 1-socket system can be ordered with one core for IBM i (up to 25 users) and up to four cores for AIX. The S812 provides the benefits of great performance per core and per socket, utilizing the POWER8 processor. It also provides resilient I/O capabilities, internal storage, and hot-plug PCI capabilities, along with greater reliability, availability, and serviceability.

Other benefits include:

- A foundation to core workloads in small footprints at a very competitive price point
- Right fit for small businesses and scale-out deployments
- Energy efficient and easy to manage by utilizing advanced energy control

The Power System S812 supports one processor socket, offering 1-core with IBM i or 4-core with AIX 3.026 GHz POWER8 configurations in a 19-inch rack-mount, 2U (EIA units) drawer configuration.

The Power S812 server supports a maximum of 64 GB DDR4 memory for IBM i workloads and a maximum of 128 GB DDR4 memory for AIX workloads. Memory features supported are 16 GB and 32 GB and run at speeds of 1600 Mbps.

I/O and system attributes in the system unit include:

- Six PCIe Gen3 Low Profile (LP) Slots (all hot pluggable)
- CAPI capable on two PCIe x16 slots (AIX)
- Twelve or eight 2.5-in. SAS SFF-3 bays for HDD or SSD (all hot pluggable)
  - Eight bays available for IBM i
  - Eight or twelve bays for AIX, depending on backplane
- Multiple RAID options supported
- One DVD
- Two front USB 3.0, two rear USB 3.0, and two rear USB 2.0 ports
- One system port (rear)
- Service processor
- 1+1 Redundant hot-swap AC power supplies
- 19-inch rack-mount 2U configuration
- AIX 6.1, 7.1, 7.2, or later, operating system support
- IBM i 7.3 TR2, 7.2 TR6, or later, operating system support with a maximum of 25 IBM i user entitlements

Key prerequisites

One of the following operating systems:

- AIX 6.1, 7.1, and 7.2, or later
- IBM i 7.3 TR2, or later
- IBM i 7.2 TR6, or later

Refer to the Software requirements section for details.

Planned availability date

March 17, 2017

Description

Summary of standard hardware features for the Power S812 server:

- POWER8 processor modules:
  - 1-core, 3.026 GHz for IBM i workloads under P05 licensing tier with up to 25 users
  - 4-core, 3.026 GHz for AIX workloads
- High-performance 1600 Mbps DDR4 ECC memory
  - 16 GB (#EM96) and 32 GB (#EM97) memory features
  - Up to 64 GB memory for 1-core S812 for use with IBM i operating system
  - Up to 128 GB memory for use with AIX operating system
- Choice of two storage backplane features:
  - Option one: Twelve SFF-3 bays, one DVD bay, one integrated SAS controller without cache, and JBOD RAID 0, 5, 6, and 10
    - -- Optionally, split the above SFF-3 bays and add a second integrated SAS controller without cache.
  - Option two: Eight SFF-3 bays, one DVD bay, a pair of integrated SAS controllers with cache, and RAID 0, 5, 6, 10, 5T2, [1] 6T2, [1] and 10T2.[1]
    - -- Optionally, attach an EXP12SX or EXP24SX SAS Storage Enclosure to the dual IOA with 4-core S812.
- Six hot-swap PCIe Gen3 slots
  - Two x16 slots and four x8 slots

[1] With AIX

Notes:

- One less PCIe slot is available with the dual IOA storage backplane feature EJ0U.
- One x8 PCIe slot is used for a PCIe Ethernet LAN adapter.

- Integrated:
  - Service processor
  - EnergyScale technology
  - Hot-swap and redundant cooling
  - Four (two front + two rear) USB 3.0 ports for general use
  - Two rear USB 2.0 ports for non-general use
  - One system port with RJ45 connector
- Two hot-plug, redundant power supplies
- 19-inch rack-mounting hardware (2U)

Power S812 system operating environments

The 1-core Power S812 server supports a single IBM i partition system. Its software tier is P05. IBM i 7.3 TR2 or IBM i 7.2 TR6, or later, is supported.

The 4-core S812 server supports a single AIX partition, which can be 1 core, 2 cores, 3 cores, or 4 cores. It is a small software tier. AIX 7.2 TL0, AIX 7.1 TL1, AIX 6.1 TL7, or later, are supported. The optional Factory Deconfiguration (#2319) can be used to "set aside" cores and potentially reduce licensing and software maintenance costs.

The S812 uses firmware 860.20 and later.

Power S812 system configuration

The minimum Power S812 initial order must include a processor module, 16 GB or 32 GB of memory, a storage backplane, one Ethernet LAN adapter, either one or two SAS drives or, alternatively, a Fibre Channel adapter to external storage, two power supplies and line cords, an operating system indicator, a cover set indicator, and a Language Group Specify.

AIX or IBM i is the primary operating system.

The minimum AIX defined initial order configuration is as follows:

Feature number	Description
EPXQ	4-core 3.026 GHz POWER8 Processor Module for AIX
EPYQ x n or EPZQ x m	Processor core activations for EPXQ where the quantity of n plus m must equal 4
1 memory DIMM	16 GB DDR4 Memory feature EM96 defaulted
1 storage backplane	Storage backplane: 12 SFF-3 bays and DVD bay, single SAS controller with no cache feature EJ0T defaulted
1 SAS drive (HDD or SSD) or a Fibre Channel adapter for external storage	300 GB 15k RPM SAS SFF-3 Disk Drive for AIX feature ESFB defaulted
EB2L x 2	AC Power Supply - 900 W
1 Ethernet LAN adapter	PCIe2 LP 4-port 1GbE Adapter feature 5260 defaulted
2 power cords	Two power cords such as feature 6458 Power Cord 4.3 m (14-ft), Drawer to IBM PDU (250V/10A)
9300	Language Group Specify
EJUD	Front bezel (used with #EJ0T backplane)
or	
EJUE	Front bezel (used with #EJ0U backplane)
EJT6	Rack OEM, bezel (used with #EJ0T backplane) - Bull or Hitachi sales only
or	
EJT7	Rack OEM, bezel (used with #EJ0U backplane) - Bull or Hitachi sales only
2146	Primary Operating System Indicator -AIX

The minimum IBM i defined initial order configuration is as follows:

Feature number	Description
EPXP	1-core 3.026 GHz POWER8 Processor module for IBM i
EPYP x 1	Processor core activations for EPXP
or	
EPZP x 1	Zero-priced 1-way processor core activations
1 memory DIMM	16 GB DDR4 Memory feature EM96 defaulted
1 storage backplane	Storage backplane: 8 SFF bays and DVD bay, pair SAS controllers with cache feature EJ0U defaulted
2 SAS drives (HDD or SSD) or a Fibre Channel adapter for external storage	283 GB 15k RPM SAS SFF-3 Disk Drives for IBM i feature ESFG defaulted
EB2L x 2	AC Power Supply - 900W
5260 x 1	PCIe2 LP 4-port 1GbE Adapter
5771 x 1	SATA DVDRAM with write cache
2 power cords	Two power cords such as feature 6458
9300	Language Group Specify
EJUD	Front bezel (used with #EJ0T backplane)
or	
EJUE	Front bezel (used with #EJ0U backplane)

Notes:

- If IBM Manufacturing is to factory integrate the server in a rack, the initial order must also have an IBM 7014-T00, 7014-T42, or 7953-94Y rack. If IBM Manufacturing is to factory integrate a future I/O expansion drawer ordered as an MES to an existing system, either a feature 0551, 0553, or ER05 rack must be ordered as part of the MES.
- No internal HDD or SSD is required if feature 0837 (Boot from SAN) is selected. A Fibre Channel adapter must be ordered if feature 0837 is selected.
- Feature EJ0T is a prerequisite for the split backplane option (#EJ0V).

Processor modules

The following options are available:

- One-core 3.026 GHz for the 1-core S812 (IBM i operating system)
- Four-core 3.026 GHz for the 4-core S812 (AIX operating system)
- Note that a 1-core S812 cannot be converted to 4-core S812 (or vice versa) after it has been shipped from IBM.

System memory

- A minimum 16 GB of memory is required on the Power S812 system (one DIMM) though more than one DIMM is recommended for higher performance.
- A maximum of 64 GB is supported on a 1-core S812 and a maximum of 128 GB is supported on a 4-core S812.
- The server has eight memory slots, but the maximum memory capacity of the server and size of DIMMs being used may allow only a subset of the slots to be used.
- Memory plugging rules require memory DIMMs to be plugged in identical pairs after the first single DIMM. For example, using a 4-core S812 and using all 16 GB DIMMs, a quantity of 1, 2, 4, 6, or 8 DIMMs could be configured.
- On a 1-core S812, different size DDR4 memory DIMMs cannot be mixed. On a 4-core S812, 16 GB and 32 GB DDR4 DIMM pairs can be mixed.

Plans for future memory upgrades should be taken into account when deciding which memory feature size to use at the time of initial system order. Note adding memory requires scheduled downtime of the server.

DDR4 Memory features for S812

Description	Feature number	Maximum DIMM quantity for 1-core	Maximum DIMM quantity for 4-core
16 GB 1600 Mbps	EM96	4	8
32 GB 1600 Mbps	EM97	2	4

Active Memory™ Expansion (#4793) can be used with the 4-core S812 to effectively expand the capacity beyond 128 GB. The degree of expansion will depend on the applications being run.

Power supply

Two redundant, hot-pluggable 900 W AC power supplies are required (two #EB2L).

Redundant fans

Redundant fans are standard.

Power cords

Two power cords are required, one for each power supply. Refer to the feature listing for options. **Recommendation:** For redundancy, attach the power cords to independent power sources.

I/O support

The following I/O is supported.

PCIe slots

The Power S812 has up to six PCIe hot-plug Gen3 slots, providing configuration flexibility. Two slots are x16 and four are x8 slots. Attachment of a PCIe Gen3 I/O Drawer is not supported on either the 1-core or 4-core S812.

The x16 slots can provide up to twice the bandwidth of x8 slots because they offer twice as many PCIe lanes. PCIe Gen3 slots can support up to twice the bandwidth of a PCIe Gen2 slot and up to four times the bandwidth of a PCIe Gen1 slot, assuming an equivalent number of PCIe lanes.

At least one PCIe Ethernet adapter is required on the server by IBM to ensure proper manufacture, test, and support of the server. One of the x8 PCIe slots is used for this required adapter, identified as the C10 slot.

The new servers are smarter about energy efficiency for cooling the PCIe adapter environment than earlier generation servers such as the IBM POWER6(R) servers. They sense which IBM PCIe adapters are installed in their PCIe slots and if an adapter requires higher levels of cooling, they automatically speed up fans to increase airflow across the PCIe adapters. Note that faster fans increase the sound level of the server. Higher wattage PCIe adapters include the PCIe3 SAS adapters (#EJ0M and #EJ11).

Note the choice of SAS backplane can reduce the available PCIe slots. See below.

SAS bays and storage backplane options

Three backplane options provide a great deal of flexibility and capability for the 1-core and the 4-core S812. One of these three must be configured:

- Storage Backplane 12 SFF-3 bays/DVD bay (#EJ0T)
- Features EJ0T and EJ0V (split backplane)
- Storage Backplane 8 SFF-3 bays/DVD bay/Dual IOA with Write Cache (#EJ0U) and optionally Easy Tier(R) functionality for the 4-core S812

Each of the three backplane options provides SFF-3 SAS bays in the system unit. These 2.5-inch or small form factor (SFF) SAS bays can contain SAS drives (HDD or SSD) mounted on a Gen3 tray or carrier. Thus the drives are designated SFF-3. SFF-1 or SFF-2 drives do not fit in an SFF-3 bay. All SFF-3 bays support concurrent maintenance or hot-plug capability.

Each of the three backplane options uses leading-edge, integrated SAS RAID controller technology designed and patented by IBM. These options can provide significant I/O performance compared to the integrated SAS controllers in earlier generation servers. A custom-designed PowerPC(R) based ASIC chip is the basis of these SAS RAID controllers and provides industry-leading RAID 5 and RAID 6 performance levels, especially for SSDs. Internally, 13 (no cache) or 16 (with cache) 6 Gb SAS ports are implemented and provide plenty of bandwidth. The integrated SAS controllers are placed in dedicated slots, and the backplane options with no cache do not reduce the number of available PCIe slots. The backplane option with cache (#EJOU) does reduce the number of PCIe slots by one.

