

Power Systems

*Installing and Configuring the IBM Power
System LC921 (9006-12P)*



Note

Before using this information and the product it supports, read the information in [“Safety notices” on page v](#), [“Notices” on page 111](#), the *IBM Systems Safety Notices* manual, G229-9054, and the *IBM Environmental Notices and User Guide*, Z125-5823.

This edition applies to IBM® Power Systems servers that contain the POWER9™ processor and to all associated models.

© **Copyright International Business Machines Corporation 2018, 2020.**

US Government Users Restricted Rights – Use, duplication or disclosure restricted by GSA ADP Schedule Contract with IBM Corp.

Contents

Safety notices.....	V
Installing and configuring the system.....	1
Installing and configuring the 9006-12P system.....	1
Prerequisites for installing the rack-mounted system.....	1
Completing inventory for your system.....	1
Determining and marking the location in the rack for the system.....	2
Optional: Converting the rack rails so that the system can be installed in a rack with round flange holes.....	4
Attaching the fixed rails to the rack.....	5
Installing the 9006-12P system into the rack and connecting and routing power cables.....	8
Completing server setup.....	9
Installing drives.....	10
Drive installation options for the 9006-12P system.....	10
Installing a drive.....	11
Installing a drive on module.....	17
Installing memory.....	19
Placement rules for memory in the 9006-12P or 9006-22P system.....	19
Installing memory in the 9006-12P system.....	21
Installing a PCIe adapter.....	23
PCIe adapter placement rules and slot priorities for the 9006-12P system.....	23
PCIe adapters by FC for the 9006-12P.....	28
Installing a PCIe adapter in the 9006-12P system.....	83
Common procedures for servicing or installing features in the 9006-12P.....	87
Before you begin servicing.....	87
Identifying the 5104-22C, 9006-12P, 9006-22C, or 9006-22P system that contains the part to replace.....	90
Preparing the system to remove and replace internal parts.....	92
Preparing the system for operation.....	95
Starting and stopping the system.....	96
Drive commands for 5104-22C, 9006-12P, 9006-22C, or 9006-22P.....	99
Sensor readings GUI display.....	102
Removing and replacing covers.....	103
Service and operating positions.....	105
Power cords for the 9006-12P.....	109
Notices.....	111
Accessibility features for IBM Power Systems servers.....	112
Privacy policy considerations	113
Trademarks.....	113
Electronic emission notices.....	114
Class A Notices.....	114
Class B Notices.....	117
Terms and conditions.....	119

Safety notices

Safety notices may be printed throughout this guide:

- **DANGER** notices call attention to a situation that is potentially lethal or extremely hazardous to people.
- **CAUTION** notices call attention to a situation that is potentially hazardous to people because of some existing condition.
- **Attention** notices call attention to the possibility of damage to a program, device, system, or data.

World Trade safety information

Several countries require the safety information contained in product publications to be presented in their national languages. If this requirement applies to your country, safety information documentation is included in the publications package (such as in printed documentation, on DVD, or as part of the product) shipped with the product. The documentation contains the safety information in your national language with references to the U.S. English source. Before using a U.S. English publication to install, operate, or service this product, you must first become familiar with the related safety information documentation. You should also refer to the safety information documentation any time you do not clearly understand any safety information in the U.S. English publications.

Replacement or additional copies of safety information documentation can be obtained by calling the IBM Hotline at 1-800-300-8751.

German safety information

Das Produkt ist nicht für den Einsatz an Bildschirmarbeitsplätzen im Sinne § 2 der Bildschirmarbeitsverordnung geeignet.

Laser safety information

IBM servers can use I/O cards or features that are fiber-optic based and that utilize lasers or LEDs.

Laser compliance

IBM servers may be installed inside or outside of an IT equipment rack.



DANGER: When working on or around the system, observe the following precautions:

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard: If IBM supplied the power cord(s), connect power to this unit only with the IBM provided power cord. Do not use the IBM provided power cord for any other product. Do not open or service any power supply assembly. Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.



- The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords. For AC power, disconnect all power cords from their AC power source. For racks with a DC power distribution panel (PDP), disconnect the customer's DC power source to the PDP.
- When connecting power to the product ensure all power cables are properly connected. For racks with AC power, connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate. For racks with a DC power distribution panel (PDP), connect the customer's DC power source to the PDP. Ensure that the proper polarity is used when attaching the DC power and DC power return wiring.
- Connect any equipment that will be attached to this product to properly wired outlets.

- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Do not attempt to switch on power to the machine until all possible unsafe conditions are corrected.
- When performing a machine inspection: Assume that an electrical safety hazard is present. Perform all continuity, grounding, and power checks specified during the subsystem installation procedures to ensure that the machine meets safety requirements. Do not attempt to switch power to the machine until all possible unsafe conditions are corrected. Before you open the device covers, unless instructed otherwise in the installation and configuration procedures: Disconnect the attached AC power cords, turn off the applicable circuit breakers located in the rack power distribution panel (PDP), and disconnect any telecommunications systems, networks, and modems.
- Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.

To Disconnect: 1) Turn off everything (unless instructed otherwise). 2) For AC power, remove the power cords from the outlets. 3) For racks with a DC power distribution panel (PDP), turn off the circuit breakers located in the PDP and remove the power from the Customer's DC power source. 4) Remove the signal cables from the connectors. 5) Remove all cables from the devices.

To Connect: 1) Turn off everything (unless instructed otherwise). 2) Attach all cables to the devices. 3) Attach the signal cables to the connectors. 4) For AC power, attach the power cords to the outlets. 5) For racks with a DC power distribution panel (PDP), restore the power from the Customer's DC power source and turn on the circuit breakers located in the PDP. 6) Turn on the devices.



- Sharp edges, corners and joints may be present in and around the system. Use care when handling equipment to avoid cuts, scrapes and pinching. (D005)

(R001 part 1 of 2):



DANGER: Observe the following precautions when working on or around your IT rack system:

- Heavy equipment—personal injury or equipment damage might result if mishandled.
- Always lower the leveling pads on the rack cabinet.
- Always install stabilizer brackets on the rack cabinet if provided, unless the earthquake option is to be installed.
- To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.
- Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices. In addition, do not lean on rack mounted devices and do not use them to stabilize your body position (for example, when working from a ladder).



- Stability hazard:
 - The rack may tip over causing serious personal injury.
 - Before extending the rack to the installation position, read the installation instructions.
 - Do not put any load on the slide-rail mounted equipment mounted in the installation position.
 - Do not leave the slide-rail mounted equipment in the installation position.
- Each rack cabinet might have more than one power cord.
 - For AC powered racks, be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.

- For racks with a DC power distribution panel (PDP), turn off the circuit breaker that controls the power to the system unit(s), or disconnect the customer's DC power source, when directed to disconnect power during servicing.
- Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.
- An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock. (R001 part 1 of 2)

(R001 part 2 of 2):



CAUTION:

- Do not install a unit in a rack where the internal rack ambient temperatures will exceed the manufacturer's recommended ambient temperature for all your rack-mounted devices.
- Do not install a unit in a rack where the air flow is compromised. Ensure that air flow is not blocked or reduced on any side, front, or back of a unit used for air flow through the unit.
- Consideration should be given to the connection of the equipment to the supply circuit so that overloading of the circuits does not compromise the supply wiring or overcurrent protection. To provide the correct power connection to a rack, refer to the rating labels located on the equipment in the rack to determine the total power requirement of the supply circuit.
- *(For sliding drawers.)* Do not pull out or install any drawer or feature if the rack stabilizer brackets are not attached to the rack or if the rack is not bolted to the floor. Do not pull out more than one drawer at a time. The rack might become unstable if you pull out more than one drawer at a time.



- *(For fixed drawers.)* This drawer is a fixed drawer and must not be moved for servicing unless specified by the manufacturer. Attempting to move the drawer partially or completely out of the rack might cause the rack to become unstable or cause the drawer to fall out of the rack. (R001 part 2 of 2)



CAUTION: Removing components from the upper positions in the rack cabinet improves rack stability during relocation. Follow these general guidelines whenever you relocate a populated rack cabinet within a room or building.

- Reduce the weight of the rack cabinet by removing equipment starting at the top of the rack cabinet. When possible, restore the rack cabinet to the configuration of the rack cabinet as you received it. If this configuration is not known, you must observe the following precautions:
 - Remove all devices in the 32U position and above.
 - Ensure that the heaviest devices are installed in the bottom of the rack cabinet.

- Ensure that there are little-to-no empty U-levels between devices installed in the rack cabinet below the 32U level, unless the received configuration specifically allowed it.
- If the rack cabinet you are relocating is part of a suite of rack cabinets, detach the rack cabinet from the suite.
- If the rack cabinet you are relocating was supplied with removable outriggers they must be reinstalled before the cabinet is relocated.
- Inspect the route that you plan to take to eliminate potential hazards.
- Verify that the route that you choose can support the weight of the loaded rack cabinet. Refer to the documentation that comes with your rack cabinet for the weight of a loaded rack cabinet.
- Verify that all door openings are at least 760 x 2083 mm (30 x 82 in.).
- Ensure that all devices, shelves, drawers, doors, and cables are secure.
- Ensure that the four leveling pads are raised to their highest position.
- Ensure that there is no stabilizer bracket installed on the rack cabinet during movement.
- Do not use a ramp inclined at more than 10 degrees.
- When the rack cabinet is in the new location, complete the following steps:
 - Lower the four leveling pads.
 - Install stabilizer brackets on the rack cabinet or in an earthquake environment bolt the rack to the floor.
 - If you removed any devices from the rack cabinet, repopulate the rack cabinet from the lowest position to the highest position.
- If a long-distance relocation is required, restore the rack cabinet to the configuration of the rack cabinet as you received it. Pack the rack cabinet in the original packaging material, or equivalent. Also lower the leveling pads to raise the casters off of the pallet and bolt the rack cabinet to the pallet.

(R002)

(L001)



DANGER: Hazardous voltage, current, or energy levels are present inside any component that has this label attached. Do not open any cover or barrier that contains this label. (L001)

(L002)



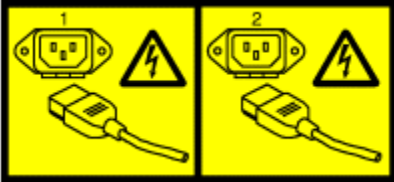
DANGER: Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices. In addition, do not lean on rack-mounted devices and do not use them to stabilize your body position (for example, when working from a ladder). Stability hazard:

- The rack may tip over causing serious personal injury.
- Before extending the rack to the installation position, read the installation instructions.

- Do not put any load on the slide-rail mounted equipment mounted in the installation position.
- Do not leave the slide-rail mounted equipment in the installation position.

(L002)

(L003)



or



or

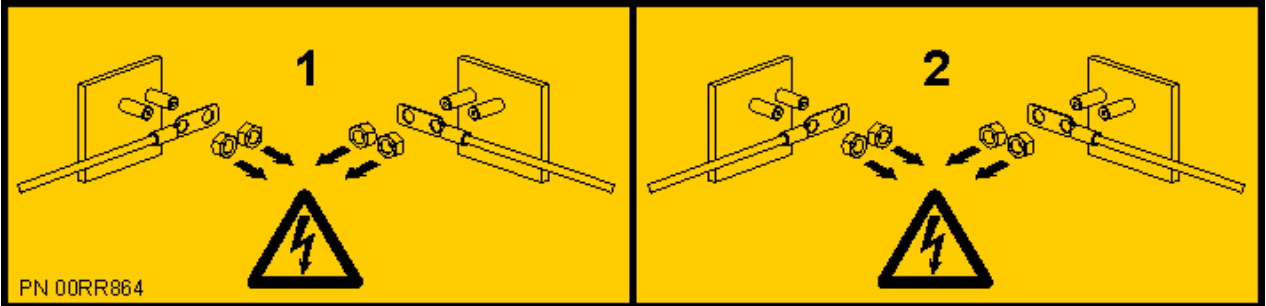



or



or






 **DANGER:** Multiple power cords. The product might be equipped with multiple AC power cords or multiple DC power cables. To remove all hazardous voltages, disconnect all power cords and power cables. (L003)


(L007)




 **CAUTION:** A hot surface nearby. (L007)

(L008)



 **CAUTION:** Hazardous moving parts nearby. (L008)

All lasers are certified in the U.S. to conform to the requirements of DHHS 21 CFR Subchapter J for class 1 laser products. Outside the U.S., they are certified to be in compliance with IEC 60825 as a class 1 laser product. Consult the label on each part for laser certification numbers and approval information.

 **CAUTION:** This product might contain one or more of the following devices: CD-ROM drive, DVD-ROM drive, DVD-RAM drive, or laser module, which are Class 1 laser products. Note the following information:

- Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.
- Use of the controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.

(C026)



CAUTION: Data processing environments can contain equipment transmitting on system links with laser modules that operate at greater than Class 1 power levels. For this reason, never look into the end of an optical fiber cable or open receptacle. Although shining light into one end and looking into the other end of a disconnected optical fiber to verify the continuity of optic fibers may not injure the eye, this procedure is potentially dangerous. Therefore, verifying the continuity of optical fibers by shining light into one end and looking at the other end is not recommended. To verify continuity of a fiber optic cable, use an optical light source and power meter. (C027)



CAUTION: This product contains a Class 1M laser. Do not view directly with optical instruments. (C028)



CAUTION: Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following information:

- Laser radiation when open.
- Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam. (C030)

(C030)



CAUTION: The battery contains lithium. To avoid possible explosion, do not burn or charge the battery.

Do Not:

- Throw or immerse into water
- Heat to more than 100 degrees C (212 degrees F)
- Repair or disassemble

Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C003)



CAUTION: Regarding IBM provided VENDOR LIFT TOOL:

- Operation of LIFT TOOL by authorized personnel only.
- LIFT TOOL intended for use to assist, lift, install, remove units (load) up into rack elevations. It is not to be used loaded transporting over major ramps nor as a replacement for such designated tools like pallet jacks, walkies, fork trucks and such related relocation practices. When this is not practicable, specially trained persons or services must be used (for instance, riggers or movers).
- Read and completely understand the contents of LIFT TOOL operator's manual before using. Failure to read, understand, obey safety rules, and follow instructions may result in property damage and/or personal injury. If there are questions, contact the vendor's service and support. Local paper manual must remain with machine in provided storage sleeve area. Latest revision manual available on vendor's web site.
- Test verify stabilizer brake function before each use. Do not over-force moving or rolling the LIFT TOOL with stabilizer brake engaged.
- Do not raise, lower or slide platform load shelf unless stabilizer (brake pedal jack) is fully engaged. Keep stabilizer brake engaged when not in use or motion.
- Do not move LIFT TOOL while platform is raised, except for minor positioning.
- Do not exceed rated load capacity. See LOAD CAPACITY CHART regarding maximum loads at center versus edge of extended platform.
- Only raise load if properly centered on platform. Do not place more than 200 lb (91 kg) on edge of sliding platform shelf also considering the load's center of mass/gravity (CoG).
- Do not corner load the platforms, tilt riser, angled unit install wedge or other such accessory options. Secure such platforms -- riser tilt, wedge, etc options to main lift shelf or forks in all four (4x or all other provisioned mounting) locations with provided hardware only, prior to use. Load objects are designed to slide on/off smooth platforms without appreciable force, so take care not

to push or lean. Keep riser tilt [adjustable angling platform] option flat at all times except for final minor angle adjustment when needed.

- Do not stand under overhanging load.
- Do not use on uneven surface, incline or decline (major ramps).
- Do not stack loads.
- Do not operate while under the influence of drugs or alcohol.
- Do not support ladder against LIFT TOOL (unless the specific allowance is provided for one following qualified procedures for working at elevations with this TOOL).
- Tipping hazard. Do not push or lean against load with raised platform.
- Do not use as a personnel lifting platform or step. No riders.
- Do not stand on any part of lift. Not a step.
- Do not climb on mast.
- Do not operate a damaged or malfunctioning LIFT TOOL machine.
- Crush and pinch point hazard below platform. Only lower load in areas clear of personnel and obstructions. Keep hands and feet clear during operation.
- No Forks. Never lift or move bare LIFT TOOL MACHINE with pallet truck, jack or fork lift.
- Mast extends higher than platform. Be aware of ceiling height, cable trays, sprinklers, lights, and other overhead objects.
- Do not leave LIFT TOOL machine unattended with an elevated load.
- Watch and keep hands, fingers, and clothing clear when equipment is in motion.
- Turn Winch with hand power only. If winch handle cannot be cranked easily with one hand, it is probably over-loaded. Do not continue to turn winch past top or bottom of platform travel. Excessive unwinding will detach handle and damage cable. Always hold handle when lowering, unwinding. Always assure self that winch is holding load before releasing winch handle.
- A winch accident could cause serious injury. Not for moving humans. Make certain clicking sound is heard as the equipment is being raised. Be sure winch is locked in position before releasing handle. Read instruction page before operating this winch. Never allow winch to unwind freely. Freewheeling will cause uneven cable wrapping around winch drum, damage cable, and may cause serious injury.
- This TOOL must be maintained correctly for IBM Service personnel to use it. IBM shall inspect condition and verify maintenance history before operation. Personnel reserve the right not to use TOOL if inadequate. (C048)

Power and cabling information for NEBS (Network Equipment-Building System) GR-1089-CORE

The following comments apply to the IBM servers that have been designated as conforming to NEBS (Network Equipment-Building System) GR-1089-CORE:

The equipment is suitable for installation in the following:

- Network telecommunications facilities
- Locations where the NEC (National Electrical Code) applies

The intrabuilding ports of this equipment are suitable for connection to intrabuilding or unexposed wiring or cabling only. The intrabuilding ports of this equipment *must not* be metallically connected to the interfaces that connect to the OSP (outside plant) or its wiring. These interfaces are designed for use as intrabuilding interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE) and require isolation from the exposed OSP cabling. The addition of primary protectors is not sufficient protection to connect these interfaces metallically to OSP wiring.