The feature EJ0T Storage Backplane option provides 12 SFF-3 bays, 1 SAS controller with zero write cache, and a DVD drive bay. All 12 bays can be used in a 4-core S812. A maximum of 8 of the 12 bays can be used in a 1-core S812.

By optionally adding the feature EJ0V split backplane, a second integrated SAS controller with no write cache is provided and the 12 SSF-3 bays are logically divided into 2 sets of 6 bays. Each SAS controller independently runs 1 of the 6-bay

sets of drives. If the split backplane option is used for a 1-core S812 with its 8-drive maximum, the split options are 4+4 or 6+2.

The feature EJ0U storage backplane option has expanded function compared to the feature EJ0T backplane. Feature EJ0U provides eight SSF-3 bays; a pair of integrated SAS controllers, each with 1.8 GB physical (effectively up to 7.2 GB with compression) write cache; a DVD bay; two SAS ports enabled for attaching an external feature EXP12SX (#ESLL) or EXP24SX (#ESLS) SAS Storage Enclosure. The SAS ports are physically mounted on the rear of the server and do not use up one of the six S812 PCIe x8 slots. Use of the SAS ports is supported on the 4-core S812, but is not supported on the 1-core S812. Easy Tier functionality is available on the 4-core S812, but not the 1-core S812.

The dual SAS controllers provide both performance and protection advantages. Patented Active-Active capabilities enhance performance when there is more than one array configured. Each of the dual controllers has access to all the backplane SAS bays and can back up the other controller if there were to be a problem with the other controller. Each controller mirrors the other's write cache, providing redundancy protection. Integrated flash memory for the write cache content provides protection against electrical power loss to the server and avoids the need for write cache battery protection and battery maintenance.

All three of these backplane options support HDDs or SSDs or a mixture of HDDs and SSDs in the SFF-3 bays. If you are mixing HDDs and SSDs, they must be in separate arrays (unless using Easy Tier function).

All three of these backplane options can offer different drive protection options: RAID 0, RAID 5, RAID 6, or RAID 10. RAID 5 requires a minimum of three drives of the same capacity. RAID 6 requires a minimum of four drives of the same capacity. RAID 10 requires a minimum of two drives. Hot spare capability is supported with RAID 5 or RAID 6. On the 4-core S812, the high-performance, expanded-function dual-IOA backplane also proves Easy Tier functionality, which is also called RAID 5T2 (2-tiered RAID 5), RAID 6T2 (2-tiered RAID 6), and RAID 10T2 (2-tiered RAID 10).

Note: Clients who have I/O performance-sensitive workloads with an appreciable percentage of writes should consider using the feature EJ0U backplane with SAS controllers with write cache or use PCIe SAS adapters with write cache, especially for HDDs. Note also that RAID 5 and RAID 6 result in more drive write activity than mirroring or than unprotected drives.

IBM i requires that disks or SSDs be protected to have a supported configuration. Storage protection for AIX is highly recommended, but not required.

If needed, the backplane option can be changed after the server is already installed. For example, the feature EJ0V split backplane feature can be added to an existing feature EJ0T backplane. Or the feature EJ0T backplane can be removed and replaced by the expanded-function dual IOA feature EJ0U backplane. Or a feature EJ0U backplane could be replaced by a feature EJ0T and EJ0V backplane.

Unlike the hot-plug PCIe slots and SAS bays, concurrent maintenance is not available for the integrated SAS controllers. Scheduled downtime is required if a service action is required for these integrated resources.

DVD drive bay

Included in the feature EJ0T or EJ0U backplanes is a slimline media bay that can optionally house a SATA DVD-RAM (#5771). This DVD is recommended but optional for AIX. It is required for IBM i. The DVD drive is run by the integrated SAS controllers, and a separate PCIe adapter is not required.

Storage Backplane Integrated Easy Tier function

The Easy Tier function is provided with the dual IOA, high-performance storage backplane (#EJ0U) on the 4-core S812. Conceptually, this function is like the Easy Tier function found in the IBM Storage products such as the DS8000(R), Storwize(R) V7000, or SVC, but implemented just within the integrated Power Systems™ SAS controllers, the integrated SAS bays, and, optionally on the 4-core S812, an

EXP12SX or EXP24SX Storage Enclosure. Hot data is automatically moved to SSD, and cold data is automatically moved to disk (HDD) in an AIX environment. No user application coding is required. The EJ0U Easy Tier function is not available on the 1-core S812, but IBM i has an integrated capability (trace/balance) that provides roughly similar capability.

Clients commonly have this hot/cold characteristic for their data. It is typical for 10% - 20% of the data to be accessed 80% - 90% of the time. This is called the *hot data*. If you can get the hot data onto SSDs, it can dramatically improve the performance of I/O-bound applications. By keeping the cold data on HDDs, the total cost per gigabyte of the solution can be minimized. You can end up with high I/O performance at a very reasonable price.

On a 4-core S812, up to 12 internal HDD/SSD SAS bays and, optionally, with the EXP12SX or EXP24SX SAS Storage Enclosure, an additional 12 or 24 SAS bays are supported with the integrated Easy Tier function by the integrated SAS controllers.

Easy Tier function is configured using RAID 5T2 (2-tiered RAID5), RAID 6T2 (2-tiered RAID6) or RAID 10T2 (2-tiered RAID10). HDDs and SSDs are combined in the same array and the controller or adapter swaps 1M or 2M bands of data between HDD and SSD, automatically moving the hot data to SSD and the cold data to HDD. The HDDs and SSDs can be different capacities in this array. If an array has multiple capacity points, for example, 600 GB HDD and 387 GB HDD, only 387 GB of the larger 600 GB HDD will be used. Note that the block size of the drives in the array must match. All drives must be 5xx byte sectors or all must be 4k byte sectors.

SAS I/O drawer attachment for the 4-core S812

The EXP24SX or EXP12SX SAS Storage Enclosures (#ESLS or #ESLL respectively) are attached to SAS ports on either a PCIe SAS adapter located in the server or to the SAS ports on the rear of the server. Two SAS ports on the rear of the server are enabled with the expanded-function storage backplane with dual IOA support. A maximum total of three SAS enclosures are supported on the 4-core S812.

- One EXP24SX (#ESLS) or one EXP12SX (#ESLL) Storage Enclosure in mode 1 can optionally be attached to the two SAS ports on the rear of the server using the EJ0U backplane. Two SAS YO cables such as feature ECBT, ECBU, ECBV, or ECBW connect the system and the enclosures. Either SSDs or HDDs can be placed in this drawer, but SSDs and HDDs cannot be mixed in this drawer.
- Up to three EXP24SX (#ESLS) or EXP12SX (#ESLL) Storage Enclosures in mode 1, 2, or 4 can be attached to SAS ports of PCIe SAS adapters using SAS YO or X cables. The specific SAS cables used will depend on the specific adapter selected and drawer mode selected. Either SSDs or HDDs can be placed in the drawer, depending on the capabilities of the adapter running the bays. Note that longer-distance SAS cables are thicker and can fill the Cable Management Arm more quickly.

The 1-core S812 does not support the attachment of the EXP24SX or EXP12SX enclosure. Neither the 1-core nor the 4-core S812 support the EXP24S SFF Gen2-bay Drawer (#5887).

The older 3.5-inch-based feature 5886 EXP12S SAS Disk Drawer and feature 5786 EXP24 SCSI Disk Drawer are not supported.

IBM offers a 1U multimedia drawer that can hold one or more DVDs, tape drive, or RDX docking stations. The 7226-1U3 is the most current offering. The earlier 7216-1U2 and 7214-1U2 are also supported. Another RDX option is the separate external docking station feature EUA4 or EU04, which is attached to a USB port. The USB port can be the integrated USB 3.0 port on the S812 or on a USB adapter such as the feature EC45.

SAS drives supported

The 1-core S812 supports the following SFF-3 capacity drives, similar to the 4-core S814:

- 571 GB 10k RPM 4k HDD (#ESF4)
- 283 GB 15K RPM 4K HDD (#ESFG)
- 283 GB 15k RPM 4k HDD (#ESFA)
- 387 GB eMLC4 4k SSD (#ES8P)

The 4-core S812 supports the following capacity drives: SFF-3 in the system unit, SFF-2 in the EXP24SX, and LFF-1 in the EXP12SX:

- SFF-3 600 GB 10K RPM HDD -- 5xx (#ESD5) and 4k (#ESF5)
- SFF-3 1.2 TB 10K RPM HDD -- 5xx (#ESD9) and 4k (#ESF9)
- SFF-3 1.8 TB 10K RPM 4K HDD (#ESFV)
- SFF-3 300 GB 15K RPM HDD -- 5xx (#ESDB) and 4k (#ESFB)
- SFF-3 600 GB 15k rpm HDD -- 5xx (#ESDF) and 4k (#ESFF)
- SFF-3 387 GB eMLC4 SSD -- 5xx (#ES7K) and 4k (#ES8N)
- SFF-3 775 GB eMLC4 SSD -- 5xx (#ES7P) and 4k (#ES8Q)
- SFF-3 1.5 TB 4k eMLC4 SSD (#ES8V)
- SFF-3 1.9 TB 4K READ INTENSIVE SSD (#ES8J)
- SFF-2 600 GB 10k RPM HDD -- 5xx (#1964) and 4k (#ESEV)
- SFF-2 1.2 TB 10k RPM HDD -- 4k (#ESF3)
- SFF-2 1.8 TB 10k RPM 4k HDD (#ESFT)
- SFF-2 300 GB 15k RPM HDD -- 5xx (#1953) and 4k (#ESEZ)
- SFF-2 600 GB 15k RPM HDD -- 4k (#ESFP)
- SFF-2 775 GB eMLC4 SSD -- 5xx (#ES7E) and 4k (#ES8C)
- SFF-2 387 GB eMLC4 SSD -- 5xx (#ES78) and 4k (#ES85)
- SFF-2 1.9 TB 4KN READ INTENSIVE SFF (#ES80)
- LFF-1 3.86 - 4.0 TB 7.2k rpm 4k HDD (#ES62)
- LFF-1 7.72 - 8.0 TB 7.2k rpm 4k HDD (#ES64)

Low-Profile PCIe adapters supported

Feature number	Feature name	1-core server	4-core server
5260	PCIe2 LP 4-port 1 GbE Adapter	x	x
5273	PCIe LP 8 Gb 2-Port Fibre Channel Adapter	x	x
5277	PCIe LP 4-Port Async EIA-232 Adapter	x	x
EC45	PCIe2 LP 4-Port USB 3.0 Adapter	x	x
EJ11	PCIe3 LP SAS Tape/DVD Adapter Quad-port 6 Gb x8	x	x
EN0T	PCIe2 LP 4-Port (10 Gb + 1 GbE) SR+RJ45 Adapter		x
EN0V	PCIe2 LP 4-port (10 Gb + 1 GbE) Copper SFP+RJ45 Adapter		x
EN0X	PCIe2 LP 2-port 10/1 GbE BaseT RJ45 Adapter		x
EN1N	PCIe1 LP SAS Tape/DVD Dual-	x	x

Feature number	Feature name	1-core server	4-core server
	port 3 Gb x8 Adapter		
EN0B	PCIe3 LP 16 Gb 2-port Fibre Channel Adapter	x	x
EN0F	PCIe2 LP 8 Gb 2-Port Fibre Channel Adapter		x
EJ0M	PCIe3 LP RAID SAS Adapter Quad-Port 6 Gb x8		x

Cable management arm

A folding arm is attached to the server's rails at the rear of the server. The server's power cords and the cables from the PCIe adapters or integrated ports run through the arm and into the rack. The arm enables the server to be pulled forward on its rails for service access to PCIe slots, memory, processors, and so on without disconnecting the cables from the server. Approximately 1 meter (3 ft) of cord/cable length is needed for the arm.

Integrated I/O ports

Four USB-3 ports are available for general client use. Two are located on the front of the server and two are located on the rear.

The one system port is RJ45 and is supported by AIX and i for attaching serial devices. AIX typically uses the port to attach an asynchronous device like a console. IBM i typically does not use this port. If the device does not have an RJ45 connection, a converter cable such as feature 3930 can provide a 9-pin D-shell connection. Note that serial devices can have very individual characteristics (different pin outs) and the feature 3930 may not be appropriate for all possible devices. In this case, the user should acquire an OEM converter cable appropriate for their device.

Two USB-3 ports are available for general client use and are located on the front of the server. Technically, two additional USB-3 ports are possible to be used on the rear of the server, but an RPQ would have to be requested as there are airflow/cooling considerations with some configurations.

The service processor card on the rear of the server has five ports. One is the system port mentioned above. There are also two USB-2 ports which are available for limited client use. The USB-2 ports can be used to communicate with a UPS. This usage is common for IBM i and requires a converter cable (#ECCF). This usage is less common for AIX. The last two service processor ports are HMC ports.

HMC or vHMC

An HMC or vHMC is not required with the Power S812. Given the S812 has only one partition and no virtualization, its value would be limited. An HMC or vHMC could be used for things like remote console support, additional diagnostic tooling, remote set and management, update access key for firmware and more.

Racking and front bezel

The S812 requires 2U in a standard 19-inch rack. Airflow is front to back. The IBM Enterprise 7014-T00, 7014-T42, and Slim Rack 7965-94Y have been tested by IBM and meet multiple certification tests required by IBM. Other 19-inch racks may work, but have not been certified by IBM Development. If other IBM or non-IBM racks are used, the client should work with IBM Service to determine if they are acceptable for S812 warranty and service support. The S812 rails can adjust to rack depths from about 24 in. - 31 in.

Different front bezels are required depending on the storage backplane, either 8-bay (EJ0U) or 12-bay (EJ0T) storage backplane features can be selected. The 8-bay (EJ0U) requires feature EJUE bezel, and the 12-bay (EJ0T) requires feature EJUD.

Power System S812 (8284-21A) CBU offering for IBM i

The Power S812 (8284-21A) CBU designation enables you to temporarily transfer IBM i user license entitlements purchased for a primary machine to a secondary CBU-designated system for HA/DR operations. Temporarily transferring user license entitlements instead of purchasing them for your secondary system may result in significant savings. Note that since the S812 is a 1-core server with an IBM i processor license entitlement, moving additional "processor entitlements" such as done on larger CBU servers is not available (or useful) while moving "user entitlements" is useful.

The CBU specify feature 0444 is available only as part of a new server purchase. Certain system prerequisites must be met and system registration and approval are required before the CBU specify feature can be applied on a new server. Standard IBM i terms and conditions do not allow either IBM i processor license entitlements or IBM i user license entitlements to be transferred permanently or temporarily. These entitlements remain with the machine they were ordered for. When you register the association between your primary and on-order CBU system, you must agree to certain terms and conditions regarding the temporary transfer.

After a new CBU system is registered along with the proposed primary system and the configuration is approved, you can temporarily move your optional IBM i user license entitlements from the primary system to the CBU system when the primary system is down or while the primary system processors are inactive. The CBU system can then support failover and role swapping for a full range of test, disaster recovery, and high availability scenarios. Temporary entitlement transfer means that the entitlement is a property transferred from the primary system to the CBU system and may remain in use on the CBU system as long as the registered primary and CBU system are in deployment for the high availability or disaster recovery operation. The intent of the CBU offering is to enable regular role-swap operations.

For a Power S812 (8284-21A) server with its IBM i P05 software tier when designated as a CBU, the primary systems can be an IBM POWER7(R), IBM POWER7 +, or POWER8 server with a P05 or P10 software tier listed below:

- S814 (8286-41A)
- S822 (8284-22A)
- P460 (7895-43X and 7895-42X)
- P270 (7954-24X)
- P260 (7895-22X, 7895-23X, and 7895-23A)
- PS704 (7891-74X)
- PS703 (7891-73X)
- PS701/702 (8406-71Y)
- 720 (8202-E4B, 8202-E4C, and 8202-E4D)
- 710 (8231-E1D and 8268-E1D)
- PS700 (8406-70Y)

The primary machine must be in the same enterprise as the S812 CBU system.

Before you can temporarily transfer IBM i user entitlements, you must have more than the minimum number of IBM i user entitlements on a primary server. You can then transfer any IBM i user entitlements above the minimum and up to 20 users for the S812 CBU since the S812 has a maximum IBM i user entitlement of 25 users, assuming the total IBM i users on the primary system do not require the IBM i entitlement you want to transfer during the time of the transfer. For example, the minimum number of IBM i users on a sampling of the POWER7 and POWER8 with IBM i user entitlements are:

- Power S814 (8286-41A) 4-core: 5 users; 6-/8-core: 10 users
- Power S822 (8284-22A): 10 users
- Power 720 (8202-E4B, 8202-E4C, 8202-E4D) 4-core: 5 users; 6-/8-core: 30 users

For example, if you have a 4-core S814 as your primary system with 50 IBM i user entitlements, you can temporarily transfer up to 20 user entitlements to the CBU.

If your primary or CBU machine is sold or discontinued from use, any temporary entitlement transfers must be returned to the machine on which they were originally acquired. For CBU registration and further information, see the IBM Capacity Backup for Power Systems website.

Reliability, Availability, and Serviceability

Reliability, fault tolerance, and data correction

The reliability of systems starts with components, devices, and subsystems that are designed to be highly reliable. During the design and development process, subsystems go through rigorous verification and integration testing processes. During system manufacturing, systems go through a thorough testing process to help ensure the highest level of product quality.

Memory subsystem reliability, availability, and serviceability (RAS)

The memory has error detection and correction circuitry designed such that the failure of any one specific memory module within an ECC word by itself can be corrected absent any other fault.

In addition, a spare DRAM per rank on each memory port provides for dynamic DRAM device replacement during runtime operation. Also, dynamic lane sparing on the DMI link allows for repair of a faulty data lane.

Other memory protection features include retry capabilities for certain faults detected at both the memory controller and the memory buffer. Memory is also periodically scrubbed to allow for soft errors to be corrected and for solid single-cell errors reported to the hypervisor, which supports operating system deallocation of a page associated with a hard single-cell fault.

Mutual surveillance

The service processor monitors the operation of the firmware during the boot process and also monitors the hypervisor for termination. The hypervisor monitors the service processor and reports the service reference code when it detects surveillance loss.

Environmental monitoring functions

The Power Systems family does ambient and over temperature monitoring and reporting.

Availability enhancement functions

The Power Systems family continues to offer and introduce significant enhancements designed to increase system availability.

POWER8 processor functions

As in POWER6, POWER7, and POWER7 +, the POWER8 processor has the ability to do processor instruction retry for some transient errors and alternate processor recovery for a number of core-related faults. This significantly reduces exposure to both hard (logic) and soft (transient) errors in the processor core. Soft failures in the processor core are transient (intermittent) errors, often due to cosmic rays or other sources of radiation, and generally are not repeatable. When an error is encountered in the core, the POWER8 processor will first automatically retry the instruction. If the source of the error was truly transient, the instruction will succeed and the system

will continue as before. On IBM systems prior to POWER6, this error would have caused a checkstop. More than one physical core is required for a fault recovery.

Hard failures are more difficult, being true logical errors that will be replicated each time the instruction is repeated. Retrying the instruction will not help in this situation.

As in POWER6 and POWER7 +, the POWER8 processor includes single processor check stopping for certain faults that cannot be handled by the availability enhancements described in the preceding section. This significantly reduces the probability of any one processor affecting total system availability.

Cache availability

The L2 and L3 caches in the POWER8 processor and L4 cache in the memory buffer chip are protected with double-bit detect, single-bit correct error detection code (ECC). In addition, the L3 cache has the ability to dynamically substitute a spare bit-line for a faulty bit-lane, allowing an entire faulty "column" of cache, impacting multiple cache lines, to be repaired. An ECC uncorrectable error detected in these caches can also trigger a purge and delete of cache lines. This results in no loss of operation if the cache lines contained data unmodified from what was stored in system memory.

Modified data would be handled through Special Uncorrectable Error handling. L1 data and instruction caches also have a retry capability for intermittent errors and a cache set delete mechanism for handling solid failures.

Special Uncorrectable Error handling

Special Uncorrectable Error (SUE) handling prevents an uncorrectable error in memory or cache from immediately causing the system to terminate. Rather, the system tags the data and determines whether it will ever be used again. If the error is irrelevant, it will not force a check stop. If the data is used, termination may be limited to the program/kernel or hypervisor owning the data; or the I/O adapters controlled by an I/O hub controller would freeze if data were transferred to an I/O device.

PCI extended error handling

PCI extended error handling (EEH)-enabled adapters respond to a special data packet generated from the affected PCI slot hardware by calling system firmware, which will examine the affected bus, allow the device driver to reset it, and continue without a system reboot.

Predictive failure and dynamic component deallocation

Servers with Power processors have long had the capability to perform predictive failure analysis on certain critical components such as processors and memory. When these components exhibit certain symptoms that may indicate a failure is imminent, the system can dynamically deallocate and call home, when enabled, about the failing part before the error is propagated system-wide. In many cases, the system will first attempt to reallocate resources in such a way that will avoid unplanned outages. In the event that insufficient resources exist to maintain full system availability, these servers will attempt to maintain partition availability by user-defined priority.

Uncorrectable error recovery

When the auto-restart option is enabled, the system can automatically restart following an unrecoverable software error, hardware failure, or environmentally induced (AC power) failure.

Serviceability

The purpose of serviceability is to efficiently repair the system while attempting to minimize or eliminate impact to system operation. Serviceability includes system

installation, MES (system upgrades/downgrades), and system maintenance/repair. Depending upon the system and warranty contract, service may be performed by the customer, an IBM representative, or an authorized warranty service provider.

The serviceability features delivered in this system provide a highly efficient service environment by incorporating the following attributes:

- Design for Customer Set Up (CSU), Customer Installed Features (CIF), and Customer Replaceable Units (CRU)
- Detection and Fault Isolation (ED/FI)
- First Failure Data Capture (FFDC)
- Light path service indicators:
  - Service labels and service diagrams available on the system and delivered through IBM Knowledge Center
  - Step-by-step service procedures documented in IBM Knowledge Center or available through the Hardware Management Console
  - CRU videos planned to be available on the web at general availability
  - Mobile access to important customer service functions available by scanning a QR label

Service interface

The service interface enables support personnel to communicate with the service support applications in a server using a console, an interface, or a terminal. Delivering a clear, concise view of available service applications, the service interface enables the support team to manage system resources and service information in an efficient and effective way. Applications available through the service interface are carefully configured and placed to give service providers access to important service functions.

Different service interfaces are used, depending on the state of the system, hypervisor, and operating environment. The primary service interfaces are:

- LEDs
- Operator Panel
- Service Processor menu
- Operating system service menu

In the light path LED implementation, the system can clearly identify components for replacement by using specific component-level LEDs, and can also guide the servicer directly to the component by signaling (turning on solid) the amber system fault LED, enclosure fault LED, and component FRU fault LED. The servicer can also use the identify function to blink the FRU-level LED.

First Failure Data Capture and error data analysis

First Failure Data Capture (FFDC) is a technique that helps ensure that when a fault is detected in a system, the root cause of the fault will be captured without the need to re-create the problem or run any sort of extending tracing or diagnostics program. For the vast majority of faults, a good FFDC design means that the root cause can also be detected automatically without servicer intervention.

FFDC information, error data analysis, and fault isolation are necessary to implement the advanced serviceability techniques that enable efficient service of the systems and to help determine the failing items.

In the rare absence of FFDC and Error Data Analysis, diagnostics are required to re-create the failure and determine the failing items.

Diagnostics

General diagnostic objectives are to detect and identify problems so they can be resolved quickly. Elements of IBM's diagnostics strategy include:

- Provide a common error code format equivalent to a system reference code with system reference number, checkpoint, or firmware error code.
- Provide fault detection and problem isolation procedures. Support remote connection ability to be used by the IBM Remote Support Center or IBM Designated Service.
- Provide interactive intelligence within the diagnostics with detailed online failure information while connected to IBM's back-end system.