Note: All Ethernet cables must be shielded and grounded at both ends.

The ac-powered system does not require the use of an external surge protection device (SPD).

The dc-powered system employs an isolated DC return (DC-I) design. The DC battery return terminal *shall not* be connected to the chassis or frame ground.

The dc-powered system is intended to be installed in a common bonding network (CBN) as described in GR-1089-CORE.

Installing and configuring the 9006-12P

Use this information to install and configure IBM Power® System LC921 (9006-12P) and to install customer-installable hardware features. This information also provides removal and replacement procedures for customer-replaceable hardware features, such as memory modules or fans.

Note: See the International Information Bulletin for Customers - Installation of IBM Machines (Publication number: SC27-6601-00) that is available from the **IBM Publications Center** (<http://www-05.ibm.com/e-business/linkweb/publications/servlet/pbi.wss>). This bulletin provides a list of the key IBM system installation activities and a list of activities that might be billable.

Installing and configuring the 9006-12P system

Learn how to install, cable, and set up your system.

Prerequisites for installing the rack-mounted system

Use the information to understand the prerequisites that are required for installing the system.

About this task

You might need to read the following documents before you begin to install the server:

- The latest version of these documents are maintained online, see:
 - [Installing the IBM Power System 9006-12P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12c_install_kickoff.htm) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12c_install_kickoff.htm)
- To plan your server installation, see [Planning for the system](http://www.ibm.com/support/knowledgecenter/POWER9/p9ia4/p9ia4_90x_kickoff.htm) (http://www.ibm.com/support/knowledgecenter/POWER9/p9ia4/p9ia4_90x_kickoff.htm).

Procedure

Ensure that you have the following items before starting your installation:

- Phillips screwdriver
- Flat-head screwdriver
- Box cutter
- Electrostatic discharge (ESD) wrist strap
- Rack with two Electronic Industries Association (EIA) units (2U) of space

Completing inventory for your system

Use this information to complete inventory for your system.

Procedure

1. Verify that you received all the boxes you ordered.
2. Unpack the server components as needed.
3. Complete a parts inventory before you install each server component by following these steps:
 - a. Locate the inventory list for your server.
 - b. Ensure that you received all the parts that you ordered.

Note: Your order information is included with your product. You can also obtain the order information from your marketing representative or the IBM Business Partner.

If you have incorrect, missing, or damaged parts, consult any of the following resources:

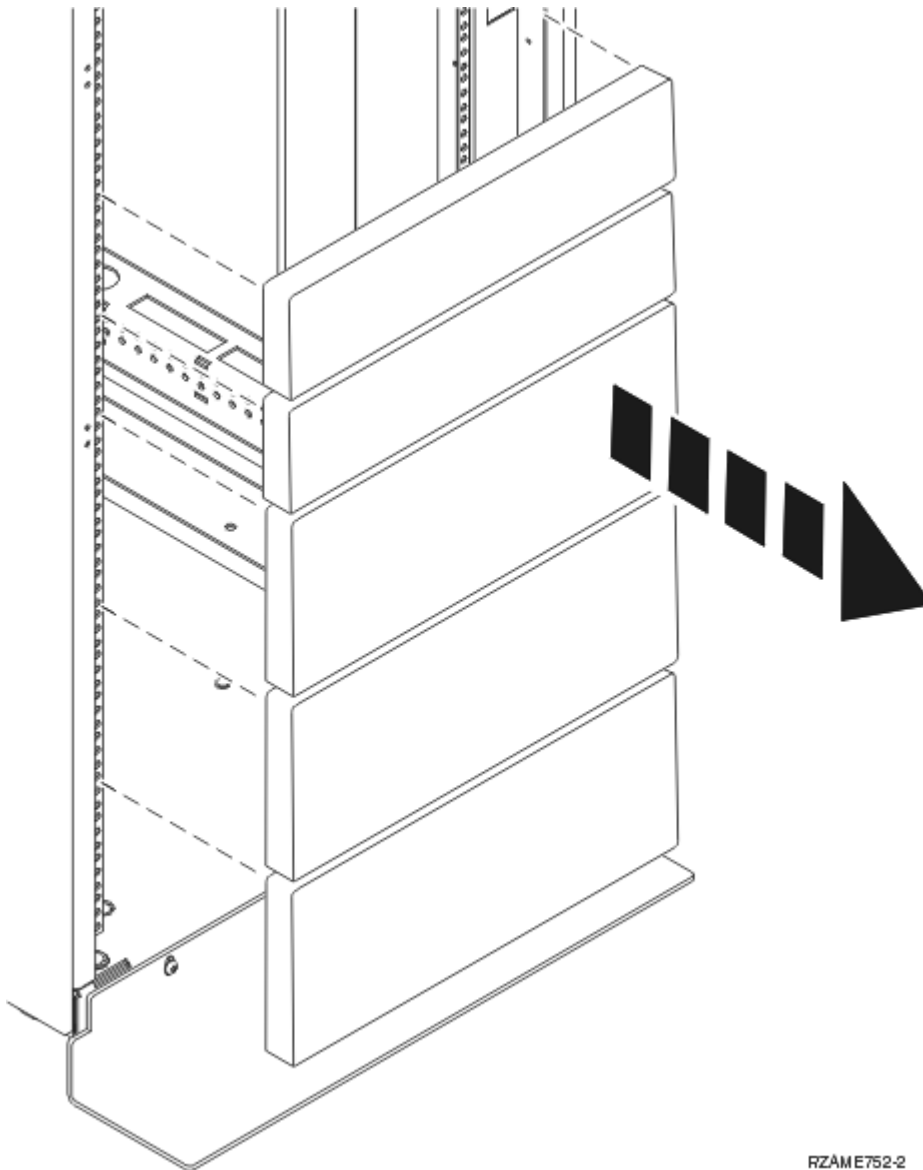
- Your IBM reseller.
- IBM Rochester manufacturing automated information line at 1-800-300-8751 (United States only).
- The Directory of worldwide contacts website <http://www.ibm.com/planetwide>. Select your location to view the service and support contact information.

Determining and marking the location in the rack for the system

You might need to determine where to install the system unit into the rack.

Procedure

1. Read the [Rack safety notices](http://www.ibm.com/support/knowledgecenter/POWER9/p9hbf/p9hbf_racksafety.htm) (http://www.ibm.com/support/knowledgecenter/POWER9/p9hbf/p9hbf_racksafety.htm).
2. Determine where to place the system unit in the rack. As you plan for installing the system unit in a rack, consider the following information:
 - Organize larger and heavier units into the lower part of the rack.
 - Plan to install system units into the lower part of the rack first.
 - Record the Electronic Industries Alliance (EIA) locations in your plan.
3. If necessary, remove the filler panels to allow access to the inside of the rack enclosure where you plan to place the system unit, as shown in [Figure 1 on page 3](#).



RZAME752-2

Figure 1. Removing the filler panels

4. Determine to place the system in the rack. Record the EIA location.
5. Facing the front of the rack and working from the right side, use tape, a marker, or pencil to mark the lower hole of each EIA unit.
6. Repeat step [“5”](#) on page 3 for the corresponding holes located on the left side of the rack.
7. Go to the rear of the rack.
8. On the right side, find the EIA unit that corresponds to the bottom EIA unit marked on the front of the rack.
9. Mark the bottom EIA unit.
10. Mark the corresponding holes on the left side of the rack.

Optional: Converting the rack rails so that the system can be installed in a rack with round flange holes

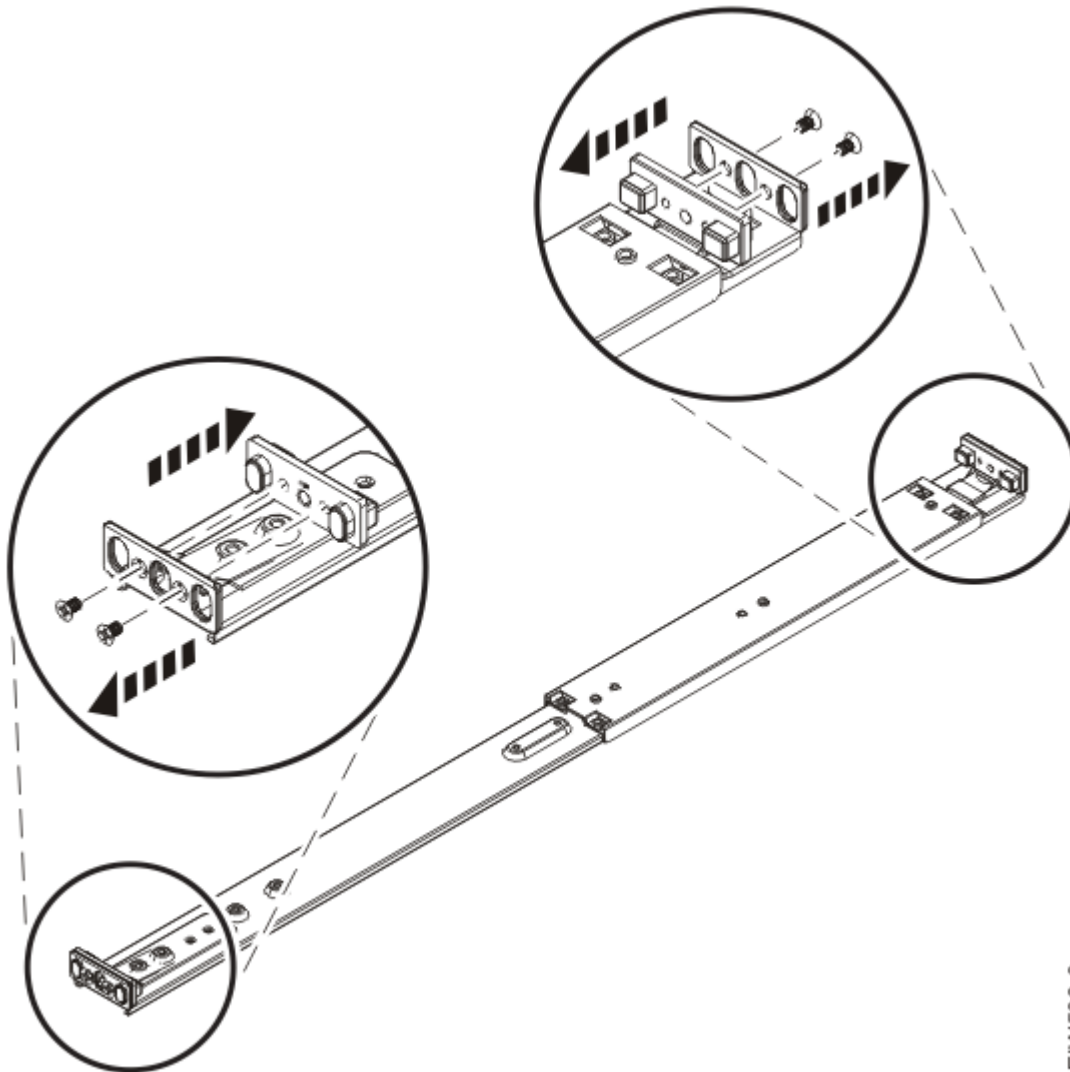
Some racks have round holes on their flanges. To install the rails onto this type of rack, you must convert the system rack rails before you install them.

About this task

To convert the rack rails so that they can be installed on racks with round holes on the flanges, complete the following tasks:

Procedure

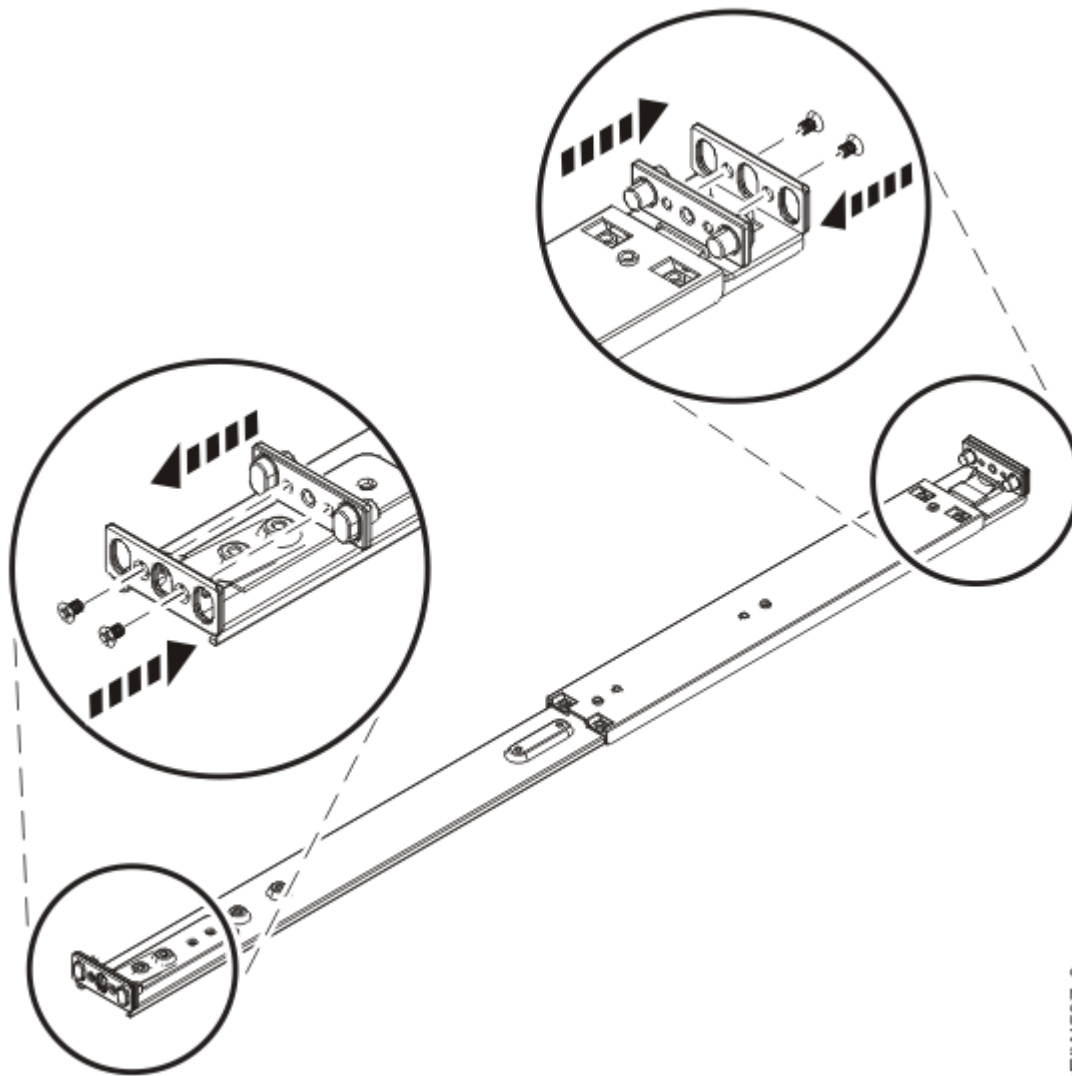
1. On each end of each rail, remove the two flat head screws that hold the pin adapters to the rail and then remove the adapters, as shown in the following figure.



P9E1W506-0

Figure 2. Removing the pin adapters on each end of the rail

2. Rotate each adapter so that the round pins are facing out. Using the screws that you removed in the previous step, reinstall the adapters so that the round pins are facing out, as shown in the following figure.



P9E1W507-0

Figure 3. Replacing the pin adapters on each end of the rail

You can now install the rails into a rack that has round flange holes.

Attaching the fixed rails to the rack

You must attach the rails to the rack. Use this procedure to perform this task.

About this task



Attention: To avoid rail failure and potential danger to yourself and to the unit, ensure that you have the correct rails and fittings for your rack. If your rack has square support flange holes or screw-thread support flange holes, ensure that the rails and fittings match the support flange holes that are used on your rack. Do not install mismatched hardware by using washers or spacers. If you do not have the correct rails and fittings for your rack, contact your IBM reseller.