Automatic diagnostics

Because of the FFDC technology designed into IBM servers, it is not necessary to perform re-create diagnostics for failures or require user intervention. Solid and intermittent errors are designed to be correctly detected and isolated at the time the failure occurs. Runtime and boot-time diagnostics fall into this category.

Concurrent maintenance

The determination of whether a firmware release can be updated concurrently is identified in the readme information file that is released with the firmware. Concurrent maintenance of the Operator Panel is supported through ASMI.

Service labels

Service providers use these labels to assist them in performing maintenance actions. Service labels are found in various formats and positions and are intended to transmit readily available information to the servicer during the repair process. Following are some of these service labels and their purpose:

- Location diagrams: Location diagrams are located on the system hardware, relating information regarding the placement of hardware components. Location diagrams may include location codes, drawings of physical locations, concurrent maintenance status, or other data pertinent to a repair. Location diagrams are especially useful when multiple components such as DIMMs, CPUs, processor books, fans, adapter cards, LEDs, and power supplies are installed.
- Remove/replace procedures: Service labels that contain remove/replace procedures are often found on a cover of the system or in other spots accessible to the servicer. These labels provide systematic procedures, including diagrams, detailing how to remove or replace certain serviceable hardware components.
- Arrows: Numbered arrows are used to indicate the order of operation and the serviceability direction of components. Some serviceable parts such as latches, levers, and touch points need to be pulled or pushed in a certain direction and in a certain order for the mechanical mechanisms to engage or disengage. Arrows generally improve the ease of serviceability.

Packing for service

The following service enhancements are included in the physical packaging of the systems to facilitate service:

- Color coding (touch points): Terracotta-colored touch points indicate that a component (FRU/CRU) can be concurrently maintained. Blue-colored touch points delineate components that are not concurrently maintained -- those that require the system to be turned off for removal or repair.
- Tool-less design: Selected IBM systems support tool-less or simple tool designs. These designs require no tools or simple tools such as flat-head screw drivers to service the hardware components.
- Positive retention: Positive retention mechanisms help to assure proper connections between hardware components such as cables to connectors, and between two cards that attach to each other. Without positive retention, hardware components run the risk of becoming loose during shipping or installation, preventing a good electrical connection. Positive retention mechanisms like latches, levers, thumb-screws, pop Nylatches (U-clips), and

cables are included to help prevent loose connections and aid in installing (seating) parts correctly. These positive retention items do not require tools.

Error handling and reporting

In the event of system hardware or environmentally induced failure, the system runtime error capture capability systematically analyzes the hardware error signature to determine the cause of failure. The analysis result will be stored in system NVRAM. When the system can be successfully restarted either manually or automatically, or if the system continues to operate, the error will be reported to the operating system. Hardware and software failures are recorded in the system log. The Service Processor event log also records unrecoverable checkstop conditions, forwards them to the SFP application, and notifies the system administrator.

The system has the ability to call home through the operating system to report platform recoverable errors and errors associated with PCI adapters or devices.

Service processor

The service processor provides the capability to diagnose, check the status of, and sense the operational conditions of a system. It runs on its own power boundary and does not require resources from a system processor to be operational to perform its tasks.

The service processors menus (ASMI) can be accessed concurrently with system operation, allowing nondisruptive abilities to change system default parameters.

Call home

Call home refers to an automatic or manual call from a customer location to the IBM support structure with error log data, server status, or other service-related information. Call home invokes the service organization in order for the appropriate service action to begin. Call home can be done through Electronic Service Agent™ running on top of the operating system. While configuring call home is optional, clients are encouraged to implement this feature in order to obtain service enhancements such as reduced problem determination and faster and potentially more accurate transmittal of error information. In general, using the call home feature can result in increased system availability. The Electronic Service Agent application can be configured for automated call home. Refer to the next section for specific details on this application.

IBM Electronic Services

Electronic Service Agent and the IBM Electronic Services web portal comprise the IBM Electronic Services solution, which is dedicated to providing fast, exceptional support to IBM customers. IBM Electronic Service Agent is a no-charge tool that proactively monitors and reports hardware events such as system errors, performance issues, and inventory. Electronic Service Agent can help focus on the customer's company business initiatives, save time, and spend less effort managing day-to-day IT maintenance issues.

System configuration and inventory information collected by Electronic Service Agent also can be viewed on the secure Electronic Services web portal and used to improve problem determination and resolution between the customer and the IBM support team. As part of an increased focus to provide even better service to IBM customers, Electronic Service Agent tool configuration and activation comes standard with the system.

Benefits: increased uptime

Electronic Service Agent is designed to enhance the warranty and maintenance service by providing faster hardware error reporting and uploading system information to IBM Support. This can optimize the time monitoring the symptoms, diagnosing the error, and manually calling IBM Support to open a problem record. And 24 x 7 monitoring and reporting means no more dependency on human

intervention or off-hours customer personnel when errors are encountered in the middle of the night.

Security

The Electronic Service Agent tool is designed to be secure in monitoring, reporting, and storing the data at IBM. The Electronic Service Agent tool is designed to securely transmit either through the internet (HTTPS or VPN) or modem to provide customers a single point of exit from their site. Communication is one way. Activating Electronic Service Agent does not enable IBM to call into a customer's system.

For additional information, go to the IBM Electronic Service Agent website.

More accurate reporting

Because system information and error logs are automatically uploaded to the IBM Support Center in conjunction with the service request, customers are not required to find and send system information, decreasing the risk of misreported or misdiagnosed errors. Once inside IBM, problem error data is run through a data knowledge management system and knowledge articles are appended to the problem record.

Customized support

Using the IBMid entered during activation, customers can view system and support information in the "My Systems" and "Premium Search" sections of the Electronic Services website.

The Electronic Services web portal is a single internet entry point that replaces the multiple entry points traditionally used to access IBM internet services and support. This web portal enables you to gain easier access to IBM resources for assistance in resolving technical problems. The newly improved My Systems and Premium Search functions make it even easier for Electronic Service Agent-enabled customers to track system inventory and find pertinent fixes.

My Systems provides valuable reports of installed hardware and software using information collected from the systems by IBM Electronic Service Agent. Reports are available for any system associated with the customer's IBMid. Premium Search combines the function of search and the value of Electronic Service Agent information, providing advanced search of the technical support knowledgebase. Using Premium Search and the Service Agent information that has been collected from the system, customers are able to see search results that apply specifically to their systems.

For more information on how to utilize the power of IBM Electronic Services, see the IBM Electronic Services website or contact an IBM Systems Services Representative.

Accessibility by people with disabilities

A US Section 508 Voluntary Product Accessibility Template (VPAT) containing details on accessibility compliance can be found on the Product accessibility information website.

Product positioning

Power System S812 (8284-21A) server solutions and services, designed for small to midsized businesses, help your business capitalize on new opportunities, manage business risk while meeting high service levels, and keep within tight budget constraints.

This System aims at large deployment for example in retail environments where reliability and security matter. The other segment are small businesses looking for a price attractive alternative that meets their performance requirements to keep

their infrastructure current. The S812 is the entry point into the POWER8 server family. To enable the financial advantage but still meet customer requirements in the mentioned segments this system comes with some limitations versus the current POWER8 scale out systems. There will be only AIX and IBM i operating support available. Currently there is no plan to support Linux™ as the current S812L system covers this segment. The S812 will have no virtualization capabilities. There is an IBM i 1-core system available and a 4-core AIX system. It is not possible to run different operating systems on these systems.

Product number

The following are newly announced features on the specific models of the IBM Power Systems™ 8284 machine type:

Description	Machine type	Model	Feature number
IBM Power System S812	8284	21A	
Mirrored System Disk Level, Specify Code	8284	21A	0040
Device Parity Protection-All, Specify Code	8284	21A	0041
Device Parity RAID-6 All, Specify Code	8284	21A	0047
RISC-to-RISC Data Migration	8284	21A	0205
RAID Hot Spare Specify	8284	21A	0347
Primary OS - IBM i	8284	21A	2145
Sys Console On HMC	8284	21A	5550
System Console-Ethernet LAN adapter	8284	21A	5557
AC Power Supply - 900W	8284	21A	EB2L
Front Bezel for 12-Bays used with #EJ0T BackPlane	8284	21A	EJUD
Front Bezel for 8-Bays used with #EJ0U BackPlane	8284	21A	EJUE
#ESF4 Load Source Specify (571GB HDD SFF-3)	8284	21A	ELT4
#ESFA Load Source Specify (283GB 15K RPM SAS SFF-3 4K Block - 4224)	8284	21A	ELTA
#ES8P Load Source Specify (387GB SFF-3 SSD 4k for IBM i)	8284	21A	ELTP
1-core 3.026 GHz POWER8 Processor	8284	21A	EPXP
4-core 3.026 GHz POWER8 Processor	8284	21A	EPXQ
One Proc Activation for #EPXP	8284	21A	EPYP
One Proc Activation for #EPXQ	8284	21A	EPYQ
One 0 Proc Activate for #EPXP	8284	21A	EPZP
One 0 Proc Activate for #EPXQ	8284	21A	EPZQ
387GB SFF-3 SSD 4k eMLC4 for IBM i	8284	21A	ES8P
571GB 10K RPM SAS SFF-3 Disk Drive 4K Block - 4224	8284	21A	ESF4
283GB 15K RPM SAS SFF-3 4K Block - 4224 Disk Drive	8284	21A	ESFA
283GB 15K RPM SAS SFF-3 Disk 4K Block	8284	21A	ESFG
1-core Express Edition for IBM i	8284	21A	EU2E
RDX USB External Docking Station	8284	21A	EUA4

The following are features already announced for the IBM Power Systems 8284 machine type:

Description	Machine type	Model	Feature number
EMEA Bulk MES Indicator	8284	21A	0004
One CSC Billing Unit	8284	21A	0010
Ten CSC Billing Units	8284	21A	0011
Special Manufacturing Operations Indicator	8284	21A	0098
AIX Partition Specify	8284	21A	0265
IBM i Operating System Partition Specify	8284	21A	0267
V.24/EIA232 6.1m (20-Ft) PCI Cable	8284	21A	0348
V.35 6.1m (20-Ft) PCI Cable	8284	21A	0353

X.21 6.1m (20-Ft) PCI Cable	8284	21A	0359
V.24/EIA232 20-Ft. PCI Cable with M3	8284	21A	0368
CBU Specify	8284	21A	0444
19 inch, 1.8 meter high rack	8284	21A	0551
19 inch, 2.0 meter high rack	8284	21A	0553
Rack Filler Panel Kit	8284	21A	0599
Load Source Not in CEC	8284	21A	0719
SAN Load Source Specify	8284	21A	0837
Modem Cable - Austria	8284	21A	1010
Modem Cable - Belgium	8284	21A	1011
Modem Cable - Africa	8284	21A	1012
Modem Cable - Italy	8284	21A	1014
Modem Cable - France	8284	21A	1015
Modem Cable - Germany	8284	21A	1016
Modem Cable - UK	8284	21A	1017
Modem Cable - Iceland/Sweden	8284	21A	1018
Modem Cable - Fin/Nor	8284	21A	1021
Modem Cable - Netherlands	8284	21A	1022
Modem Cable - Swiss	8284	21A	1023
Modem Cable - Denmark	8284	21A	1024
Modem Cable - US/Canada and General Use	8284	21A	1025
USB 500 GB Removable Disk Drive	8284	21A	1107
Custom Service Specify, Rochester Minn, USA	8284	21A	1140
300GB 15k RPM SAS SFF-2 Disk Drive (AIX/Linux)	8284	21A	1953
600GB 10k RPM SAS SFF-2 Disk Drive (AIX/Linux)	8284	21A	1964
Primary OS - AIX	8284	21A	2146
Factory Deconfiguration of 1-core	8284	21A	2319
2M LC-SC 50 Micron Fiber Converter Cable	8284	21A	2456
2M LC-SC 62.5 Micron Fiber Converter Cable	8284	21A	2459
3M Asynchronous Terminal/Printer Cable EIA-232	8284	21A	2934
Asynchronous Cable EIA-232/V.24 3M	8284	21A	2936
Serial-to-Serial Port Cable for Drawer/Drawer-3.7M	8284	21A	3124
Serial-to-Serial Port Cable for Rack/Rack- 8M	8284	21A	3125
1m, (3.3-ft) IB 40G Copper Cable QSFP/QSFP	8284	21A	3287
3m, (9.8-ft.) IB 40G Copper Cable QSFP/QSFP	8284	21A	3288
5m QDR IB/E'Net Copper Cable QSFP/QSFP	8284	21A	3289
10 meter Quad Data Rate InfiniBand Optical Cable, QSFP/QSFP	8284	21A	3290
30 meter Quad Data Rate InfiniBand Optical Cable, QSFP/QSFP	8284	21A	3293
Widescreen LCD Monitor	8284	21A	3632
SAS Cable (AE) Adapter to Enclosure, single controller/single path 3M	8284	21A	3684
SAS Cable (AE) Adapter to Enclosure, single controller/single path 6M	8284	21A	3685
0.3M Serial Port Converter Cable, 9-Pin to 25-Pin	8284	21A	3925
Serial Port Null Modem Cable, 9-pin to 9-pin, 3.7M	8284	21A	3927
Serial Port Null Modem Cable, 9-pin to 9-pin, 10M	8284	21A	3928
System Serial Port Converter Cable	8284	21A	3930
Extender Cable - USB Keyboards, 1.8M	8284	21A	4256
Rack Integration Services: BP only	8284	21A	4648
Rack Integration Services	8284	21A	4649
One and only one rack indicator feature is required on all orders (#4650 to #4666).			
Rack Indicator- Not Factory Integrated	8284	21A	4650
Rack Indicator, Rack #1	8284	21A	4651
Rack Indicator, Rack #2	8284	21A	4652
Rack Indicator, Rack #3	8284	21A	4653
Rack Indicator, Rack #4	8284	21A	4654
Rack Indicator, Rack #5	8284	21A	4655
Rack Indicator, Rack #6	8284	21A	4656
Rack Indicator, Rack #7	8284	21A	4657
Rack Indicator, Rack #8	8284	21A	4658
Rack Indicator, Rack #9	8284	21A	4659
Rack Indicator, Rack #10	8284	21A	4660
Rack Indicator, Rack #11	8284	21A	4661
Rack Indicator, Rack #12	8284	21A	4662

Rack Indicator, Rack #13	8284	21A	4663
Rack Indicator, Rack #14	8284	21A	4664
Rack Indicator, Rack #15	8284	21A	4665
Rack Indicator, Rack #16	8284	21A	4666
Power Active Memory Expansion Enablement	8284	21A	4793
Software Preload Required	8284	21A	5000
PCIe2 LP 4-port 1GbE Adapter	8284	21A	5260
PCIe LP 8Gb 2-Port Fibre Channel Adapter	8284	21A	5273
PCIe LP 4-Port Async EIA-232 Adapter	8284	21A	5277
SATA Slimline DVD-RAM Drive	8284	21A	5771
Opt Front Door for 1.8m Rack	8284	21A	6068
Opt Front Door for 2.0m Rack	8284	21A	6069
1.8m Rack Acoustic Doors	8284	21A	6248
2.0m Rack Acoustic Doors	8284	21A	6249
1.8m Rack Trim Kit	8284	21A	6263
2.0m Rack Trim Kit	8284	21A	6272
Power Cord 4.3m (14-ft), Drawer to IBM PDU (250V/ 10A)	8284	21A	6458
Power Cord 4.3m (14-ft), Drawer To OEM PDU (125V, 15A)	8284	21A	6460
Power Cord 4.3m (14-ft), Drawer to Wall/OEM PDU (250V/15A) U. S.	8284	21A	6469
Power Cord 1.8m (6-ft), Drawer to Wall (125V/15A)	8284	21A	6470
Power Cord 2.7m (9-ft), Drawer to Wall/OEM PDU (250V/10A)	8284	21A	6471
Power Cord 2.7m (9-ft), Drawer to Wall/OEM PDU (250V/16A)	8284	21A	6472
Power Cord 2.7m (9-ft), Drawer to Wall/OEM PDU (250V/10A)	8284	21A	6473
Power Cord 2.7m (9-ft), Drawer to Wall/OEM PDU, (250V/13A)	8284	21A	6474
Power Cord 2.7m (9-ft), Drawer to Wall/OEM PDU, (250V/16A)	8284	21A	6475
Power Cord 2.7m (9-ft), Drawer to Wall/OEM PDU, (250V/10A)	8284	21A	6476
Power Cord 2.7m (9-ft), Drawer to Wall/OEM PDU, (250V/16A)	8284	21A	6477
Power Cord 2.7 M(9-foot), To Wall/OEM PDU, (250V, 16A)	8284	21A	6478
Power Cord 2.7m (9-ft), Drawer to Wall/OEM PDU, (125V/15A or 250V/10A)	8284	21A	6488
4.3m (14-Ft) 3PH/24A 380-415V Power Cord	8284	21A	6489
4.3m (14-Ft) 1PH/63A 200-240V Power Cord	8284	21A	6491
4.3m (14-Ft) 1PH/48-60A 200-240V Power Cord	8284	21A	6492
Power Cord 2.7m (9-ft), Drawer to Wall/OEM PDU, (250V/10A)	8284	21A	6493
Power Cord 2.7m (9-ft), Drawer to Wall/OEM PDU, (250V/10A)	8284	21A	6494
Power Cord 2.7M (9-foot), To Wall/OEM PDU, (250V, 10A)	8284	21A	6496
Power Cable - Drawer to IBM PDU, 200-240V/10A	8284	21A	6577
Optional Rack Security Kit	8284	21A	6580
Modem Tray for 19-Inch Rack	8284	21A	6586
Power Cord 2.7M (9-foot), To Wall/OEM PDU, (125V, 15A)	8284	21A	6651
4.3m (14-Ft) 3PH/16A 380-415V Power Cord	8284	21A	6653
4.3m (14-Ft) 1PH/24-30A Pwr Cord	8284	21A	6654
4.3m (14-Ft) 1PH/24-30A WR Pwr Cord	8284	21A	6655
4.3m (14-Ft)1PH/24A Power Cord	8284	21A	6656
4.3m (14-Ft) 1PH/32A Power Cord	8284	21A	6657
4.3m (14-Ft) 1PH/24A Pwr Cd-Korea	8284	21A	6658
Power Cord 2.7M (9-foot), To Wall/OEM PDU, (250V, 15A)	8284	21A	6659
Power Cord 4.3m (14-ft), Drawer to Wall/OEM PDU (125V/15A)	8284	21A	6660
Power Cord 2.8m (9.2-ft), Drawer to IBM PDU, (250V/10A)	8284	21A	6665
4.3m (14-Ft) 3PH/32A 380-415V Power Cord-Australia	8284	21A	6667
Power Cord 4.3M (14-foot), Drawer to OEM PDU, (250V, 15A)	8284	21A	6669
Power Cord 2.7M (9-foot), Drawer to IBM PDU, 250V/10A	8284	21A	6671
Power Cord 2M (6.5-foot), Drawer to IBM PDU,			

250V/10A	8284	21A	6672
Power Cord 2.7m (9-ft), Drawer to Wall/OEM PDU, (250V/10A)	8284	21A	6680
Intelligent PDU+, 1 EIA Unit, Universal UTG0247 Connector	8284	21A	7109
Environmental Monitoring Probe	8284	21A	7118
Power Distribution Unit	8284	21A	7188
Power Distribution Unit (US) - 1 EIA Unit, Universal, Fixed Power Cord	8284	21A	7196
USB Mouse	8284	21A	8845
Order Routing Indicator- System Plant	8284	21A	9169
Language Group Specify - US English	8284	21A	9300
New AIX License Core Counter	8284	21A	9440
New IBM i License Core Counter	8284	21A	9441
Other AIX License Core Counter	8284	21A	9444
Other License Core Counter	8284	21A	9449
Month Indicator	8284	21A	9461
Day Indicator	8284	21A	9462
Hour Indicator	8284	21A	9463
Minute Indicator	8284	21A	9464
Qty Indicator	8284	21A	9465
Countable Member Indicator	8284	21A	9466
Language Group Specify - Dutch	8284	21A	9700
Language Group Specify - French	8284	21A	9703
Language Group Specify - German	8284	21A	9704
Language Group Specify - Polish	8284	21A	9705
Language Group Specify - Norwegian	8284	21A	9706
Language Group Specify - Portuguese	8284	21A	9707
Language Group Specify - Spanish	8284	21A	9708
Language Group Specify - Italian	8284	21A	9711
Language Group Specify - Canadian French	8284	21A	9712
Language Group Specify - Japanese	8284	21A	9714
Language Group Specify - Traditional Chinese (Taiwan)	8284	21A	9715
Language Group Specify - Korean	8284	21A	9716
Language Group Specify - Turkish	8284	21A	9718
Language Group Specify - Hungarian	8284	21A	9719
Language Group Specify - Slovakian	8284	21A	9720
Language Group Specify - Russian	8284	21A	9721
Language Group Specify - Simplified Chinese (PRC)	8284	21A	9722
Language Group Specify - Czech	8284	21A	9724
Language Group Specify -- Romanian	8284	21A	9725
Language Group Specify - Croatian	8284	21A	9726
Language Group Specify -- Slovenian	8284	21A	9727
Language Group Specify - Brazilian Portuguese	8284	21A	9728
Language Group Specify - Thai	8284	21A	9729
SP WSU 3Y 24x7 SD	8284	21A	B0UQ
SP HDR/MR POWER 3Y	8284	21A	B0VH
0.5M FDR IB / 40GbE Copper Cable QSFP	8284	21A	EB40
1M FDR IB / 40GbE Copper Cable QSFP	8284	21A	EB41
2M FDR IB / 40GbE Copper Cable QSFP	8284	21A	EB42
IBM i 7.2 Indicator	8284	21A	EB72
IBM i 7.3 Indicator	8284	21A	EB73
Rack Front Door (Black)	8284	21A	EC01
Rack Rear Door	8284	21A	EC02
Rack Side Cover	8284	21A	EC03
Rack Suite Attachment Kit	8284	21A	EC04
Slim Rear Acoustic Door	8284	21A	EC07
Slim Front Acoustic Door	8284	21A	EC08
Rear Door Heat Exchanger for 2.0 Meter Slim Rack	8284	21A	EC15
PCIe2 LP 4-Port USB 3.0 Adapter	8284	21A	EC45
SAS AE1 Cable 4m - HD Narrow 6Gb Adapter to Enclosure	8284	21A	ECBY
SAS YE1 Cable 3m - HD Narrow 6Gb Adapter to Enclosure	8284	21A	ECBZ
System Port Converter Cable for UPS	8284	21A	ECCF
Variable Length, Blue Cat5e Cable	8284	21A	ECCG
Variable Length, Green Cat5e Cable	8284	21A	ECCH
Variable Length, Yellow Cat5e Cable	8284	21A	ECCJ
Variable Length FIBRE SAN CABLE	8284	21A	ECCK
Variable Length DAC QSFP+ TO QSFP+ CABLE	8284	21A	ECCN
3.0M SAS X12 Cable (Two Adapter to Enclosure)	8284	21A	ECDJ
4.5M SAS X12 Active Optical Cable (Two Adapter to Enclosure)	8284	21A	ECDK