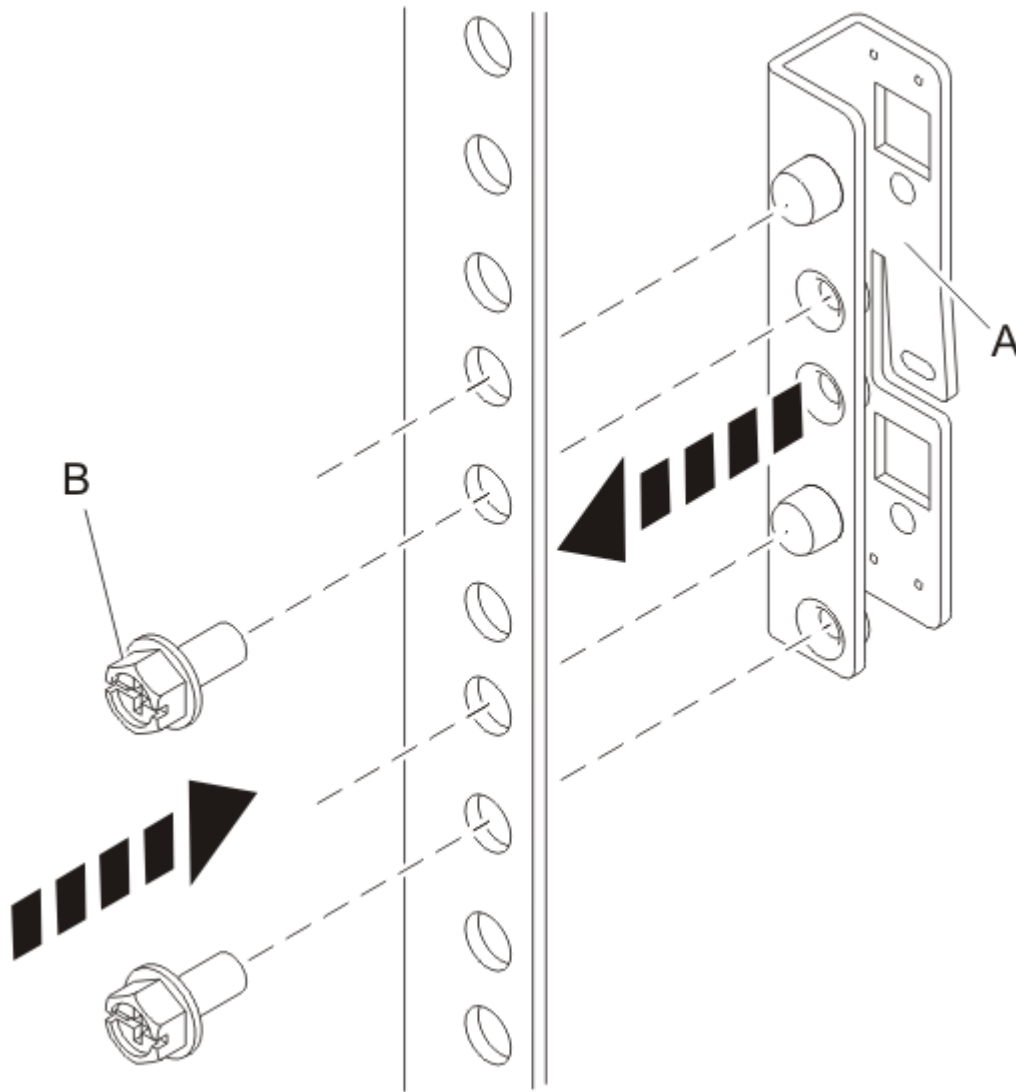
Note: The system requires 1 EIA rack unit (1U) of space.

Ensure that you have the necessary parts to install the rails. The following parts are included with the rail kit:

- Slide rail screws, used to attach the two parts of each slide rail
- Slide rail rack screws, used to secure the rails to the rack
- Rails

- 10 - 32 x 0.635 cm (0.25 in.) screws, used to attach the rails to system chassis
- Round-to-square rack hole adapters (optional)

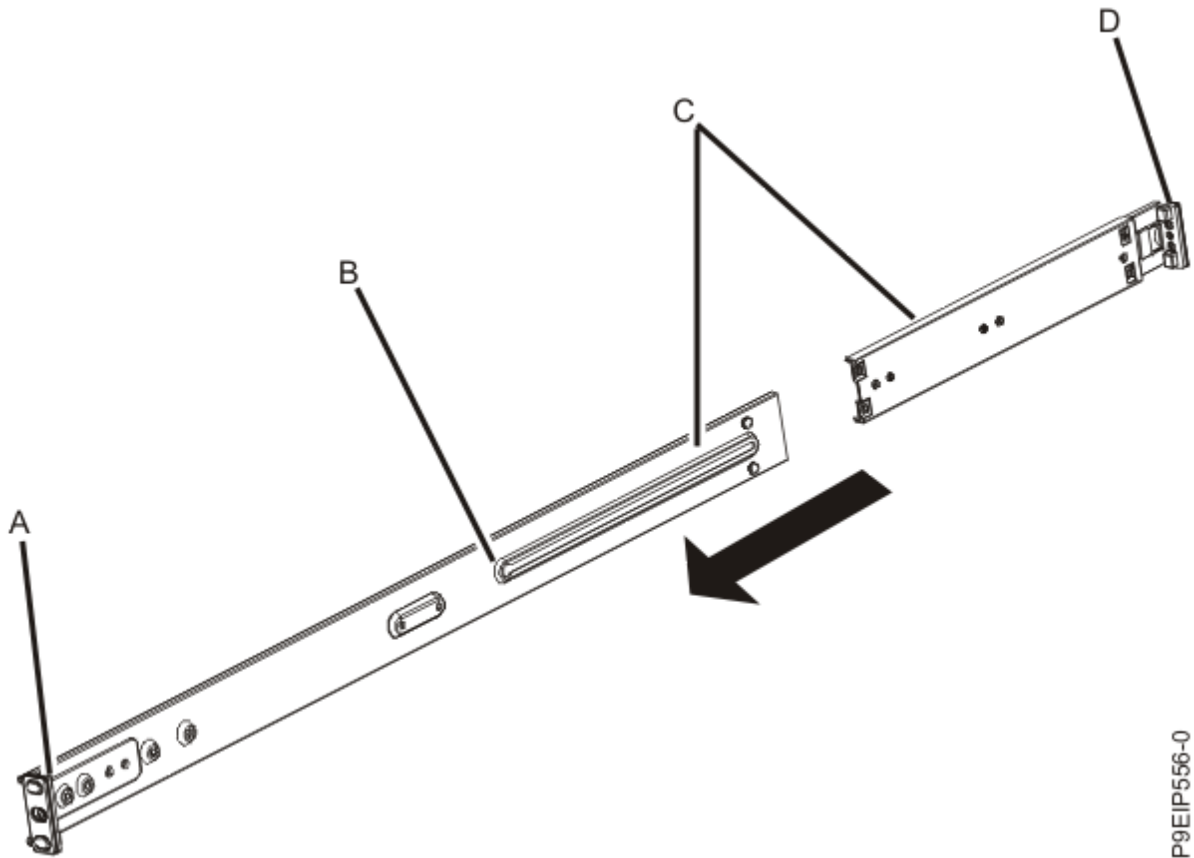
Note: If your rack has round holes, you must attach two round-to-square hole adapters to each side of the rack flanges. Align each adapter (A) with the holes in the rack flange. Secure each adapter to the rack flanges by installing two hex-head screws (B). If a washer was included in your adapter kit, use the washer when you install the hex-head screws.



P9EIP820-0

Procedure

1. Remove the rail pieces from the packaging and place them on a work surface.
2. Replace the rail rack square pins (A) and (D) with the rail rack round pins.
3. Connect the two parts of each rack slide rail. To connect the two parts of the rack slide rail, perform the following tasks:
 - a. Identify the two pieces of the left rack slide rail. Align the short and long pieces (C). Ensure that the rack rail pins are pointing in the same direction (A) and (D).



P9EIP556-0

- b. The shorter piece of the rack slide rail has a metal pin. Insert the pin into the hole in the longer piece of the rack slide rail (**B**). Slide the shorter piece of the rack rail into the longer piece of the rack rail.
- c. Align the holes in the two pieces of the rack slide rails. Using a Philips-head screwdriver, attach the two parts by loosely screwing two threaded rail screws through the holes in the rack slide rail.

Note: Do not tighten the rack slide rail screws.

- d. Repeat steps [“3.a” on page 6](#) - [“3.c” on page 7](#) for the right slide rail.
4. Install the rack slide rails into the rack.
 - a. Move to the front of the rack.
 - b. Select the left rack slide rail, and locate the EIA unit that you previously marked. Each slide rail is also marked **Back**, to designate the rear of the rack. Ensure that you are holding the front end of the rack slide rail.
 - c. Extend the rail from the front of the rack to the rear of the rack and align the rack slide rail pins with the holes in the rack flange that you previously marked.
 - d. Push the rack rail pins into the rear rack flange until the rear rack rail latch clicks into place.
 - e. Pull the front of the rack rail toward the front of the rack rail flange. Align the slide rail pins with the holes in the rail flange and pull them until the rail latch clicks into place.
 - f. Using a screwdriver, tighten the rail screws that you installed in step [“3” on page 6](#).

Note: You might need 2U of space to access and tighten the rail screws.

 - g. Repeat steps [“4.a” on page 7](#) - [“4.f” on page 7](#) for the right slide rail.

Installing the 9006-12P system into the rack and connecting and routing power cables

After you install the IBM Power System LC921 (9006-12P) server into the rails in the rack, connect and route power cables.

About this task

Note: This system requires two people to install the system into the rack.

Procedure

1. Remove the protective plastic film from the top of the system chassis.
2. Move to the front of the rack.
3. Using two people, lift the system and align the system chassis rails on each side of the chassis with the rack slide rails.
4. While one person is supporting the weight of the system, have the second person gently push the system into the rack, until you hear each slide rail click into place.
5. Push the system toward the rear of the rack until the system.
6. Secure the system to the rack by screwing a screw through the handles on each side of the system chassis.
7. Plug the power cords into the power supplies.

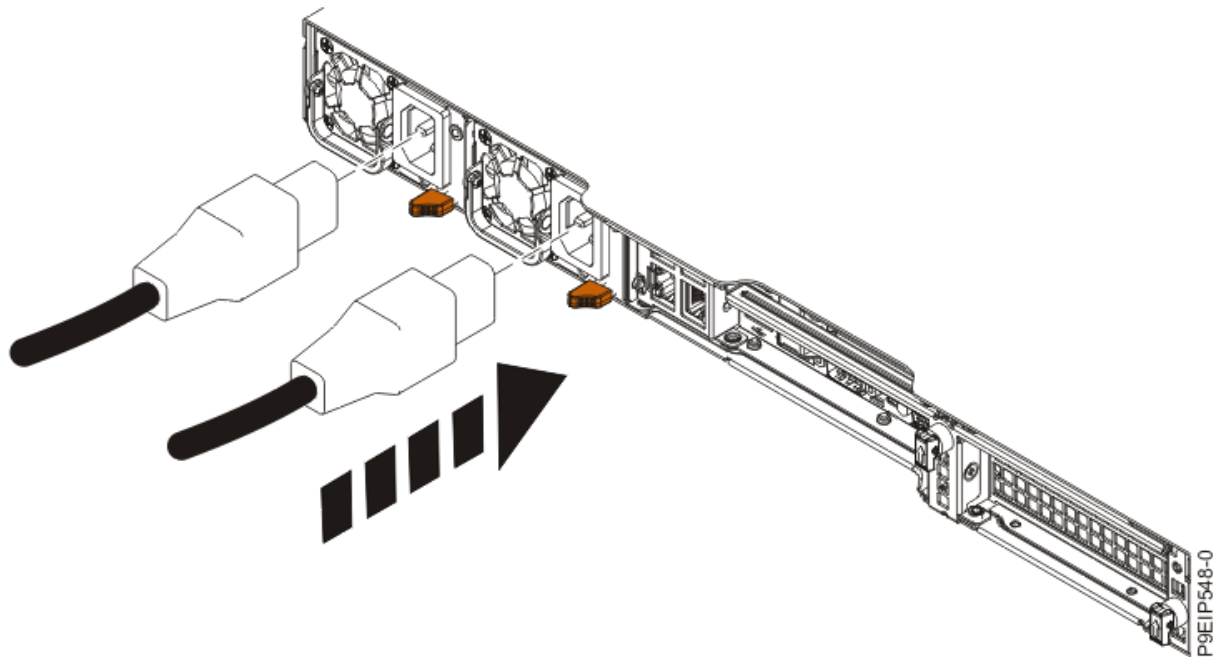


Figure 4. Plugging the power cords into the power supplies

8. Attach all cables to the rear of the server.

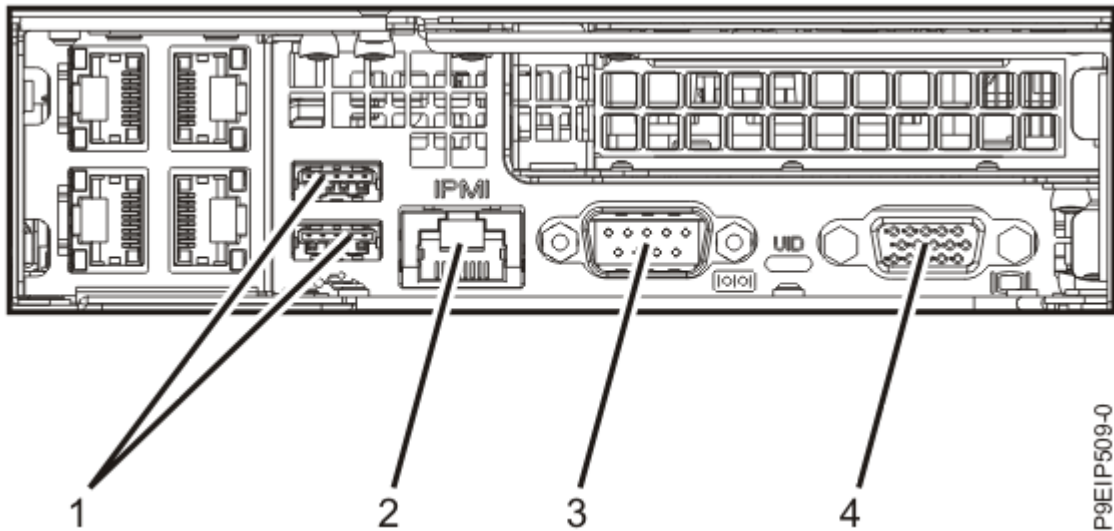


Figure 5. Rear ports

Identifier	Description
1	USB 2.0 used for keyboard and mouse. Certain USB drives might be too wide to fit properly into the USB ports on the rear of the system. Test the fit of your USB drive before proceeding.
2	Ethernet Intelligent Platform Management Interface (IPMI)
3	Serial IPMI
4	Video Graphics Array (VGA) used for monitor. Only the 1024 x 768 at 60 Hz VGA setting is supported. Only up to a 3-meter cable is supported. Only text-based capability is supported.

9. Plug the system power cords and the power cords for any other attached devices into the alternating current (AC) power source.
10. Press and hold the power button until the system begins the power-on sequence.
11. Continue with [“Completing server setup”](#) on page 9.

Completing server setup

Learn how to set up your server.

Procedure

1. Connect your server to a VGA terminal and keyboard or a console.
Only the 1024x768 at 60 Hz VGA setting is supported. Only up to a 3 meter cable is supported.
2. Go to [Getting fixes](http://www.ibm.com/support/knowledgecenter/POWER9/p9ei8/p9ei8_fixes_kickoff.htm) (http://www.ibm.com/support/knowledgecenter/POWER9/p9ei8/p9ei8_fixes_kickoff.htm) and update the system firmware with the most recent level of firmware.
3. You can receive important technical information and updates for specific IBM Support tools and resources by subscribing to receive updates. To subscribe to receive updates, complete the following steps:

- a. Go to the [IBM Support Portal](#).
 - b. Log in by using your IBM ID and password and click **Sign in**.
 - c. Click **Support notifications**.
 - d. Click **Browse for a product**.
 - e. Select **Power > Firmware**, find your machine type and model and click **Subscribe**.
 - f. Exit the **Browse for a product** screen.
 - g. Click **Delivery preferences** to set email preferences and click **Submit**.
 - h. Click **Edit** to select the types of documentation updates that you want to receive and click **Submit**.
4. You can install the Linux operating system on bare metal systems, or on non-virtualized systems. For these systems, the operating system runs directly on the Open Power Abstraction Layer (OPAL) firmware.
- For more information about installing the Linux operating system on bare-metal systems, see [Installing Linux on bare-metal systems](http://www.ibm.com/support/knowledgecenter/linuxonibm/liabw/liabwkickoff.htm) (<http://www.ibm.com/support/knowledgecenter/linuxonibm/liabw/liabwkickoff.htm>).

Installing storage drives in the 9006-12P system

Learn how to install storage drives in the IBM Power System LC921 (9006-12P) system.

About this task

You can install the following types of drives in the system:

- SATA drives connected to the SATA controller ports on the system backplane
- Disk on module (DOM) drives
- SAS drives connected to a SAS RAID adapter
- NVMe drives connected to an NVMe adapter
- 3.5-inch drives
- 2.5-inch drives by using an adapter

Drive installation options for the 9006-12P system

Find information about the drive installation options for the IBM Power System LC921 (9006-12P) system.

SATA Drives

The system can support four SATA drives. The SATA drives can be installed into the front drive bay locations.

One SAS cable connects the disk drive backplane to 4 SATA sockets on the system backplane.

You can plug SATA drive on module (DOM) drives directly into the system backplane. Up to two SATA DOM drives can be installed. Use the two orange SATA connectors.

SAS Drives

By using SATA/SAS RAID adapters, the system can support up to four SATA/SAS drives.

One SAS cable connects the SAS port on the disk drive backplane to the SAS port on the system backplane.

Sample SAS configuration:

- RAID adapter supporting four front-mounted SATA/SAS drives.
- Two SATA DOMs plugged into the system backplane.

NVMe Enabled System and Drives

When the system has an NVMe adapter, the system supports NVMe drives. The first two NVMe drives must be plugged into drive locations 1 and 2 as shown in [Figure 6 on page 11](#). The second two NVMe drives must be plugged into drive locations 3 and 4.

Two NVMe cables connect the disk drive backplane to the NVMe storage adapter.

NVMe drives are supported only on host operating systems. NVMe drives are not supported by guest operating systems. On systems with RHEL 7.3 or later, or Ubuntu 16.04 or later, NVMe drives can be used as bootable drives. Port 1 of the internal NVMe host bus adapter must be plugged into NVMe port 1 on the disk drive backplane.