10M SAS X12 Active Optical Cable (Two Adapter to Enclosure)	8284	21A	ECDL
1.5M SAS YO12 Cable (Adapter to Enclosure)	8284	21A	ECDT
3.0M SAS YO12 Cable (Adapter to Enclosure)	8284	21A	ECDU
4.5M SAS YO12 Active Optical Cable (Adapter to Enclosure)	8284	21A	ECDV
10M SAS YO12 Active Optical Cable (Adapter to Enclosure)	8284	21A	ECDW
Custom Service Specify, Mexico	8284	21A	ECSM
Custom Service Specify, Poughkeepsie, USA	8284	21A	ECSP
Optical Wrap Plug	8284	21A	ECW0
Boot Drive / Load Source in EXP12SX Specify (in #ESLL or #ELLL)	8284	21A	EHR1
Boot Drive / Load Source in EXP24SX Specify (in #ESLS or #ELLS)	8284	21A	EHR2
SSD Placement Indicator - #ESLS/#ELLS	8284	21A	EHS2
PCIe3 LP RAID SAS Adapter Quad-Port 6Gb x8	8284	21A	EJ0M
Storage Backplane 12 SFF-3 Bays/DVD Bay	8284	21A	EJ0T
Storage Backplane 8 SFF-3 Bays/DVD Bay/Dual IOA with Write Cache	8284	21A	EJ0U
Split #EJ0T to 6+6 SFF-3 Bays: Add 2nd SAS Controller	8284	21A	EJ0V
PCIe3 LP SAS Tape/DVD Adapter Quad-port 6Gb x8	8284	21A	EJ11
PCIe1 LP SAS Tape/DVD Dual-port 3Gb x8 Adapter	8284	21A	EJ1N
Front OEM Bezel for 12-Bay BackPlane	8284	21A	EJT6
Front OEM Bezel for 8-Bay BackPlane	8284	21A	EJT7
Specify Mode-1 & CEC SAS Ports & (2)YO12 for EXP12SX #ESLL/ELLL	8284	21A	EJV0
Specify Mode-1 & (1)EJ0J/EJ0M/EL3B/EL59 & (1)YO12 for EXP12SX #ESLL/ELLL	8284	21A	EJV1
Specify Mode-1 & (2)EJ0J/EJ0M/EL3B/EL59 & (2)YO12 for EXP12SX #ESLL/ELLL	8284	21A	EJV2
Specify Mode-2 & (2)EJ0J/EJ0M/EL3B/EL59 & (2)X12 for EXP12SX #ESLL/ELLL	8284	21A	EJV3
Specify Mode-2 & (4)EJ0J/EJ0M/EL3B/EL59 & (2)X12 for EXP12SX #ESLL/ELLL	8284	21A	EJV4
Specify Mode-4 & (4)EJ0J/EJ0M/EL3B/EL59 & (2)X12 for EXP12SX #ESLL/ELLL	8284	21A	EJV5
Specify Mode-2 & (1)EJ0J/EJ0M/EL3B/EL59 & (2)YO12 for EXP12SX #ESLL/ELLL	8284	21A	EJV6
Specify Mode-2 & (2)EJ0J/EJ0M/EL3B/EL59 & (2)YO12 for EXP12SX #ESLL/ELLL	8284	21A	EJV7
Specify Mode-2 & (1)EJ0J/EJ0M/EL3B/EL59 & (1)YO12 for EXP12SX #ESLL/ELLL	8284	21A	EJVA
Specify Mode-2 & (2)EJ0J/EJ0M/EL3B/EL59 & (1)X12 for EXP12SX #ESLL/ELLL	8284	21A	EJVB
Specify Mode-4 & (1)EJ0J/EJ0M/EL3B/EL59 & (1)X12 for EXP12SX #ESLL/ELLL	8284	21A	EJVC
Specify Mode-4 & (2)EJ0J/EJ0M/EL3B/EL59 & (1)X12 for EXP12SX #ESLL/ELLL	8284	21A	EJVD
Specify Mode-4 & (3)EJ0J/EJ0M/EL3B/EL59 & (2)X12 for EXP12SX #ESLL/ELLL	8284	21A	EJVE
Specify Mode-1 & CEC SAS Ports & (2)YO12 for EXP24SX #ESLS/ELS	8284	21A	EJW0
Specify Mode-1 & (1)EJ0J/EJ0M/EL3B/EL59 & (1)YO12 for EXP24SX #ESLS/ELLS	8284	21A	EJW1
Specify Mode-1 & (2)EJ0J/EJ0M/EL3B/EL59 & (2)YO12 for EXP24SX #ESLS/ELLS	8284	21A	EJW2
Specify Mode-2 & (2)EJ0J/EJ0M/EL3B/EL59 & (2)X12 for EXP24SX #ESLS/ELLS	8284	21A	EJW3
Specify Mode-2 & (4)EJ0J/EJ0M/EL3B/EL59 & (2)X12 for EXP24SX #ESLS/ELLS	8284	21A	EJW4
Specify Mode-4 & (4)EJ0J/EJ0M/EL3B/EL59 & (2)X12 for EXP24SX #ESLS/ELLS	8284	21A	EJW5
Specify Mode-2 & (1)EJ0J/EJ0M/EL3B/EL59 & (2)YO12 for EXP24SX #ESLS/ELLS	8284	21A	EJW6
Specify Mode-2 & (2)EJ0J/EJ0M/EL3B/EL59 & (2)YO12 for EXP24SX #ESLS/ELLS	8284	21A	EJW7
Specify Mode-2 & (1)EJ0J/EJ0M/EL3B/EL59 & (1)YO12 for EXP24SX #ESLS/ELLS	8284	21A	EJWA
Specify Mode-2 & (2)EJ0J/EJ0M/EL3B/EL59 & (1)X12 for EXP24SX #ESLS/ELLS	8284	21A	EJWB
Specify Mode-4 & (1)EJ0J/EJ0M/EL3B/EL59 & (1)X12			

for EXP24SX #ESLS/ELLS	8284	21A	EJWC
Specify Mode-4 & (2)EJ0J/EJ0M/EL3B/EL59 & (1)X12 for EXP24SX #ESLS/ELLS	8284	21A	EJWD
Specify Mode-4 & (3)EJ0J/EJ0M/EL3B/EL59 & (2)X12 for EXP24SX #ESLS/ELLS	8284	21A	EJWE
Full Width Keyboard -- USB, US English, #103P	8284	21A	EK51
Full Width Keyboard -- USB, French, #189	8284	21A	EK52
Full Width Keyboard -- USB, Italian, #142	8284	21A	EK53
Full Width Keyboard -- USB, German/Austrian, #129	8284	21A	EK54
Full Width Keyboard -- USB, UK English, #166P	8284	21A	EK55
Full Width Keyboard -- USB, Spanish, #172	8284	21A	EK56
Full Width Keyboard -- USB, Japanese, #194	8284	21A	EK57
Full Width Keyboard -- USB, Brazilian Portuguese, #275	8284	21A	EK58
Full Width Keyboard -- USB, Hungarian, #208	8284	21A	EK59
Full Width Keyboard -- USB, Korean, #413	8284	21A	EK60
Full Width Keyboard -- USB, Chinese, #467	8284	21A	EK61
Full Width Keyboard -- USB, French Canadian, #445	8284	21A	EK62
Full Width Keyboard -- USB, Belgian/UK, #120	8284	21A	EK64
Full Width Keyboard -- USB, Swedish/Finnish, #153	8284	21A	EK65
Full Width Keyboard -- USB, Danish, #159	8284	21A	EK66
Full Width Keyboard -- USB, Bulgarian, #442	8284	21A	EK67
Full Width Keyboard -- USB, Swiss/French/German, #150	8284	21A	EK68
Full Width Keyboard -- USB, Norwegian,#155	8284	21A	EK69
Full Width Keyboard -- USB, Dutch, #143	8284	21A	EK70
Full Width Keyboard -- USB, Portuguese, #163	8284	21A	EK71
Full Width Keyboard -- USB, Greek, #319	8284	21A	EK72
Full Width Keyboard -- USB, Hebrew, #212	8284	21A	EK73
Full Width Keyboard -- USB, Polish, #214	8284	21A	EK74
Full Width Keyboard -- USB, Slovakian, #245	8284	21A	EK75
Full Width Keyboard -- USB, Czech, #243	8284	21A	EK76
Full Width Keyboard -- USB, Turkish, #179	8284	21A	EK77
Full Width Keyboard -- USB, LA Spanish, #171	8284	21A	EK78
Full Width Keyboard -- USB, Arabic, #253	8284	21A	EK79
Full Width Keyboard -- USB, Thai, #191	8284	21A	EK80
Full Width Keyboard -- USB, Russian, #443	8284	21A	EK81
Full Width Keyboard -- USB, Slovenian, #234	8284	21A	EK82
Full Width Keyboard -- USB, US English Euro, #103P	8284	21A	EK83
PDU Access Cord 0.38m	8284	21A	ELC0
16 GB DDR4 Memory	8284	21A	EM96
32 GB DDR4 Memory	8284	21A	EM97
1m (3.3-ft), 10Gb E'Net Cable SFP+ Act Twinax Copper	8284	21A	EN01
3m (9.8-ft), 10Gb E'Net Cable SFP+ Act Twinax Copper	8284	21A	EN02
5m (16.4-ft), 10Gb E'Net Cable SFP+ Act Twinax Copper	8284	21A	EN03
PCIe3 LP 16Gb 2-port Fibre Channel Adapter	8284	21A	EN0B
PCIe2 LP 8Gb 2-Port Fibre Channel Adapter	8284	21A	EN0F
PCIe2 LP 4-Port (10Gb+1GbE) SR+RJ45 Adapter	8284	21A	EN0T
PCIe2 LP 4-port (10Gb+1GbE) Copper SFP+RJ45 Adapter	8284	21A	EN0V
PCIe2 LP 2-port 10/1GbE BaseT RJ45 Adapter	8284	21A	EN0X
Horizontal PDU Mounting Hardware	8284	21A	EPTH
High Function 9xC19 PDU: Switched, Monitoring	8284	21A	EPTJ
High Function 9xC19 PDU 3-Phase: Switched, Monitoring	8284	21A	EPTL
High Function 12xC13 PDU: Switched, Monitoring	8284	21A	EPTN
High Function 12xC13 PDU 3-Phase: Switched, Monitoring	8284	21A	EPTQ
42U Slim Rack	8284	21A	ER05
Bulk Packaging Request ID	8284	21A	ERB0
Bulk Packaging IDr #1	8284	21A	ERB1
Bulk Packaging ID #2	8284	21A	ERB2
Bulk Packaging ID #3	8284	21A	ERB3
Bulk Packaging ID #4	8284	21A	ERB4
Bulk Packaging ID #5	8284	21A	ERB5
Bulk Packaging ID #6	8284	21A	ERB6
Bulk Packaging ID #7	8284	21A	ERB7
Bulk Packaging ID #8	8284	21A	ERB8
Bulk Packaging ID #9	8284	21A	ERB9
Bulk Packaging ID #10	8284	21A	ERBA

Bulk Packaging ID #11	8284	21A	ERBB
Bulk Packaging ID #12	8284	21A	ERBC
Bulk Packaging ID #13	8284	21A	ERBD
Bulk Packaging ID #14	8284	21A	ERBE
Bulk Packaging ID #15	8284	21A	ERBF
Bulk Packaging ID #16	8284	21A	ERBG
Bulk Packaging ID #17	8284	21A	ERBH
Bulk Packaging ID #18	8284	21A	ERBJ
Bulk Packaging ID #19	8284	21A	ERBK
Bulk Packaging ID #20	8284	21A	ERBL
No Bulk Packaging Specify	8284	21A	ERBZ
RFID Tags for Servers, Compute Nodes, Chassis, Racks, and HMCs	8284	21A	ERF1
Rear rack extension	8284	21A	ERG0
3.86-4.0 TB 7200 RPM 4K SAS LFF-1 Nearline Disk Drive (AIX/Linux)	8284	21A	ES62
7.72-8.0 TB 7200 RPM 4K SAS LFF-1 Nearline Disk Drive (AIX/Linux)	8284	21A	ES64
387GB SFF-2 SSD 5xx eMLC4 for AIX/Linux	8284	21A	ES78
775GB SFF-2 SSD 5xx eMLC4 for AIX/Linux	8284	21A	ES7E
387GB SFF-3 SSD 5xx eMLC4 for AIX/Linux	8284	21A	ES7K
775GB SFF-3 SSD 5xx eMLC4 for AIX/Linux	8284	21A	ES7P
1.9TB Read Intensive SAS 4k SFF-2 SSD for AIX/ Linux	8284	21A	ES80
387GB SFF-2 SSD 4k eMLC4 for AIX/Linux	8284	21A	ES85
775GB SFF-2 SSD 4k eMLC4 for AIX/Linux	8284	21A	ES8C
1.9TB Read Intensive SAS 4k SFF-3 SSD for AIX/ Linux	8284	21A	ES8J
387GB SFF-3 SSD 4k eMLC4 for AIX/Linux	8284	21A	ES8N
775GB SFF-3 SSD 4k eMLC4 for AIX/Linux	8284	21A	ES8Q
1.55TB SFF-3 SSD 4k eMLC4 for AIX/Linux	8284	21A	ES8V
S&H - No Charge	8284	21A	ESC0
S&H-a	8284	21A	ESC5
600GB 10K RPM SAS SFF-3 Disk Drive (AIX/Linux)	8284	21A	ESD5
1.2TB 10K RPM SAS SFF-3 Disk Drive (AIX/Linux)	8284	21A	ESD9
300GB 15K RPM SAS SFF-3 Disk Drive (AIX/Linux)	8284	21A	ESDB
600GB 15k RPM SAS SFF-3 Disk Drive - 5xx Block (Aix/Linux)	8284	21A	ESDF
600GB 10K RPM SAS SFF-2 Disk Drive 4K Block - 4096	8284	21A	ESEV
300GB 15K RPM SAS SFF-2 4K Block - 4096 Disk Drive	8284	21A	ESEZ
1.2TB 10K RPM SAS SFF-2 Disk Drive 4K Block - 4096	8284	21A	ESF3
600GB 10K RPM SAS SFF-3 Disk Drive 4K Block - 4096	8284	21A	ESF5
1.2TB 10K RPM SAS SFF-3 Disk Drive 4K Block - 4096	8284	21A	ESF9
300GB 15K RPM SAS SFF-3 4K Block - 4096 Disk Drive	8284	21A	ESFB
600GB 15K RPM SAS SFF-3 4K Block - 4096 Disk Drive	8284	21A	ESFF
600GB 15K RPM SAS SFF-2 4K Block - 4096 Disk Drive	8284	21A	ESFP
1.8TB 10K RPM SAS SFF-2 Disk Drive 4K Block - 4096	8284	21A	ESFT
1.8TB 10K RPM SAS SFF-3 Disk Drive 4K Block - 4096	8284	21A	ESFV
Specify AC Power Supply for EXP12SX/EXP24SX Storage Enclosure	8284	21A	ESLA
EXP12SX SAS Storage Enclosure	8284	21A	ESLL
EXP24SX SAS Storage Enclosure	8284	21A	ESLS
1TB Removable Disk Drive Cartridge	8284	21A	EU01
RDX USB External Docking Station for Removable Disk Cartridge	8284	21A	EU04
RDX 320 GB Removable Disk Drive	8284	21A	EU08
1.5TB Removable Disk Drive Cartridge	8284	21A	EU15
Cable Ties & Labels	8284	21A	EU19
Order Placed Indicator	8284	21A	EU29
2TB Removable Disk Drive Cartridge (RDX)	8284	21A	EU2T
Core Use HW Feature	8284	21A	EUC6
Core Use HW Feature 10X	8284	21A	EUC7

Publications

IBM Power Systems hardware documentation provides you with the following topical information:

- Licenses, notices, safety, and warranty information
- Planning for the system
- Installing and configuring the system
- Troubleshooting, service, and support
- Installing, configuring, and managing consoles, terminals, and interfaces
- Installing operating systems
- Creating a virtual computing environment
- Enclosures and expansion units
- Glossary

IBM Knowledge Center provides access to the PurePower System™ Solution documentation at the POWER8 systems information web page.

Product documentation is also available on DVD (SK5T-7087).

The following information is shipped with the 8284-21A:

- Power Hardware Information DVD (SK5T-7087)
- Installing the 8284-21A
- Important Notices
- Warranty Information
- License Agreement for Machine Code

For hardware documentation such as installation instructions, user's information, and service information, available to download or view, go to the IBM support website.

You can access AIX documentation by going to IBM Knowledge Center.

IBM Knowledge Center provides you with a single point of reference where you can access product documentation for IBM systems hardware, operating systems, and server software. Through a consistent framework, you can efficiently find information and personalize your access by going to IBM Knowledge Center for all your product information needs.

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Services

Global Technology Services

IBM services include business consulting, outsourcing, hosting services, applications, and other technology management.

These services help you learn about, plan, install, manage, or optimize your IT infrastructure to be an on-demand business. They can help you integrate your high-

speed networks, storage systems, application servers, wireless protocols, and an array of platforms, middleware, and communications software for IBM and many non-IBM offerings. IBM is your one-stop shop for IT support needs.

For details on available services, contact your IBM representative or go to the IBM Global Technology Services(R) website.

For details on available IBM Business Continuity and Recovery Services, contact your IBM representative or go to the Resiliency Services website.

Details on education offerings related to specific products can be found on the IBM authorized training website.

Technical information

Specified operating environment

Physical specifications

- Width: 443 mm (17.5 in.)
- Depth: 755 mm (29.7 in.)
- Height: 87 mm (3.5 in.)
- Weight: 28.6 kg (63 lb)

To assure installability and serviceability in non-IBM industry-standard racks, review the installation planning information for any product-specific installation requirements.

Operating environment

- Temperature: (nonoperating) 5° - 45°C (41° - 113°F); recommended temperature (operating) 18° - 27°C (64° - 80°F); allowable operating temperature 5°- 35°C (41°- 95°F)
- Relative humidity: Nonoperating 8% - 80%; recommended 5.5°C (42°F) dew point to 60% RH and 15°C (59°F) dew point
- Maximum dew point: 28°C (84°F)(operating)
- Operating voltage: 900W PSU: 100 - 127 V AC or 200 - 240 V AC
- Operating frequency: 47/63 Hz
- Maximum measured power consumption: 1,225 watts (maximum)
- Power factor: 0.98
- Thermal output: 4,180 Btu/hour (maximum)
- Power-source loading
  - 1.88 kVa (maximum configuration)
  - Maximum altitude: 3,050 m (10,000 ft)

  Note: The maximum measured value is the worst case power consumption expected from a fully populated server under an intensive workload. The maximum measured value also accounts for component tolerance and non-ideal operating conditions. Power consumption and heat load vary greatly by server configuration and utilization. The IBM Systems Energy Estimator website should be used to obtain a heat output estimate based on a specific configuration

Noise level and sound power

- Rack-mount system: 6.7 bels operating; 6.7 bels idling

EMC conformance classification

This equipment is subject to FCC rules and shall comply with the appropriate FCC rules before final delivery to the buyer or centers of distribution.

- US: FCC Class A
- Europe: CISPR 22 Class A
- Japan: VCCI-A
- Korea: Korean Requirement Class A
- China: People's Republic of China commodity inspection law Class A

Homologation - Telecom environmental testing (Safety and EMC)

Homologation approval for specific countries has been initiated with the IBM Homologation and Type Approval (HT&A) organization in LaGaude, France. This Power Systems model and applicable features meet the environmental testing requirements of the country telecom and have been designed and tested in compliance with the Full Quality Assurance Approval (FQAA) process as delivered by the British Approval Board for Telecom (BABT), the UK Telecom regulatory authority.

This product is not certified for connection by any means whatsoever to interfaces of public telecommunications networks. Certification may be required by law prior to making any such connection. Contact an IBM representative or reseller for any questions.

Product safety/Country testing/Certification

- UL 60950 Underwriters Laboratory, Safety Information
- CSA C22.2 No. 60950-00, Canadian Standards Association
- EN60950 European Norm
- IEC 60950, Edition 1, International Electrotechnical Commission, Safety Information
- Nordic deviations to IEC 60950-1 1st Edition

General requirements:

The product is in compliance with IBM Corporate Bulletin C-B 0-2594-000 Statement of Conformity of IBM Product to External Standard (Suppliers Declaration).

Homologation

This product is not certified for direct connection by any means whatsoever to interfaces of public telecommunications networks. Certification may be required by law prior to making any such connection. Contact an IBM representative or reseller for any questions.

Software requirements

The Power S812 supports:

- FW 860.20 and above
- IBM i 7.3 TR2, or later, and IBM i 7.2 TR6, or later, with a maximum of 25 IBM i user entitlements
- AIX levels supported for any I/O configuration (no VIOS):
  - AIX Version 7.2 with the 7200-01 Technology Level and Service Pack 1, or later
  - AIX Version 7.2 with the 7200-00 Technology Level and Service Pack 1, or later
  - AIX Version 7.1 with the 7100-04 Technology Level and Service Pack 1, or later
  - AIX Version 7.1 with the 7100-03 Technology Level and Service Pack 3, with APAR IV56367, or later
  - AIX Version 7.1 with the 7100-02 Technology Level and Service Pack 5, or later
  - AIX Version 7.1 with the 7100-01 Technology Level and Service Pack 10, or later

- AIX Version 6.1 with the 6100-09 Technology Level and Service Pack 3, with APAR IV56366, or later
- AIX Version 6.1 with the 6100-08 Technology Level and Service Pack 5, or later
- AIX Version 6.1 with the 6100-07 Technology Level and Service Pack 10, or later

Limitations

- The integrated system ports are supported for modem and asynchronous terminal connections by AIX. Any other application using serial ports requires a serial port adapter to be installed in a PCI slot. The integrated system ports do not support HACMP™ configurations.
- The Power S812 is designed for simplicity and cost effectiveness and thus has a number of limitations compared to the Power S822 or Power S814 server:
  - There is a maximum of one partition.
  - There is no virtualization of processors, memory, or I/O (no VIOS).
  - The 1-core server runs i and does not run AIX.
  - The 4-core server runs AIX and does not run i.
  - PCIe Gen3 I/O Expansion Drawers are not supported.
  - Older SAS expansion drawers such as the EXP24S (#5887) and earlier are not supported.
- Specific 1-core Power S812 hardware rules:
  - A maximum of 64 GB memory.
  - A maximum of eight SAS bays supported.
  - Zero SAS expansion drawers supported.
  - Only 4k disk and 4k SSD options: 387 GB SSD, 600 GB 10k, and 283 GB 15k.
  - A maximum of 25 IBM i users
- Specific 4-core Power S812 hardware rules:
  - A maximum of 128 GB memory.
  - A maximum of three SAS expansion drawers (EXP24SX or EXP12SX).

Planning information

Cable orders

No additional cables are required.

Security, auditability, and control

This product uses the security and auditability features of host software and application software.

The customer is responsible for evaluation, selection, and implementation of security features, administrative procedures, and appropriate controls in application systems and communications facilities.

Global Technology Services

Contact your IBM representative for the list of selected services available in your country, either as standard or customized offerings, for the efficient installation, implementation, and integration of this product.

IBM Electronic Services

IBM has transformed its delivery of hardware and software support services to help you achieve higher system availability. Electronic Services is a web-enabled solution that offers an exclusive, no-additional-charge enhancement to the service and support available for IBM servers. These services are designed to provide the opportunity for greater system availability with faster problem resolution and preemptive monitoring. Electronic Services comprises two separate, but complementary, elements: Electronic Services news page and Electronic Services Agent.

The Electronic Services news page is a single internet entry point that replaces the multiple entry points traditionally used to access IBM Internet services and support. The news page enables you to gain easier access to IBM resources for assistance in resolving technical problems.

The Electronic Service Agent™ is no-additional-charge software that resides on your server. It monitors events and transmits system inventory information to IBM on a periodic, client-defined timetable. The Electronic Service Agent automatically reports hardware problems to IBM. Early knowledge about potential problems enables IBM to deliver proactive service that may result in higher system availability and performance. In addition, information collected through the Service Agent is made available to IBM service support representatives when they help answer your questions or diagnose problems. Installation and use of IBM Electronic Service Agent for problem reporting enables IBM to provide better support and service for your IBM server.

To learn how Electronic Services can work for you, go to the IBM Electronic Support website.

Terms and conditions

Volume orders

Contact your IBM representative.

Products - terms and conditions

Warranty period

Three years.

An IBM part or feature installed during the initial installation of an IBM machine is subject to a full warranty effective on the date of installation of the machine. An IBM part or feature that replaces a previously installed part or feature assumes the remainder of the warranty period for the replaced part or feature. An IBM part or feature added to a machine without replacing a previously installed part or feature is subject to a full warranty effective on its date of installation. Unless specified otherwise, the warranty period, type of warranty service, and service level of a part or feature are the same as those for the machine in which it is installed.