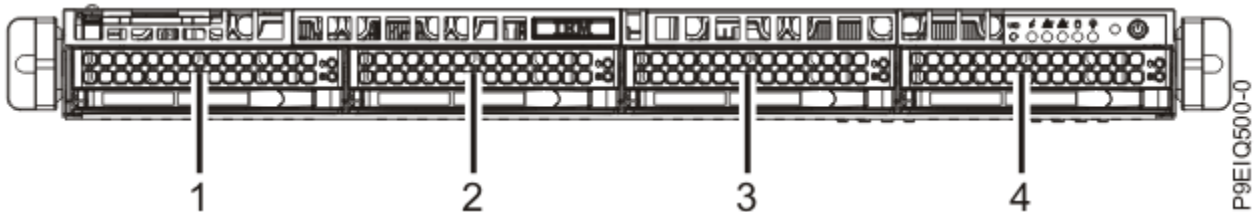


Figure 6. NVMe drive locations

Sample NVMe configuration:

- Four NVMe front-mounted drives with the NVMe adapter.
- Two SATA DOMs plugged into the system backplane.

Installing a drive in the 9006-12P system

Learn how to install a drive in the IBM Power System LC921 (9006-12P) system.

Before you begin

You can install SATA and SAS drives with the system powered on and running.

When installing NVMe drives, the system must be powered off; for instructions, see [“Stopping the 5104-22C, 9006-12P, 9006-22C, or 9006-22P system” on page 98](#).

Procedure

1. Attach the electrostatic discharge (ESD) wrist strap.

The ESD wrist strap must be connected to an unpainted metal surface until the service procedure is completed, and if applicable, until the service access cover is replaced.



Attention:

- Attach an electrostatic discharge (ESD) wrist strap to the front ESD jack, to the rear ESD jack, or to an unpainted metal surface of your hardware to prevent the electrostatic discharge from damaging your hardware.
- When you use an ESD wrist strap, follow all electrical safety procedures. An ESD wrist strap is used for static control. It does not increase or decrease your risk of receiving electric shock when using or working on electrical equipment.
- If you do not have an ESD wrist strap, just prior to removing the product from ESD packaging and installing or replacing hardware, touch an unpainted metal surface of the system for a minimum of 5 seconds. If at any point in this service process you move away from the system, it is important to again discharge yourself by touching an unpainted metal surface for at least 5 seconds before you continue with the service process.

2. Unlock the drive bay handle (**B**) by pushing in the handle release (**A**) as shown in [Figure 7](#) on [page 12](#). The handle (**B**) snaps out towards you. If the handle does not snap out all the way, the drive does not slide out of the system.

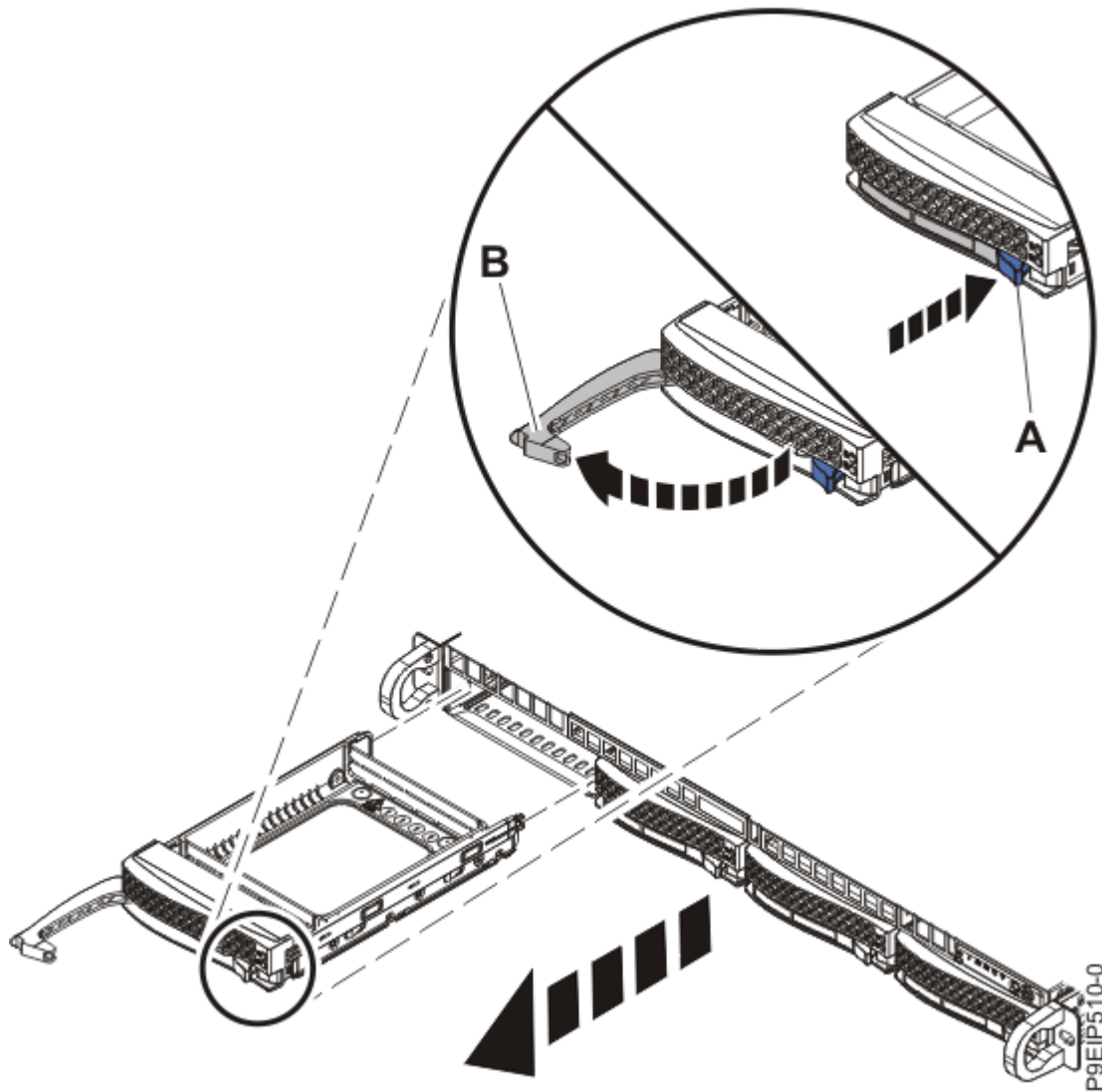


Figure 7. Removing a drive

3. If you are installing more than one drive, remove those drive trays.
4. For 3.5-inch drives, remove the plastic filler from the carrier. For a 2.5-inch drive in a 3.5-inch opening, use a 2.5-inch tool-less drive carrier.
5. Install a drive into the tray.

Orient the drive such that the connectors are pointing to the rear of the drive.

- A 3.5-inch drive fills the tray, as shown in [Figure 8](#) on [page 13](#). Fasten the drive to the sides of the tray with the screws (two or three screws on each side), depending on the number of threaded holes present on the drive. If the number of threaded holes is greater than the number of screws that are available, use the threaded holes that are closest to each end of the drive.

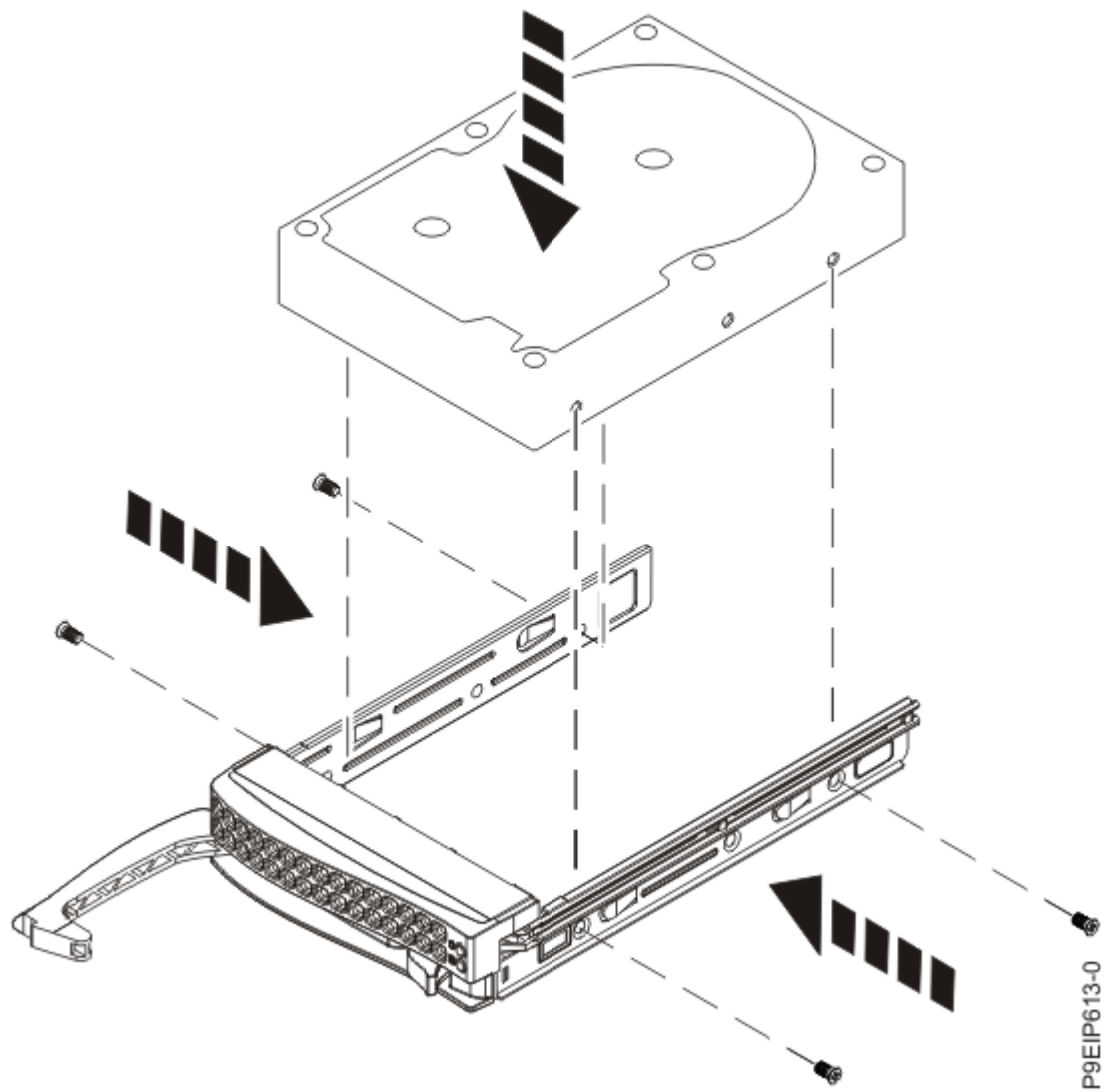


Figure 8. Mounting the 3.5-inch drive in the tray

- A 2.5-inch drive slides into the rear of the tool-less drive carrier.
 - a. Turn the tray upside down as shown in [Figure 9 on page 14](#).
 - b. Open the retention spring **(B)** as shown in [Figure 10 on page 15](#).
 - c. Place the 2.5-inch drive **(A)** into the tray, aligning the pins with the screw holes in the drive.
 - d. When the pins are aligned, close the retention spring, allowing the pins to secure the drive in the tray.
 - e. Turn the tray right side up.

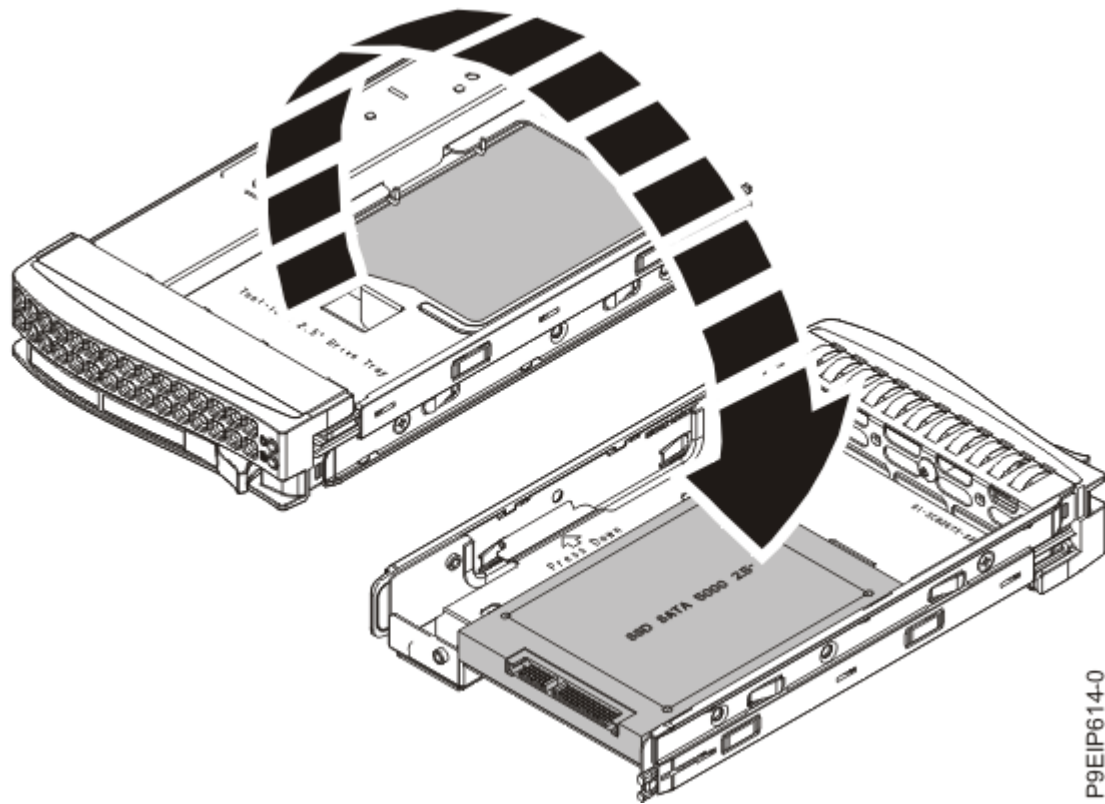


Figure 9. Turning the 2.5-inch tray upside-down

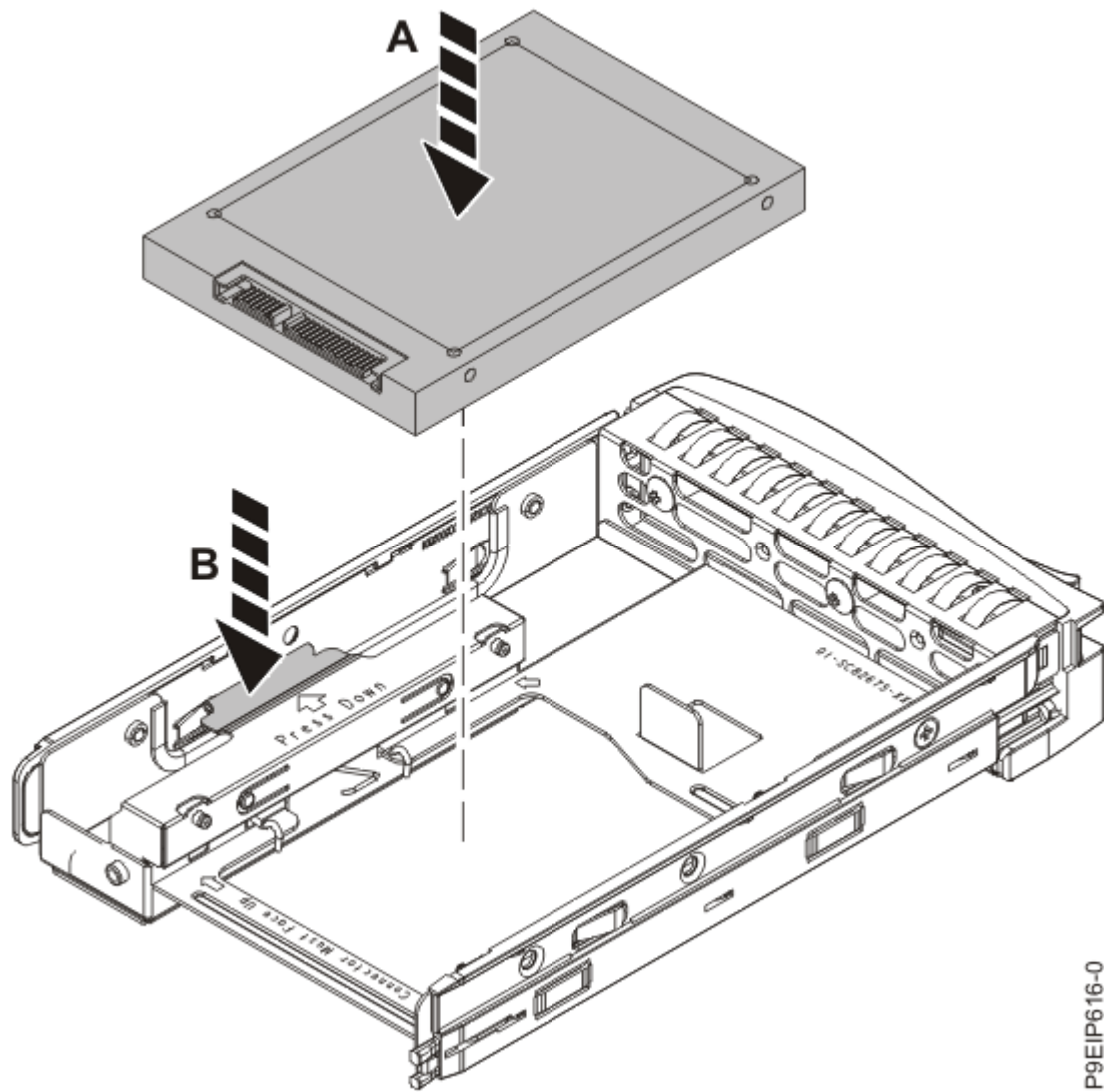


Figure 10. Mounting the 2.5-inch drive in the tray

6. Ensure that the drive handle is open. Support the drive by the bottom as you position the drive, and insert it into the drive slot.