Warranty services

If required, IBM provides repair or exchange service depending on the types of warranty service specified for the machine. IBM will attempt to resolve your problem over the telephone, or electronically via an IBM website. You must follow the problem determination and resolution procedures that IBM specifies. Scheduling of service will depend the time of your call and is subject to parts availability. If applicable to your product, parts considered Customer Replaceable Units (CRUs) will be provided as part of the machine's standard warranty service.

Service levels are response-time objectives and are not guaranteed. The specified level of warranty service may not be available in all worldwide locations. Additional charges may apply outside IBM's normal service area. Contact your local IBM representative or your reseller for country-specific and location-specific information.

CRU Service

IBM provides replacement CRUs to you for you to install. CRU information and replacement instructions are shipped with your machine and are available from IBM upon your request. CRUs are designated as being either a Tier 1 (mandatory) or a Tier 2 (optional) CRU.

Tier 1 CRU

Installation of Tier 1 CRUs is your responsibility. If IBM installs a Tier 1 CRU at your request, you will be charged for the installation.

Tier 2 CRU

You may install a Tier 2 CRU yourself or request IBM to install it, at no additional charge.

Based upon availability, CRUs will be shipped for next-business-day (NBD) delivery. IBM specifies, in the materials shipped with are placement CRU, whether a defective CRU must be returned to IBM. When return is required, return instructions and a container are shipped with the replacement CRU. You may be charged for the replacement CRU if IBM does not receive the defective CRU within 15 days of your receipt of the replacement.

The following parts have been designated as Tier 1 CRUs:

- DASD SFF Drive
- DASD SSD Drive
- DVD Drive
- Fan
- Fan Cage
- All PCI Adapters
- Base SAS Card
- High-Function RAID Card Cable
- Memory DIMMs
- Native USB Serial Card
- Operator Panel
- Operator Panel Cable
- Power Supply
- Line/power cord
- Keyboard
- Mouse
- External cables
- Power Bus Signal Cable
- Display
- Time of Day (TOD) Battery

On-site Service

IBM will repair the failing machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM machine. The area must be clean, well-lit, and suitable for the purpose.

Service level is:

- IBM onsite Repair Limited, 9 hours per day, Monday through Friday, excluding public or national holidays, next-business-day response, Latest Call Registration 15:00.

Additional reference for Europe

For additional information, see the *Operational Guide* and *Service Level References* found on the IBM Maintenance and Technical Support Services website.

Advanced Part Exchange warranty service

Advanced Part Exchange warranty service allows you to order and track replacement parts directly under Customer Replaceable Unit or Parts Only Service following procedures that are provided by IBM. Replacement parts are shipped to your location for you to install. IBM will use commercially reasonable delivery methods to ship the replacement part for NBD delivery. Advanced Part Exchange warranty service is not available in all countries. You must be approved and registered to use this service. Contact your IBM representative or your reseller for further information.

Non-IBM parts service

Warranty service

IBM is now shipping machines with selected non-IBM parts that contain an IBM field replaceable unit (FRU) part number label. These parts are to be serviced during the IBM machine warranty period. IBM is covering the service on these selected non-IBM parts as an accommodation to their customers, and normal warranty service procedures for the IBM machine apply.

International Warranty Service

International Warranty Service allows you to relocate any machine that is eligible for International Warranty Service and receive continued warranty service in any country where the IBM machine is serviced. If you move your machine to a different country, you are required to report the machine information to your Business Partner or IBM representative.

The warranty service type and the service level provided in the servicing country may be different from that provided in the country in which the machine was purchased. Warranty service will be provided with the prevailing warranty service type and service level available for the eligible machine type in the servicing country, and the warranty period observed will be that of the country in which the machine was purchased.

The following types of information can be found on the International Warranty Service website

- Machine warranty entitlement and eligibility
- Directory of contacts by country with technical support contact information
- Announcement Letters

Warranty service upgrades

During the warranty period, warranty service upgrades provide an enhanced level of On-site Service for an additional charge. A warranty service upgrade must be purchased during the warranty period and is for a fixed term (duration). It is not refundable or transferable and may not be prorated. If required, IBM will provide the warranty service upgrade enhanced level of On-Site Service acquired by the customer. Service levels are response-time objectives and are not guaranteed. See the Warranty services section for additional details.

IBM will attempt to resolve your problem over the telephone or electronically by access to an IBM website. Certain machines contain remote support capabilities for direct problem reporting, remote problem determination, and resolution with IBM. You must follow the problem determination and resolution procedures that IBM specifies. Following problem determination, if IBM determines on-site service

is required, scheduling of service will depend upon the time of your call, machine technology and redundancy, and availability of parts.

On-site Service

IBM will repair the failing machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM machine. The area must be clean, well-lit, and suitable for the purpose. The following on-site response-time objectives are available as warranty service upgrades for your machine.

The service level is:

- IBM On-site Repair, Same-Business-Day, On-site Response Time, Latest Call Registration 12:00, 9 hours per day, Monday through Friday, excluding public or national holidays
- IBM On-site Repair, Same-Business-Day, On-site Response Time, Latest Call Registration 18:00, 18 hours per day, Monday through Saturday, excluding public or national holidays
- IBM On-site Repair, Same-Business-Day, 6 hours average On-site Response Time, 24 hours per day, Monday through Sunday, 365 days a year

Customer Replaceable Units (CRUs) may be provided as part of the machine's standard warranty CRU Service except that you may install a CRU yourself or request IBM installation, at no additional charge, under the CRU and On-site Service level specified above. For additional information on the CRU Service, see the warranty information.

Maintenance service options

Maintenance services

If required, IBM provides repair or exchange service depending on the types of maintenance service specified for the machine. IBM will attempt to resolve your problem over the telephone or electronically, via an IBM website. Certain machines contain remote support capabilities for direct problem reporting, remote problem determination, and resolution with IBM. You must follow the problem determination and resolution procedures that IBM specifies. Scheduling of service will depend upon the time of your call and is subject to parts availability. Service levels are response-time objectives and are not guaranteed. The specified level of maintenance service may not be available in all worldwide locations. Additional charges may apply outside IBM's normal service area. Contact your local IBM representative or your reseller for country-specific and location-specific information. The following service selections are available as maintenance options for your machine type.

On-site Service: IBM will repair the failing machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM machine. The area must be clean, well-lit, and suitable for the purpose.

Service levels are:

- IBM On-site Repair Limited, Next-Business-Day, On-site Response Time, Latest Call Registration 15:00, 9 hours per day, Monday through Friday, excluding public or national holidays
- IBM On-site Repair, Next-Business-Day, On-site Response Time, 9 hours per day, Latest Call Registration 15:00, Monday through Friday, excluding public or national holidays
- IBM On-site Repair, Same-Business-Day, On-site Response Time, Latest Call Registration 12:00, 9 hours per day, Monday through Friday, excluding public or national holidays
- IBM On-site Repair, Same-Business-Day, 6 hours average, On-site Response Time, 24 hours per day, Monday through Sunday, 365 days a year

- ESA and SSU customers: 2-hour coverage extension at no additional charge

Customer Replaceable Unit (CRU) Service: If your problem can be resolved with a CRU (for example, keyboard, mouse, speaker, memory, or hard disk drive), and depending upon the maintenance service offerings in your geography, IBM will ship the replacement CRU to you for you to install. CRU information and replacement instructions are shipped with your machine and are available from IBM upon your request.

Based upon availability, CRUs will be shipped for next-business-day delivery. IBM specifies, in the materials shipped with a replacement CRU, whether a defective CRU must be returned to IBM. When return is required, 1) return instructions and a container are shipped with the replacement CRU, and 2) you may be charged for the replacement CRU if IBM does not receive the defective CRU within 15 days of your receipt of the replacement.

CRUs are designated as being either a Tier 1 (mandatory) or a Tier 2 (optional) CRU.

Tier 1 (mandatory) CRUs: Installation of Tier 1 CRUs, as specified in this announcement, is your responsibility. If IBM installs a Tier 1 CRU at your request, you will be charged for the installation.

For machines with On-site Same-day Response Service, IBM will replace a Tier 1 CRU part at your request, at no additional charge.

Tier 2 (optional) CRUs: You may install a Tier 2 CRU yourself or request IBM to install it, at no additional charge.

The following parts have been designated as Tier 1 CRUs:

- DASD SFF Drive
- DASD SSD Drive
- DVD Drive
- Fan
- Fan Cage
- All PCI Adapters
- Base SAS Card
- High-Function RAID Card Cable
- Memory DIMMs
- Native USB Serial Card
- Operator Panel
- Operator Panel Cable
- Power Supply
- Line/power cord
- Keyboard
- Mouse
- External cables
- Power Bus Signal Cable
- Display
- Time of Day (TOD) Battery

Model and feature numbers for which there is a maintenance charge:

Machine type-model	Feature number
8284-21A	-
8286-21A	0551

Machine type-model	Feature number
8286-21A	0553
8286-21A	EC15
8286-21A	EPXP
8286-21A	EPXQ
8286-21A	ER05
8286-21A	ES78
8286-21A	ES7E
8286-21A	ES7K
8286-21A	ES7P
8286-21A	ES80
8286-21A	ES85
8286-21A	ES8C
8286-21A	ES8J
8286-21A	ES8N
8286-21A	ES8P
8286-21A	ES8Q
8286-21A	ES8V
8286-21A	ESLL
8286-21A	ESLS

Non-IBM parts service

Under certain conditions, IBM provides services for selected non-IBM parts at no additional charge for machines that are covered under warranty service upgrades or maintenance services.

This service includes hardware problem determination (PD) on the non-IBM parts (for example, adapter cards, PCMCIA cards, disk drives, memory) installed within IBM machines and provides the labor to replace the failing parts at no additional charge.

If IBM has a Technical Service Agreement with the manufacturer of the failing part, or if the failing part is an accommodations part (a part with an IBM FRU label), IBM may also source and replace the failing part at no additional charge. For all other non-IBM parts, customers are responsible for sourcing the parts. Installation labor is provided at no additional charge, if the machine is covered under a warranty service upgrade or a maintenance service.

Usage plan machine

No

IBM hourly service rate classification

Three

When a type of service involves the exchange of a machine part, the replacement may not be new, but will be in good working order.

Maintenance service offerings

This machine is eligible under terms and conditions of IBM ServiceElite, the IBM Enterprise Service Agreement (ESA), or the IBM Maintenance Agreement. Consult your IBM representative for details.

General terms and conditions

Field-installable features

Yes

Model conversions

No

Machine installation

Customer setup. Customers are responsible for installation according to the instructions IBM provides with the machine.

Graduated program license charges apply

Yes

The applicable processor group is: Small.

Licensed Machine Code

IBM Machine Code is licensed for use by a customer on the IBM machine for which it was provided by IBM under the terms and conditions of the IBM License Agreement for Machine Code, to enable the machine to function in accordance with its specifications, and only for the capacity authorized by IBM and acquired by the customer. You can obtain the agreement by contacting your IBM representative. It can also be found on the License Agreement for Machine Code and Licensed Internal Code website.

Machine using LMC Type Model: 8284-21A

Access to Machine Code updates is conditioned on entitlement and license validation in accordance with IBM policy and practice. IBM may verify entitlement through customer number, serial number, electronic restrictions, or any other means or methods employed by IBM in its discretion.

If the machine does not function as warranted and your problem can be resolved through your application of downloadable Machine Code, you are responsible for downloading and installing these designated Machine Code changes as IBM specifies. If you would prefer, you may request IBM to install downloadable Machine Code changes; however, you may be charged for that service.

Machine Code License Acceptance Requirement

C.) Acceptance-By-Use Machine: No, the LIC license requires signed acceptance by the machine's end user directly with IBM, applicable to orders for a new machine, machine type conversion MES, and to machines transferred to another user.

Prices

For all local charges, contact your IBM representative.

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IBM Directory of worldwide contacts

Corrections

(Corrected on February 24, 2017)

Revised Overview and Description sections with information about rear USB 3.0 ports.