Ensure that the drive is fully seated and is all the way into the system.

7. Lock the drive bay handle (**A**) by pushing in the handle release as shown in [Figure 11](#) on page 16.

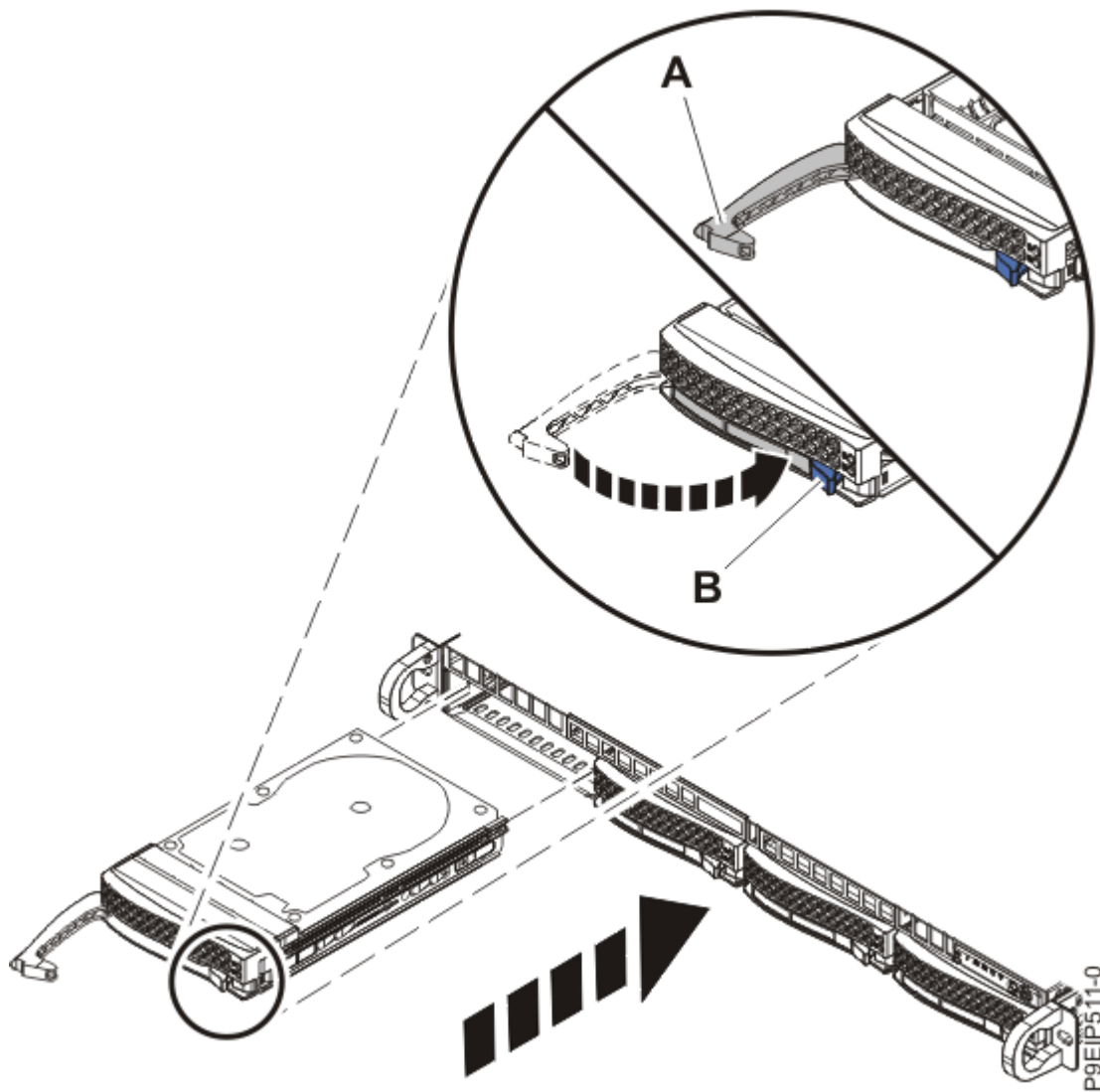


Figure 11. Disk drive lock detail

8. If you installed an NVMe drive, power on the system.
For instructions, see [“Starting the 5104-22C, 9006-12P, 9006-22C, or 9006-22P system ”](#) on page 96.
9. For a non-RAID drive, configure the installed drive for your environment. If the drive is part of a RAID configuration, skip this step, the drive is detected and configured when inserted.

After you insert the new drive, you need to rescan for the device.

Ubuntu Linux® operating system

To run the **rescan-scsi-bus** command in the Ubuntu Linux operating system, log in to the system as the root user, and run the following command:

```
rescan-scsi-bus
```

The **rescan-scsi-bus** tool is available in the `scsitools` package; install the package by using the following command:

```
sudo apt-get install scsitools
```

Red Hat Enterprise Linux (RHEL) version 7.2

To run the `rescan` command in the RHEL version 7.2 operating system, log in to the system as the root user, and run the following command:

```
rescan-scsi-bus.sh -a
```

The **rescan-scsi-bus** tool is available in the `sg3_utils` package; install the package by using the following command:

```
yum install sg3_utils
```

You can also refer to: [Adding a Storage Device or Path](https://access.redhat.com/documentation/en-US/Red_Hat_Enterprise_Linux/7/html/Storage_Administration_Guide/logical-unit-add-remove.html) (https://access.redhat.com/documentation/en-US/Red_Hat_Enterprise_Linux/7/html/Storage_Administration_Guide/logical-unit-add-remove.html).

10. Load or restore data from your backup media.

Installing a drive on module in the 9006-12P system

Learn how to install a drive on module (DOM) in the IBM Power System LC921 (9006-12P) system.

Before you begin

Power off the system and place it in the service position. For instructions, see [“Preparing the 9006-12P system to remove and replace internal parts”](#) on page 92.

About this task

You can plug SATA drive on module (DOM) drives directly into the system backplane. Up to two SATA DOM drives can be installed. Use the two orange SATA connectors.

Procedure

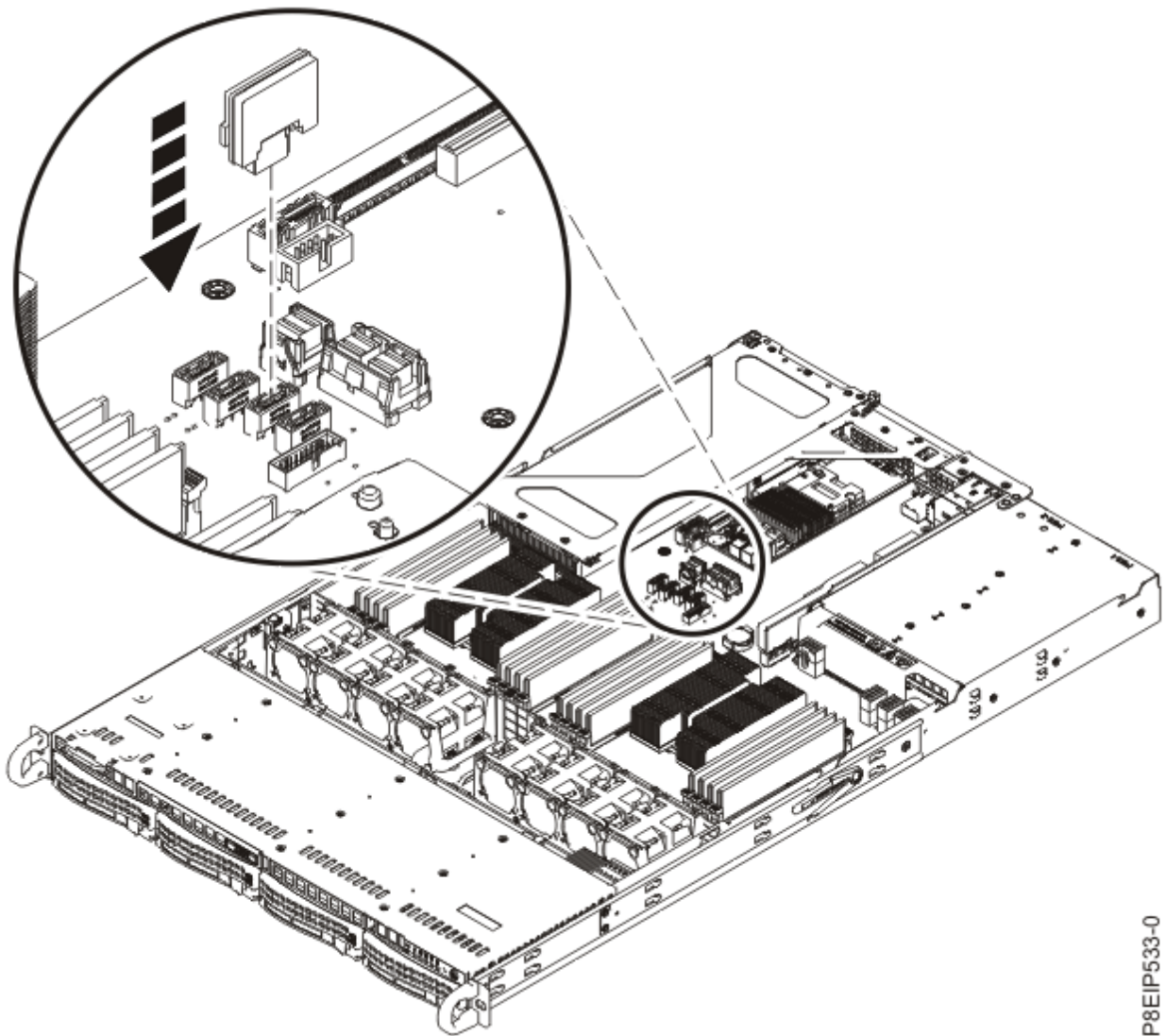
1. Attach the electrostatic discharge (ESD) wrist strap.

The ESD wrist strap must be connected to an unpainted metal surface until the service procedure is completed, and if applicable, until the service access cover is replaced.



Attention:

- Attach an electrostatic discharge (ESD) wrist strap to the front ESD jack, to the rear ESD jack, or to an unpainted metal surface of your hardware to prevent the electrostatic discharge from damaging your hardware.
 - When you use an ESD wrist strap, follow all electrical safety procedures. An ESD wrist strap is used for static control. It does not increase or decrease your risk of receiving electric shock when using or working on electrical equipment.
 - If you do not have an ESD wrist strap, just prior to removing the product from ESD packaging and installing or replacing hardware, touch an unpainted metal surface of the system for a minimum of 5 seconds. If at any point in this service process you move away from the system, it is important to again discharge yourself by touching an unpainted metal surface for at least 5 seconds before you continue with the service process.
2. Install the DOM into the system backplane, in positions **(A)**, as shown in [Figure 12 on page 18](#). Depending on the DOM model, you might also have to plug in a small power cord for the DOM. Ensure that you plug in the connectors properly.



P8EIP533-0

Figure 12. Installing a DOM

3. Prepare the system for operation. For instructions, see [“Preparing the 9006-12P system for operation after you remove and replace internal parts”](#) on page 95.
4. For a non-RAID drive, configure the installed drive for your environment. If the drive is part of a RAID configuration, skip this step, the drive is detected and configured when inserted.

After you insert the new drive, you need to rescan for the device.

Ubuntu Linux operating system

To run the **rescan-scsi-bus** command in the Ubuntu Linux operating system, log in to the system as the root user, and run the following command:

```
rescan-scsi-bus
```

The **rescan-scsi-bus** tool is available in the **scsitools** package; install the package by using the following command:

```
sudo apt-get install scsitools
```

Red Hat Enterprise Linux (RHEL) version 7.2

To run the **rescan** command in the RHEL version 7.2 operating system, log in to the system as the root user, and run the following command:

```
rescan-scsi-bus.sh -a
```


The **rescan-scsi-bus** tool is available in the `sg3_utils` package; install the package by using the following command:

```
yum install sg3_utils
```

You can also refer to: [Adding a Storage Device or Path \(https://access.redhat.com/documentation/en-US/Red_Hat_Enterprise_Linux/7/html/Storage_Administration_Guide/logical-unit-add-remove.html\)](https://access.redhat.com/documentation/en-US/Red_Hat_Enterprise_Linux/7/html/Storage_Administration_Guide/logical-unit-add-remove.html).

5. Load or restore data from your backup media.

Installing memory in the 9006-12P system

Learn how to install memory in the IBM Power System LC921 (9006-12P) system.

Placement rules for memory in the 9006-12P or 9006-22P system

Learn about the configurations and rules that apply to adding memory to the IBM Power System LC921 (9006-12P) or IBM Power System LC922 (9006-22P) system.

- The system supports, 2, 4, 6, 8, 12, or 16 memory DIMMs (dual inline memory modules)
- The memory DIMMs can be 8, 16, 32, 64, or 128 GB
- For a single-processor system, the first four DIMMs must be installed in a pairs. After the first four DIMMs, you must add memory DIMMs in quads.
- For a two-processor system, the first eight DIMMs must be installed in a pairs. After the first eight DIMMS, you must add memory DIMMs in quads.
- Memory pairs must have the same size and type (A and B must match each other; C and D must match each other).
- Memory pairs can have different memory sizes and types from other memory pairs (A and B do not need to match C and D).
- The memory DIMMs must be added in a sequence.
- For a two-processor system, use [Table 2 on page 19](#) and [Figure 13 on page 20](#) to determine the memory placement.
- For a single-processor system, use [Table 3 on page 20](#) and [Figure 14 on page 21](#).

Slot Location	Plugging Sequence
P1-A1 and P1-B1	1
P2-A1 and P2-B1	2
P1-C1 and P1-D1	3
P2-C1 and P2-D1	4
P1-A2, P1-B2, P1-C2, and P1-D2	5
P2-A2, P2-B2, P2-C2, and P2-D2	6

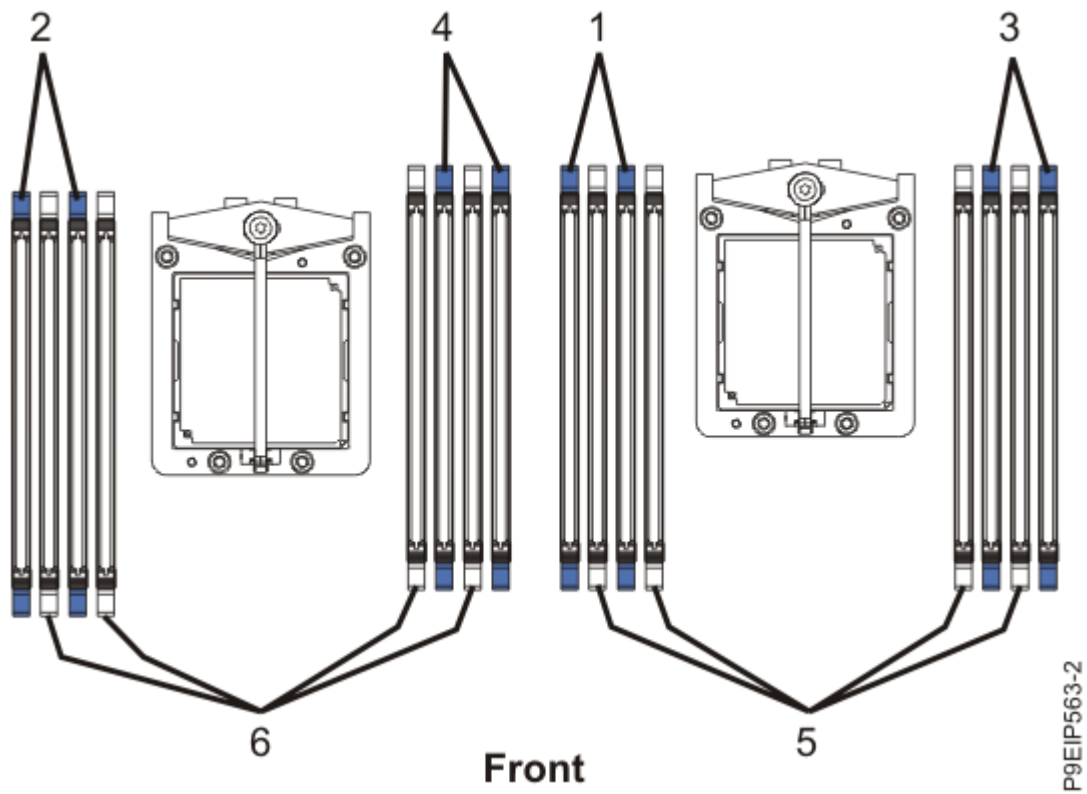


Figure 13. Two-processor memory plugging sequence

Slot Location	Plugging Sequence
P1-A1 and P1-B1	1
P1-C1 and P1-D1	2
P1-A2, P1-B2, P1-C2, and P1-D2	3

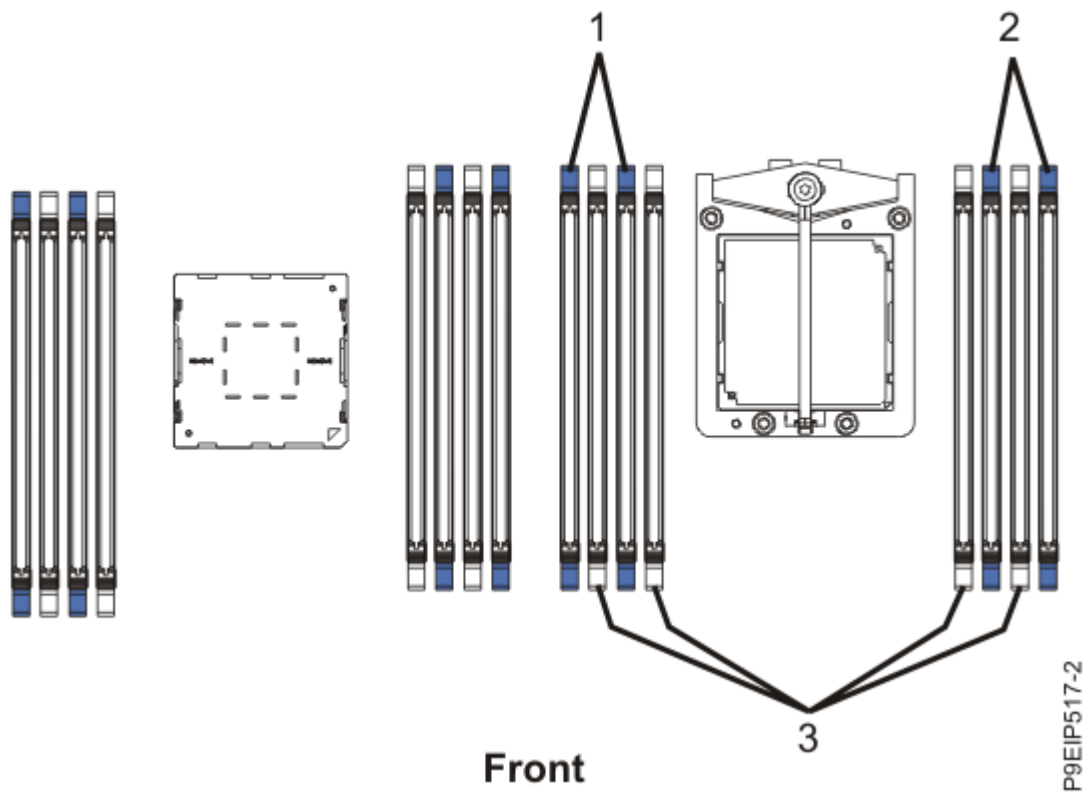


Figure 14. Single-processor plugging sequence

Installing memory in the 9006-12P system

Learn how to install memory in the IBM Power System LC921 (9006-12P) system.

Before you begin

Power off the system and place it in the service position. For instructions, see [“Preparing the 9006-12P system to remove and replace internal parts”](#) on page 92.

Procedure

1. Attach the electrostatic discharge (ESD) wrist strap.

The ESD wrist strap must be connected to an unpainted metal surface until the service procedure is completed, and if applicable, until the service access cover is replaced.



Attention:

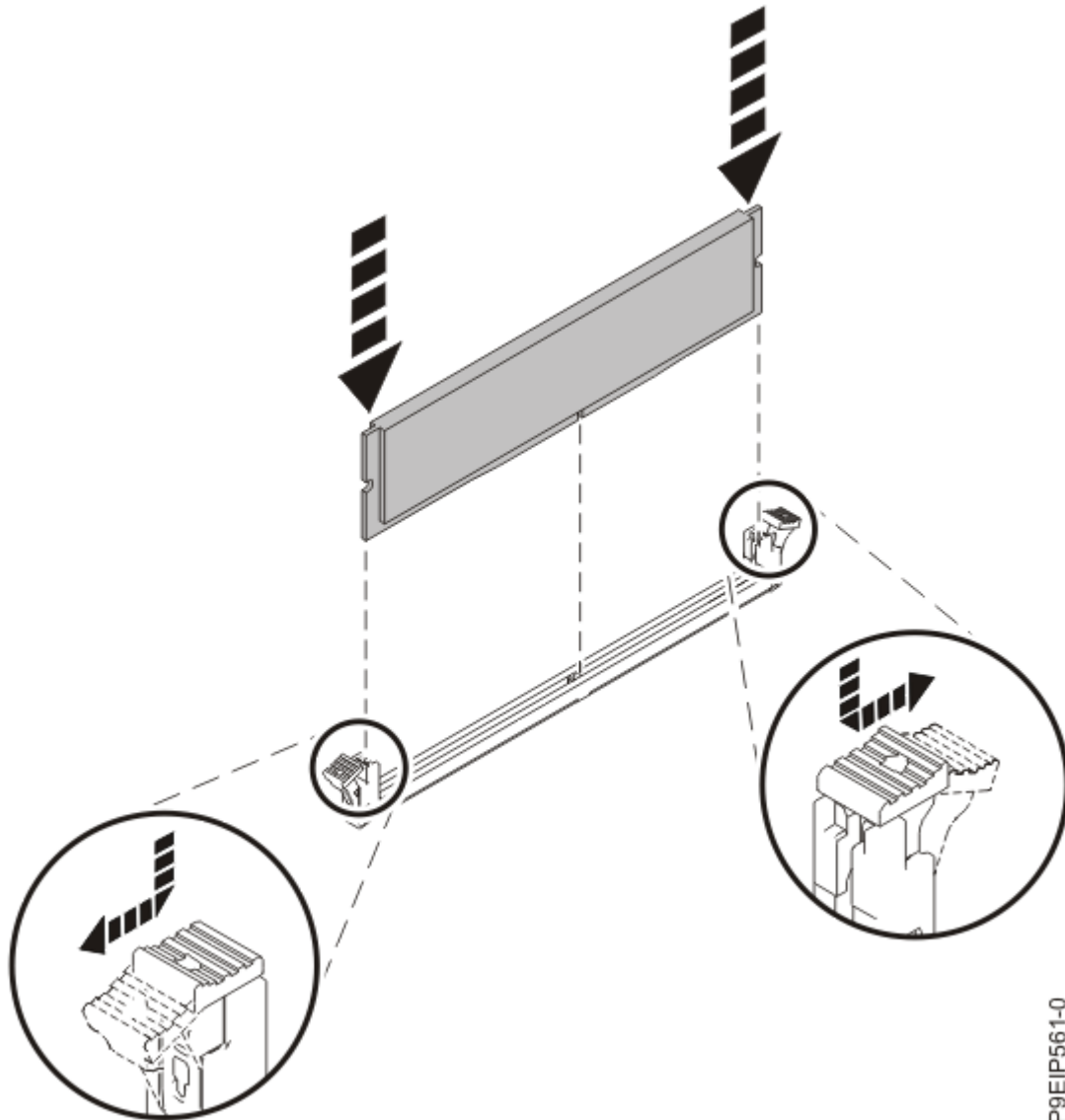
- Attach an electrostatic discharge (ESD) wrist strap to the front ESD jack, to the rear ESD jack, or to an unpainted metal surface of your hardware to prevent the electrostatic discharge from damaging your hardware.
- When you use an ESD wrist strap, follow all electrical safety procedures. An ESD wrist strap is used for static control. It does not increase or decrease your risk of receiving electric shock when using or working on electrical equipment.
- If you do not have an ESD wrist strap, just prior to removing the product from ESD packaging and installing or replacing hardware, touch an unpainted metal surface of the system for a minimum of 5 seconds. If at any point in this service process you move away from the system, it is important to again discharge yourself by touching an unpainted metal surface for at least 5 seconds before you continue with the service process.

2. Determine the slot in which you want to install the memory. See [“Placement rules for memory in the 9006-12P or 9006-22P system”](#) on page 19 to understand the plugging rules and to ensure that you plug the memory into the system in the correct sequence.
3. Depending on the memory location, you might need to remove the system processor air baffles. Carefully unsnap and lift the processor air baffle from the system.
4. Push the DIMM locking tabs away from the socket.
5. Insert the memory DIMM.
 - a) Grasp the memory DIMM along its edges and align it with the slot on the system backplane.



Attention: Memory is keyed to prevent it from being installed incorrectly. Note the location of the key tab within the memory connector before you attempt to install it.

- b) Press firmly on each side of the memory DIMM until the locking tab locks in place with an audible click.



P9EIP561-0

Figure 15. Inserting the memory DIMM

6. If you removed the system processor air baffle, replace it. Insert the edge of the air baffle into the fan support. Then, carefully press the air baffle down into place.

What to do next

Prepare the system for operation. For instructions, see “Preparing the 9006-12P system for operation after you remove and replace internal parts” on page 95.

Installing a PCIe adapter in the 9006-12P system

Learn how to install Peripheral Component Interconnect Express (PCIe) adapters in the system.

About this task

Installing this feature is a customer task. You can complete this task yourself, or contact a service provider to complete the task for you. You might be charged a fee by the service provider for this service.

The features listed in Table 4 on page 23 are electromagnetic compatibility (EMC) Class B features. See the [Class B Notices](#) in the Hardware Notices section.

Feature	Description
EKAA	Broadcom (LSI) MegaRAID 9361-8i SAS3 Controller with 8 Internal Ports (1 GB Cache) PCIe3.0 x8 LP with cables; Adapter part number: 01EM631 (AOC-K-9361-8IS-IB001) and 01EM636 (AOC-K-9361-8IB-IB001)
EKA3	Intel 82575EB Dual-port Gigabit Ethernet Controller PCIe x4.0 LP; Adapter part number: 01EM700 (AOC-SG-I2)
EKED	Broadcom (LSI) 9300-8E SAS3 HBA PCIe3.0 x8 LP Adapter; Adapter part number: 01EM634 (AOC-SAS3-9300-8E)
EKGC	Broadcom (LSI) 9305-16E SAS3 HBA PCIe3.0 x8 LP; Adapter part number: 01EM701 (AOC-SAS3-9305-16E)

PCIe adapter placement rules and slot priorities for the 9006-12P system

Find information about the placement rules and slot priorities for the Peripheral Component Interconnect Express (PCIe) adapters that are supported for the IBM Power System LC921 (9006-12P).

PCIe slot descriptions

The 9006-12P system provides PCIe generation 4 slots. Full-length, half-length, or short (low-profile) adapters can be installed. [Figure 16 on page 23](#) shows the rear view of the system with the PCIe adapter slots. [Table 5 on page 24](#) lists the PCIe adapter slot locations and details for the 9006-12P system.

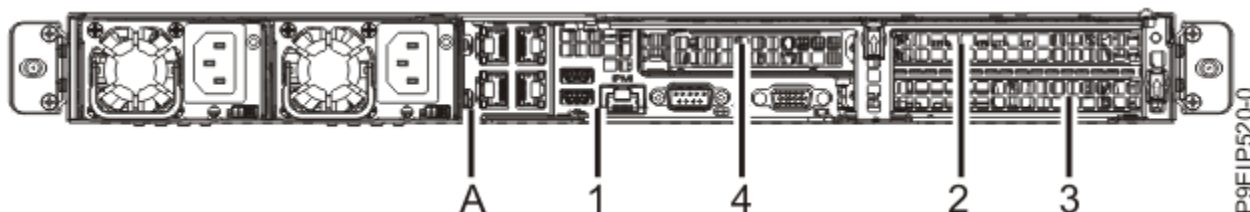


Figure 16. Rear view of an 9006-12P system with PCIe slots indicated

Table 5. PCIe slot locations and descriptions for the 9006-12P system

Slot location	CPU Connection	Description	Adapter size	Coherent Accelerator Processor Interface (CAPI)
1 (UIO Slot1)	CPU1-PEC0	PCIe4 x8	Half-height, half-length, internal	Yes
2 (WIO Slot1)	CPU2-PEC0	PCIe4 x16	Double-wide, full-height, full-length	Yes
3 (WIO Slot2)	CPU2-PEC2	PCIe4 x16	Full-height, full-length	Yes
4 (WIO-R Slot)	CPU2-PEC1	PCIe4 x8	Half-height, half-length	No

PCIe adapter placement rules

Use this information to select slots for installing PCIe adapters in the 9006-12P system. Table 6 on page 24 provides information about the adapters, the slot priorities in the system they are supported on, and the maximum number of adapters that can be installed in the supported system. You can click the link that appears in the feature code column for more technical information specific to the PCIe adapter.

Table 6. PCIe adapters supported in the 9006-12P system

Feature code	Description	9006-12P (1 processor)		9006-12P (2 processors)	
		Slot priority	Maximum number of adapters supported	Slot priority	Maximum number of adapters supported
EKA1	Cavium (Qlogic) BCM57840 PCIe3.0 x8 LP 4-port SFP+ 10 Gb Ethernet adapter; Adapter part number: 01EM699 (AOC-STG-B4S)	Not supported	Not supported	4, 3, 2	3
EKA2	Intel 82599ES Ethernet Converged Network Adapter x520-DA2 Dual-port 10G/1G SFP+ PCIe2.0 x8 LP; Adapter part number: 01EM697 (AOC-STGN-I2S)	Not supported	Not supported	4, 3, 2	3
EKA3	Intel 82575EB Dual-port Gigabit Ethernet Controller PCIe x4.0 LP; Adapter part number: 01EM700 (AOC-SG-I2)	Not supported	Not supported	4, 3, 2	3

Table 6. PCIe adapters supported in the 9006-12P system (continued)

Feature code	Description	9006-12P (1 processor)		9006-12P (2 processors)	
		Slot priority	Maximum number of adapters supported	Slot priority	Maximum number of adapters supported
EKAA	Broadcom (LSI) MegaRAID 9361-8i SAS3 Controller with 8 Internal Ports (1 GB Cache) PCIe3.0 x8 LP with cables; Adapter part number: 01EM631 (AOC-K-9361-8IS-IB001) and 01EM636 (AOC-K-9361-8IB-IB001)	1	1	1, 4, 3, 2	1
EKAB	SMC AOC-K-S3008L-L8i 12 Gbps SAS3/RAID 0,1 and 10 PCIe3.0 x8 LP with cables; Adapter part number: 01EM633 (AOC-SED-LSI00287) and 01EM638 (AOC-K-S3008L-L8iB-IB001)	1	1	1, 4, 3, 2	1
EKED	Broadcom (LSI) 9300-8E SAS3 HBA PCIe3.0 x8 LP Adapter; Adapter part number: 01EM634 (AOC-SAS3-9300-8E)	Not supported	Not supported	4, 3, 2	3
EKAF	Emulex LPE16002B-M6-O Dual-port 16 Gb Fibre Channel Card PCIe3.0 x8 LP; Adapter part number: 01EM694 (AOC-LPE16002B-M6-O)	Not supported	Not supported	4, 3, 2	3
EKAG	SMC Quad-port NVMe Host Bus Adapter (PEX9733) PCIe3.0 x8 LP with cables; Adapter part number: 01EM635 (AOC-K-SLG3-4E2PS-IB001) and 01EM639 (AOC-K-SLG3-4E2PB-IB001)	1	1	1, 4, 3, 2	1

Table 6. PCIe adapters supported in the 9006-12P system (continued)

Feature code	Description	9006-12P (1 processor)		9006-12P (2 processors)	
		Slot priority	Maximum number of adapters supported	Slot priority	Maximum number of adapters supported
EKAH	Broadcom (LSI) MegaRAID 9361-8i SAS3 Controller with 8 internal ports (2 GB Cache) PCIe3.0 x8 with cables; Adapter part number: 01EM632 (AOC-K-9361-8I2S-IB001) and 01EM637 (AOC-K-9361-8I2B-IB001)	1	1	1, 4, 3, 2	1
EKAM	Mellanox MCX415A-CCAT ConnectX-4 EN 100 GbE Single-port QSFP28 PCIe3.0 x16 LP; Adapter part number: 01EM687 (AOC-MCX415A-CCAT-IB001)	Not supported	Not supported	2, 3	2
EKAQ	Qlogic QLE2692OP Dual-port 16 Gb Fibre Channel adapter PCIe3 x8 LP; Adapter part number: 01EM692 (AOC-QLE2692SR-IB001)	Not supported	Not supported	4, 3, 2	2
EKAU	Mellanox MCX4121A-ACAT ConnectX-4 Lx EN 25 GbE Dual-port SFP28 PCIe3.0 x8 LP; Adapter part number: 01EM688 (AOC-MCX4121A-ACAT-IB001)	Not supported	Not supported	4, 3, 2	3
EKAY	Mellanox MCX556A-EDAT ConnectX-5 VPI EDR InfiniBand 100 Gb/s and 100 GbE Dual-port QSFP28 PCIe4.0 x16 LP; Adapter part number: 01EM691 (AOC-MCX556A-EDAT-IB001)	Not supported	Not supported	2, 3	2

Table 6. PCIe adapters supported in the 9006-12P system (continued)

Feature code	Description	9006-12P (1 processor)		9006-12P (2 processors)	
		Slot priority	Maximum number of adapters supported	Slot priority	Maximum number of adapters supported
EKF1	Mellanox MCX414A-BCAT ConnectX-4 EN dual-port 40/56GbE QFSP28 PCIe3.0 x8 LP adapter; Adapter part number: 01EM689 (AOC-MCX414A-BCAT-IB001)	Not supported	Not supported	4,3,2	3
EKFD	Mellanox MCX555A-ECAT ConnectX-5 VPI EDR InfiniBand 100 Gb/s and 100 GbE Single-port QSFP28 PCIe3.0 x16 LP; Adapter part number: 01EM690 (AOC-MCX555A-ECAT-IB001)	Not supported	Not supported	2, 3	2
EKFE	Qlogic QLE2742 32 Gb Fibre Channel adapter PCIe3 x8 2-port LP; Adapter part number: 01EM693 (AOC-QLE2742SR-IB001)	Not supported	Not supported	4, 3, 2	3
EKFF	Broadcom 5719 QP 1G (1G/100M/10M) Network Interface Card PCIe x4 LP; Adapter part number: 01EM698 (AOC-BCM5719-4P-BRC)	Not supported	Not supported	4, 3, 2	3
EKFH	Intel XL710 Ethernet Converged Network Adapter Quad-port 10G/1G SFP+ PCIe3.0 x8 LP; Adapter part number: 01EM695 (AOC-STG-i4S)	Not supported	Not supported	4, 3, 2	3
EKFP	Intel XL710/X557 10GBase-T Converged Network Adapter Quad-port (10G/1G/100M speeds) PCIe3.0 x8 LP; Adapter part number: 01EM696 (AOC-STG-i4T)	Not supported	Not supported	4, 3, 2	3

Table 6. PCIe adapters supported in the 9006-12P system (continued)

Feature code	Description	9006-12P (1 processor)		9006-12P (2 processors)	
		Slot priority	Maximum number of adapters supported	Slot priority	Maximum number of adapters supported
EKGC	Broadcom (LSI) 9305-16E SAS3 HBA PCIe3.0 x8 LP; Adapter part number: 01EM701 (AOC-SAS3-9305-16E)	Not supported	Not supported	4, 3, 2	3
EKSQ	Samsung PM1725a NVMe 1.6 TB 5DWPD PCIe3.0 x8 LP Adapter; Adapter part number: 01EM677 (HDS-AVT-MZPLL1T6HEHP003)	1	1	4, 3, 2, 1	4
EKSR	Samsung PM1725a NVMe 3.2 TB 5DWPD PCIe3.0 x8 LP Adapter; Adapter part number: 01EM678 (HDS-AVT-MZPLL3T2HMLS003)	1	1	4, 3, 2, 1	4

PCIe adapter information by feature type for the 9006-12P

Find information about the Peripheral Component Interconnect Express (PCIe) adapters that are supported for the IBM Power System LC921 (9006-12P) server.

The table shows the available adapters by feature code (FC), description, adapter FRU number, and provides a link to more details for each adapter.

Important:

- This document does not replace the latest sales and marketing publications and tools that document supported features.
- If you are installing a new feature, ensure that you have the software and utilities that are required to support the new feature and determine whether you must install any adapter firmware updates. The latest version of adapter firmware and utilities can be downloaded from [Fix Central](http://www.ibm.com/support/fixcentral/) (<http://www.ibm.com/support/fixcentral/>).

Table 7. PCIe adapters supported in the 9006-12P system

Feature code	Description
EKA1	Cavium (Qlogic) BCM57840 PCIe3.0 x8 LP 4-port SFP+ 10 Gb Ethernet adapter; Adapter part number: 01EM699 (AOC-STG-B4S)
EKA2	Intel 82599ES Ethernet Converged Network Adapter x520-DA2 Dual-port 10G/1G SFP+ PCIe2.0 x8 LP; Adapter part number: 01EM697 (AOC-STGN-I2S)
EKA3	Intel 82575EB Dual-port Gigabit Ethernet Controller PCIe x4.0 LP; Adapter part number: 01EM700 (AOC-SG-I2)
EKAA	Broadcom (LSI) MegaRAID 9361-8i SAS3 Controller with 8 Internal Ports (1 GB Cache) PCIe3.0 x8 LP with cables; Adapter part number: 01EM631 (AOC-K-9361-8IS-IB001) and 01EM636 (AOC-K-9361-8IB-IB001)

Table 7. PCIe adapters supported in the 9006-12P system (continued)

Feature code	Description
EKAB	SMC AOC-K-S3008L-L8i 12 Gbps SAS3/RAID 0,1 and 10 PCIe3.0 x8 LP with cables; Adapter part number: 01EM633 (AOC-SED-LSI00287) and 01EM638 (AOC-K-S3008L-L8iB-IB001)
EKAF	Emulex LPE16002B-M6-O Dual-port 16 Gb Fibre Channel Card PCIe3.0 x8 LP; Adapter part number: 01EM694 (AOC-LPE16002B-M6-O)
EKAG	SMC Quad-port NVMe Host Bus Adapter (PEX9733) PCIe3.0 x8 LP with cables; Adapter part number: 01EM635 (AOC-K-SLG3-4E2PS-IB001) and 01EM639 (AOC-K-SLG3-4E2PB-IB001)
EKAH	Broadcom (LSI) MegaRAID 9361-8i SAS3 Controller with 8 internal ports (2 GB Cache) PCIe3.0 x8 with cables; Adapter part number: 01EM632 (AOC-K-9361-8I2S-IB001) and 01EM637 (AOC-K-9361-8I2B-IB001)
EKAM	Mellanox MCX415A-CCAT ConnectX-4 EN 100 GbE Single-port QSFP28 PCIe3.0 x16 LP; Adapter part number: 01EM687 (AOC-MCX415A-CCAT-IB001)
EKAQ	Qlogic QLE2692OP Dual-port 16 Gb Fibre Channel adapter PCIe3 x8 LP; Adapter part number: 01EM692 (AOC-QLE2692SR-IB001)
EKAU	Mellanox MCX4121A-ACAT ConnectX-4 Lx EN 25 GbE Dual-port SFP28 PCIe3.0 x8 LP; Adapter part number: 01EM688 (AOC-MCX4121A-ACAT-IB001)
EKAY	Mellanox MCX556A-EDAT ConnectX-5 VPI EDR InfiniBand 100 Gb/s and 100 GbE Dual-port QSFP28 PCIe4.0 x16 LP; Adapter part number: 01EM691 (AOC-MCX556A-EDAT-IB001)
EKED	Broadcom (LSI) 9300-8E SAS3 HBA PCIe3.0 x8 LP Adapter; Adapter part number: 01EM634 (AOC-SAS3-9300-8E)
EKF1	Mellanox MCX414A-BCAT ConnectX-4 EN dual-port 40/56GbE QFSP28 PCIe3.0 x8 LP adapter; Adapter part number: 01EM689 (AOC-MCX414A-BCAT-IB001)
EKFD	Mellanox MCX555A-ECAT ConnectX-5 VPI EDR InfiniBand 100 Gb/s and 100 GbE Single-port QSFP28 PCIe3.0 x16 LP; Adapter part number: 01EM690 (AOC-MCX555A-ECAT-IB001)
EKFE	Qlogic QLE2742 32 Gb Fibre Channel adapter PCIe3 x8 2-port LP; Adapter part number: 01EM693 (AOC-QLE2742SR-IB001)
EKFF	Broadcom 5719 QP 1G (1G/100M/10M) Network Interface Card PCIe x4 LP; Adapter part number: 01EM698 (AOC-BCM5719-4P-BRC)
EKFH	Intel XL710 Ethernet Converged Network Adapter Quad-port 10G/1G SFP+ PCIe3.0 x8 LP; Adapter part number: 01EM695 (AOC-STG-i4S)
EKFP	Intel XL710/X557 10GBase-T Converged Network Adapter Quad-port (10G/1G/100M speeds) PCIe3.0 x8 LP; Adapter part number: 01EM696 (AOC-STG-i4T)
EKGC	Broadcom (LSI) 9305-16E SAS3 HBA PCIe3.0 x8 LP; Adapter part number: 01EM701 (AOC-SAS3-9305-16E)
EKSQ	Samsung PM1725a NVMe 1.6 TB 5DWPD PCIe3.0 x8 LP Adapter; Adapter part number: 01EM677 (HDS-AVT-MZPLL1T6HEHP003)
EKSR	Samsung PM1725a NVMe 3.2 TB 5DWPD PCIe3.0 x8 LP Adapter; Adapter part number: 01EM678 (HDS-AVT-MZPLL3T2HMLS003)

PCIe3 x4 Intel x550 10GBase-T Converged Network Adapter with Dual RJ45 Ports (FC EKA0)

Learn about the specifications and operating system requirements for feature code (FC) EKA0 adapters.

Overview

The PCIe3 x4 Intel x550 10GBase-T Converged Network Adapter with Dual RJ45 Ports is a PCI Express (PCIe) generation 3 (Gen3) x4 adapter. The adapter can be used in either a x8 or x16 PCIe slot in the system. The adapter has an auto-negotiation feature 1 - 10 GbE that offers compatibility with earlier versions for a smooth transition to 10 GbE.

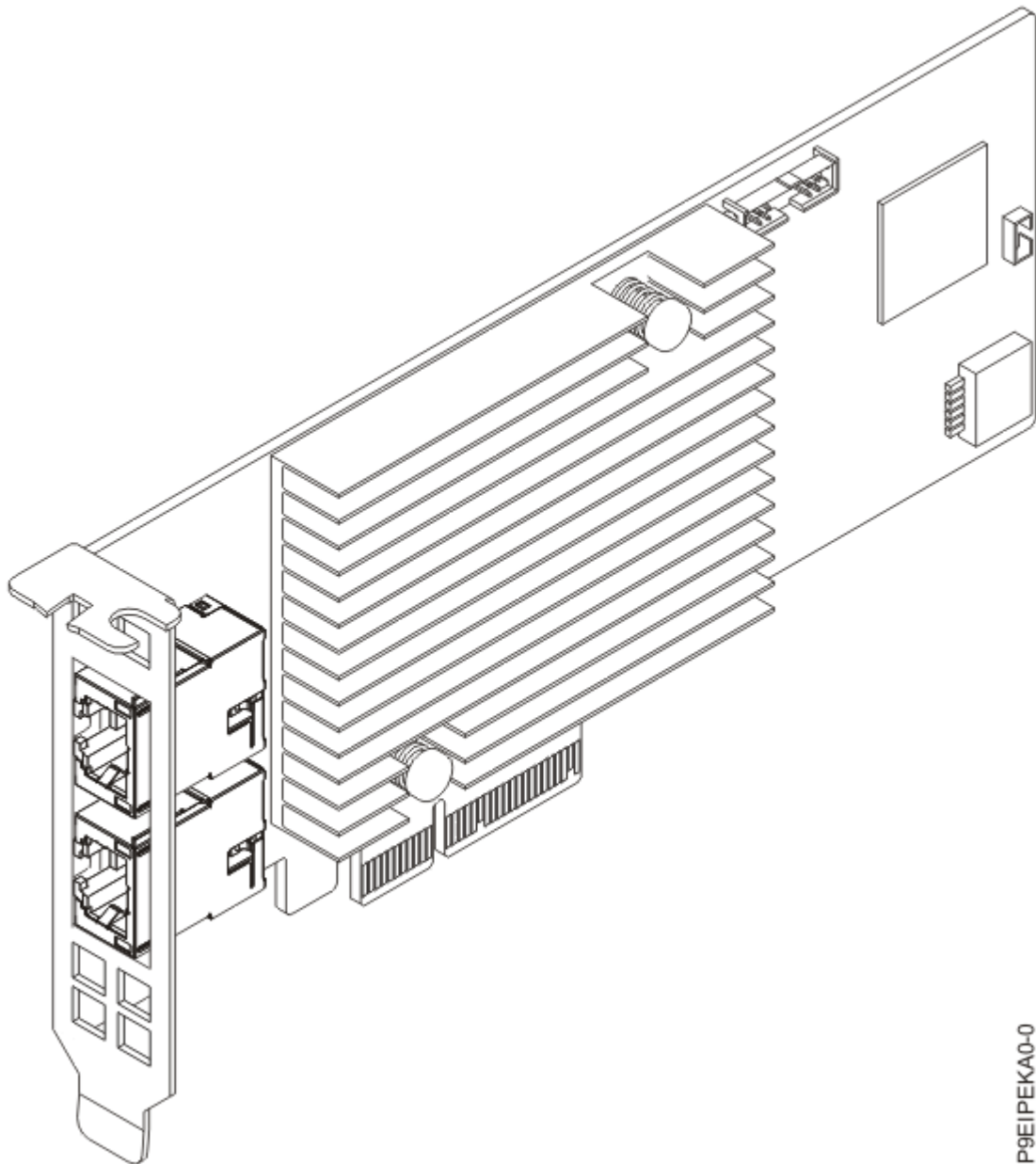


Figure 17. PCIe3 x4 Intel x550 10GBase-T Converged Network Adapter with Dual RJ45 Ports

Specifications

Item	Description
------	-------------

Adapter FRU number

AOC-STGS-I2T.

I/O bus architecture

PCIe3 x4.

Slot requirement

For more information about slot priorities, maximums, and placement rules, see the [PCIe adapter placement rules for the 9006-12P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) or [PCIe adapter placement rules for the 9006-22P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita).

Cables

RJ-45 Category-6 up to 55 M.

Voltage

3.3 V, 12 V.

Form factor

Short, low-profile.

Attributes provided

Direct Cache Access (DCA) to avoid cache misses.

TCP/UDP Segmentation offload.

Support for Virtual Machine Device Queues (VMDq and Next-generation VMDq).

Preboot eXecution Environment (PXE) support.

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether any prerequisites must be met for this feature and attaching devices. To check for operating system and partition requirements, see one of the following links:

- The latest version of enabling libraries and utilities can be downloaded from the [Fix Central](http://www.ibm.com/support/fixcentral/) website (<http://www.ibm.com/support/fixcentral/>).
- [IBM Prerequisite website](http://www14.software.ibm.com/support/customercare/iprt/home) (www14.software.ibm.com/support/customercare/iprt/home).
- [IBM System Storage Interoperation Center \(SSIC\)](http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss) (<http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss>)
- The latest version of the device driver or the IBM Power RAID adapter utilities (iprutils) can be downloaded from the [IBM Service and Productivity Tools](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html) website (<http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html>).
- For information about important notices for Linux on IBM Power Systems, see the [Linux on IBM](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html) website (www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html).

Cavium (Qlogic) BCM57840 PCIe3.0 x8 LP 4-port SFP+ 10 Gb Ethernet adapter (FC EKA1)

Learn about the specifications and operating system requirements for the feature code (FC) EKA1 adapter.

Overview

The Cavium (Qlogic) BCM57840 PCIe3.0 x8 LP 4-port SFP+ 10 Gb Ethernet adapter is a PCI Express (PCIe) generation 3 (Gen3) x8 adapter. The adapter can be used in either a x8 or x16 PCIe slot in the system. The adapter offers a broad selection of networking features that include TCP offload, support for PXE boot and virtualized environments (VMDq and PC-SIG SRIOV), and energy-efficient Ethernet (IEEE 802.3az).

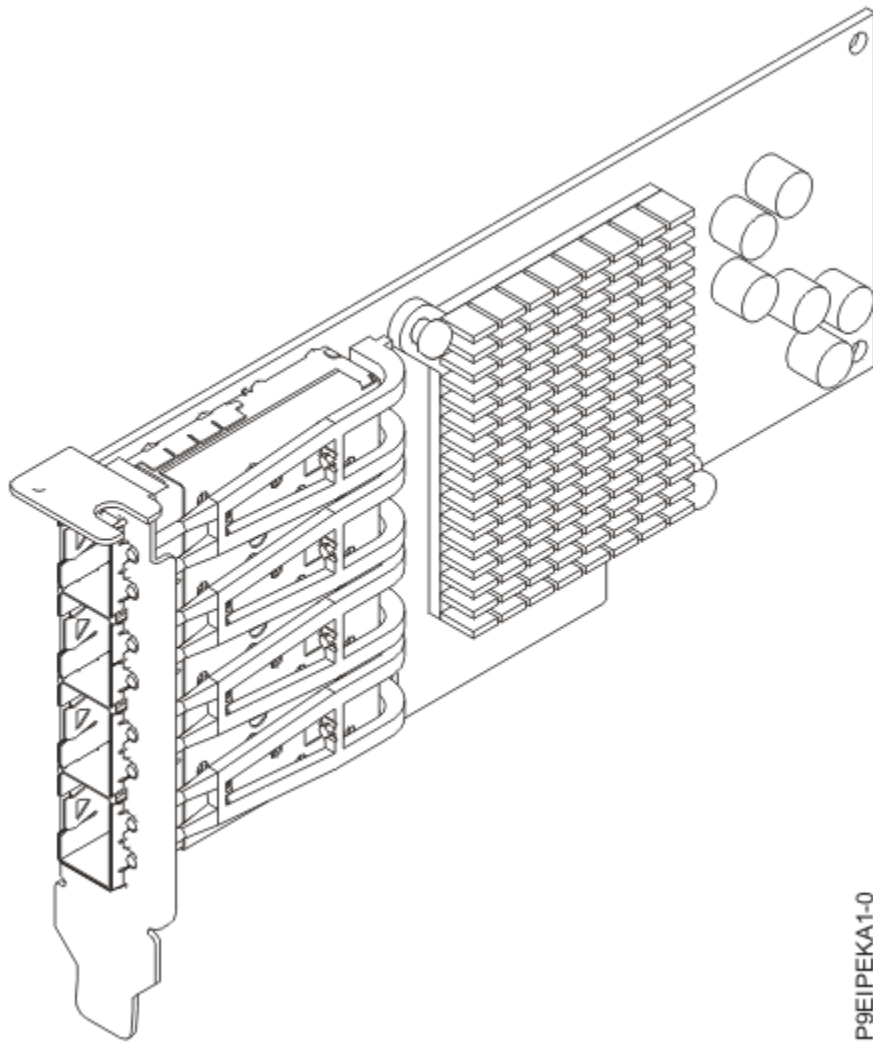


Figure 18. Cavium (Qlogic) BCM57840 PCIe3.0 x8 LP 4-port SFP+ 10 Gb Ethernet adapter

Specifications

Item

Description

Adapter FRU number

01EM699 (AOC-STG-B4S).

I/O bus architecture

PCIe3 x8.

Slot requirement

For more information about slot priorities, maximums, and placement rules, see the [PCIe adapter placement rules for the 9006-12P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) or [PCIe adapter placement rules for the 9006-22P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita)

Voltage

3.3 V, 12 V.

Form factor

Short, low-profile.

Attributes provided

4 10Gb SFP+ ports.

TCP offload engine (TOE) for iSCSI and networking acceleration.

IPv6 acceleration.

SR-IOV with up to 64 virtual functions (VFs) for guest operating systems (GOS) per port.

Transceivers and cables

FC EKC0: 3 M 10 Gb SFP+ SR Cable Fiber Active Optical Cable (AOC).

FC EKC1: 3 M 10 Gb SFP+ Copper Passive.

FC EKC2: 10/1 Gb SFP+ SR Optical Transceiver.

LC-LC fiber-optic cables (with required optional transceivers).

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether any prerequisites must be met for this feature and attaching devices. To check for operating system and partition requirements, see one of the following links:

- The latest version of enabling libraries and utilities can be downloaded from the [Fix Central](http://www.ibm.com/support/fixcentral/) website (<http://www.ibm.com/support/fixcentral/>).
- [IBM Prerequisite website](http://www14.software.ibm.com/support/customer/ibm/prerequisite/home) (www14.software.ibm.com/support/customer/ibm/prerequisite/home).
- [IBM System Storage Interoperation Center \(SSIC\)](http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss) (<http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss>)
- The latest version of the device driver or the IBM Power RAID adapter utilities (iprutils) can be downloaded from the [IBM Service and Productivity Tools website](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html) (<http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html>).
- For information about important notices for Linux on IBM Power Systems, see the [Linux on IBM](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html) website (www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html).

Intel 82599ES Ethernet Converged Network Adapter x520-DA2 Dual-port 10G/1G SFP+ PCIe2.0 x8 LP (FC EKA2)

Learn about the specifications and operating system requirements for the feature code (FC) EKA2 adapter.

Overview

The Intel 82599ES Ethernet Converged Network Adapter x520-DA2 Dual-port 10G/1G SFP+ PCIe2.0 x8 LP is a PCI Express (PCIe) generation 2 (Gen2) x8 adapter. The adapter can be used in either a x8 or x16 PCIe slot in the system. The adapter offers a broad selection of features including iSCSI remote boot support, load balancing on multiple CPUs, and Fibre Channel over Ethernet (FCoE) support.

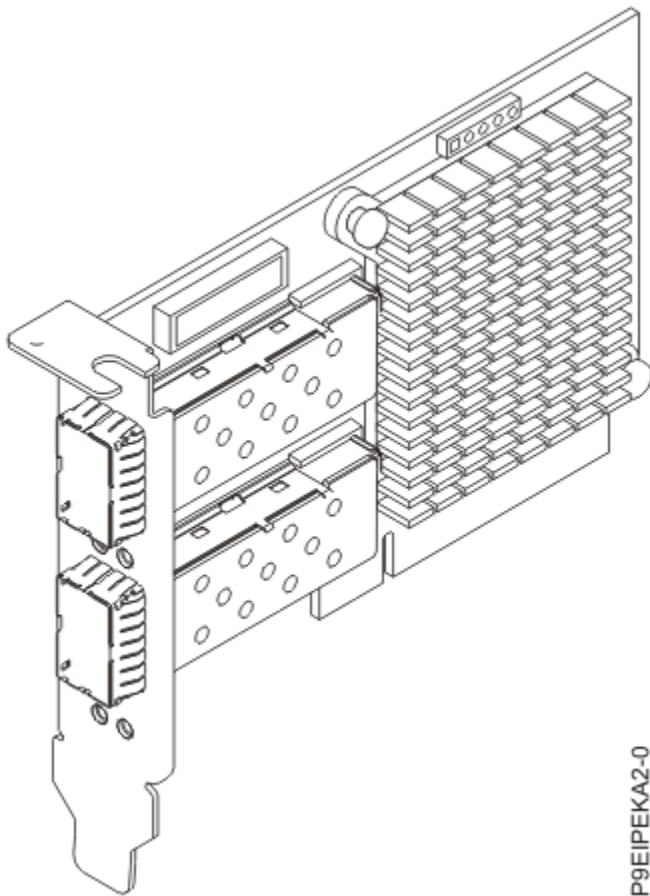


Figure 19. Intel 82599ES Ethernet Converged Network Adapter x520-DA2 Dual-port 10G/1G SFP+ PCIe2.0 x8 LP

Specifications

Item

Description

Adapter FRU number

01EM697 (AOC-STGN-I2S)

I/O bus architecture

PCIe2 x8

Slot requirement

For more information about slot priorities, maximums, and placement rules, see the [PCIe adapter placement rules for the 9006-12P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) or [PCIe adapter placement rules for the 9006-22P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita)

Voltage

3.3V, 12 V.

Form factor

Short, low-profile.

Attributes provided

Preboot eXecution Environment (PXE) support.

Direct Cache Access (DCA) to avoid cache misses.

IPv6 offloading.

VMDq, Next-generation VMDq (64 queues per port) and PC-SIG SR-IOV implementation.

Transceivers and cables

FC EKC0: 3 M 10 Gb SFP+ SR Cable Fiber Active Optical Cable (AOC)

FC EKC1: 3 M 10 Gb SFP+ Copper Passive

FC EKC2: 10/1 Gb SFP+ SR Optical Transceiver

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether any prerequisites must be met for this feature and attaching devices. To check for operating system and partition requirements, see one of the following links:

- The latest version of enabling libraries and utilities can be downloaded from the [Fix Central](http://www.ibm.com/support/fixcentral/) website (<http://www.ibm.com/support/fixcentral/>).
- [IBM Prerequisite website](http://www14.software.ibm.com/support/customer/care/iprt/home) (www14.software.ibm.com/support/customer/care/iprt/home).
- [IBM System Storage Interoperation Center \(SSIC\)](http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss) (<http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss>)
- The latest version of the device driver or the IBM Power RAID adapter utilities (iprutils) can be downloaded from the [IBM Service and Productivity Tools](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html) website (<http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html>).
- For information about important notices for Linux on IBM Power Systems, see the [Linux on IBM](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html) website (www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html).

Intel 82575EB Dual-port Gigabit Ethernet Controller PCIe x4.0 LP (FC EKA3)

Learn about the specifications and operating system requirements for feature code (FC) EKA3 adapters.

Overview

The Intel 82575EB Dual-port Gigabit Ethernet Controller PCIe x4.0 LP is a PCI Express (PCIe) generation 2 (Gen2) x4 adapter. The adapter can be used in either an x8 or x16 PCIe slot in the system. The adapter offers a high-performing PCIe 10/100/1000 Ethernet connection. It also improves flexibility and performance in a virtualized environment in multi-core systems by lowering interrupt overhead and providing sorted multiple data queue paths.

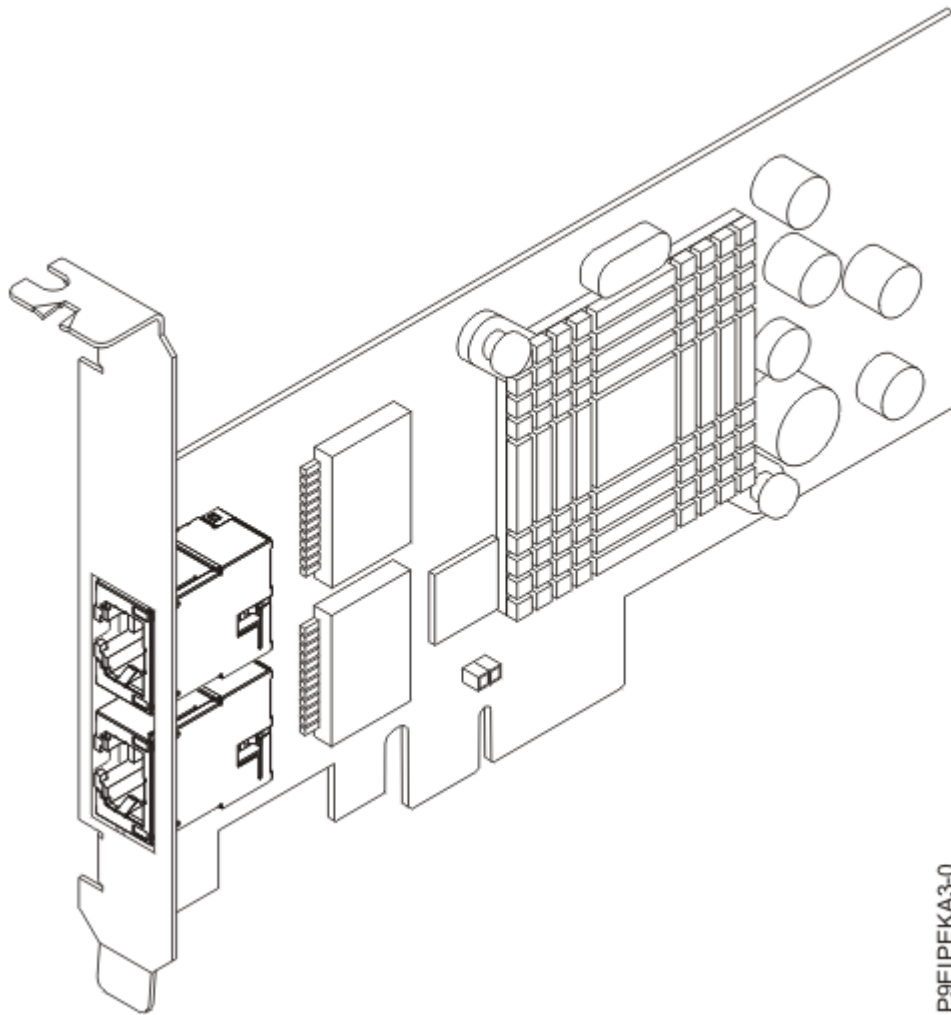


Figure 20. Intel 82575EB Dual-port Gigabit Ethernet Controller PCIe x4.0 LP

Specifications

Item

Description

Adapter FRU number

01EM700 (AOC-SG-I2)

I/O bus architecture

PCIe2 x4.

Slot requirement

For more information about slot priorities, maximums, and placement rules, see the [PCIe adapter placement rules for the 9006-12P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) or [PCIe adapter placement rules for the 9006-22P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita).

Voltage

3.3 V, 12 V.

Attributes provided

- Preboot eXecution Environment (PXE) support.
- Intel I/O Acceleration Technology (I/O AT).
- Direct Cache Access (DCA).
- Low-latency interrupts.

Transceivers and cables

Supported cable length is more than 100 M.

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether any prerequisites must be met for this feature and attaching devices. To check for operating system and partition requirements, see one of the following links:

- The latest version of enabling libraries and utilities can be downloaded from the [Fix Central](http://www.ibm.com/support/fixcentral/) website (<http://www.ibm.com/support/fixcentral/>).
- [IBM Prerequisite](http://www14.software.ibm.com/support/customercare/iprt/home) website (www14.software.ibm.com/support/customercare/iprt/home).
- [IBM System Storage Interoperation Center \(SSIC\)](http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss) (<http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss>)
- The latest version of the device driver or the IBM Power RAID adapter utilities (iprutils) can be downloaded from the [IBM Service and Productivity Tools](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html) website (<http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html>).
- For information about important notices for Linux on IBM Power Systems, see the [Linux on IBM](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html) website (www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html).

Broadcom (LSI) MegaRAID 9361-8i SAS3 Controller with 8 Internal Ports (1 GB Cache) PCIe3.0 x8 LP with cables (FC EKAA and EKEA)

Learn about the specifications and operating system requirements for feature code (FC) EKAA and EKEA adapters.

Overview

The Broadcom (LSI) MegaRAID 9361-8i SAS3 Controller with 8 Internal Ports (1 GB Cache) PCIe3.0 x8 LP with cables is a PCI Express (PCIe) generation 3 (Gen3) x8 adapter. The adapter can be used in either a x8 or x16 PCIe slot in the system. The adapter features 8 internal SAS connectors for high-performance storage connectivity. This Redundant Array of Independent Disks (RAID) adapter is built on the LSI Logic SAS IC and MegaRAID technology. It also supports high capacity storage applications by using high-performance RAID architecture, including hardware RAID 5 and 6.

Important: RAID mode is the adapter default and needs to be configured by the customer before drives are shown to the operating system for installation. For instructions, see [StorCLI commands](#).

Note: This adapter requires an additional PCIe slot to mount the CacheVault supercapacitor.

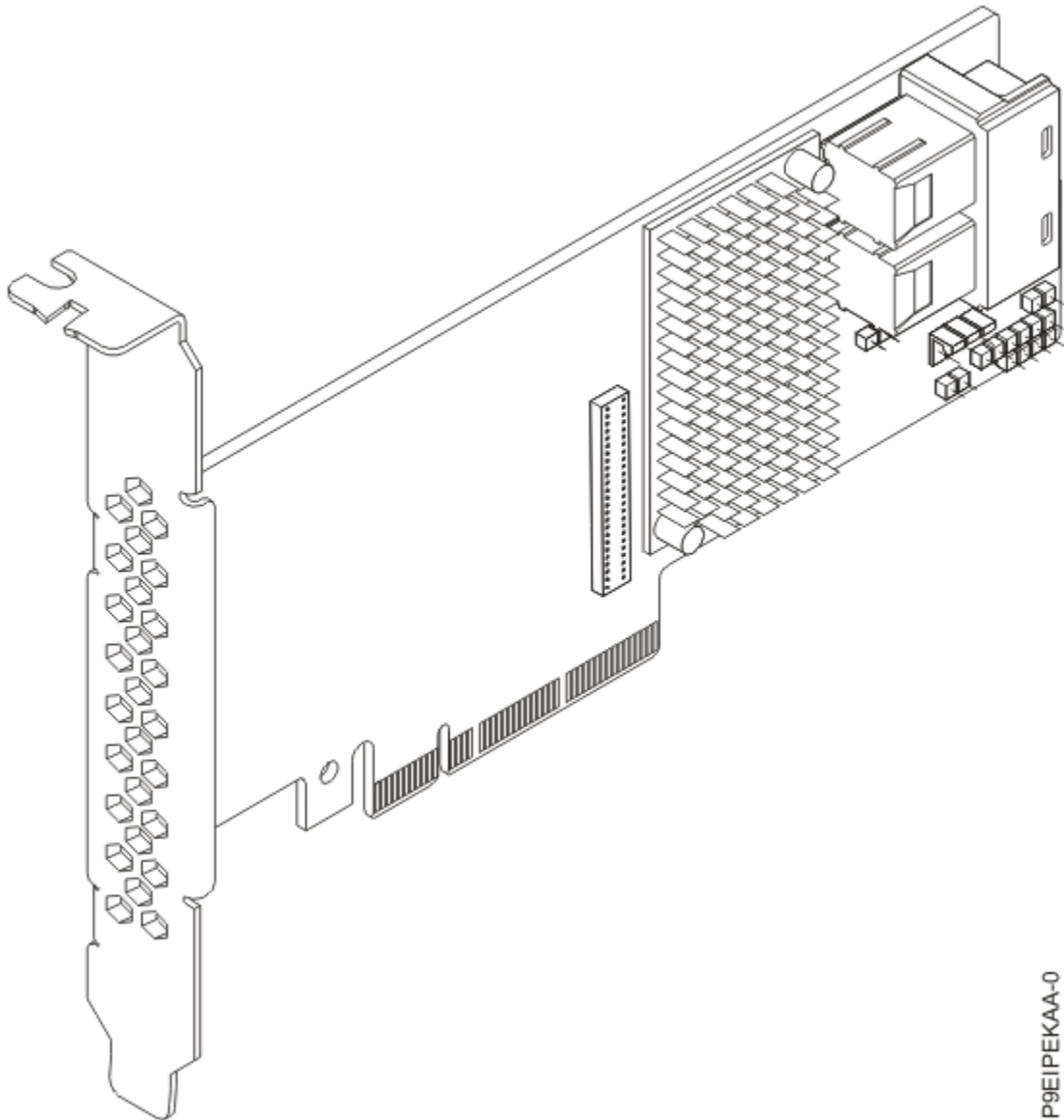


Figure 21. Broadcom (LSI) MegaRAID 9361-8i SAS3 Controller with 8 Internal Ports (1 GB Cache) PCIe3.0 x8 LP with cables

Specifications

Item

Description

Adapter FRU number

FC ECAA: 01EM631 (AOC-K-9361-8IS-IB001)

FC EKEA: 01EM636 (AOC-K-9361-8IB-IB001)

I/O bus architecture

PCIe3 x8

Slot requirement

For more information about slot priorities, maximums, and placement rules, see the PCIe adapter placement rules for the 9006-12P (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) or PCIe adapter placement rules for the 9006-22P (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita).

Voltage

3.3 V, 12 V.

Form factor

Short, low-profile.

Attributes provided

Port-independent auto-negotiation.

Automatically negotiates PCIe link widths.

Supports 1.5, 3.0, 6.0 and 12 Gb/s SAS and SATA data transfer rates.

Advanced array configuration and management utilities.

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether any prerequisites must be met for this feature and attaching devices. To check for operating system and partition requirements, see one of the following links:

- The latest version of enabling libraries and utilities can be downloaded from the [Fix Central](http://www.ibm.com/support/fixcentral/) website (<http://www.ibm.com/support/fixcentral/>).
- [IBM Prerequisite website](http://www14.software.ibm.com/support/customer/care/iprt/home) (www14.software.ibm.com/support/customer/care/iprt/home).
- [IBM System Storage Interoperation Center \(SSIC\)](http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss) (<http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss>)
- The latest version of the device driver or the IBM Power RAID adapter utilities (iprutils) can be downloaded from the [IBM Service and Productivity Tools](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html) website (<http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html>).
- For information about important notices for Linux on IBM Power Systems, see the [Linux on IBM](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html) website (www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html).

Important: For a list of known Linux operating system issues that might affect this adapter, see the [IBM Power LC readme](https://ibm.biz/BdrgTZ) (<https://ibm.biz/BdrgTZ>).

SMC AOC-K-S3008L-L8i 12 Gbps SAS3/RAID 0,1 and 10 PCIe3.0 x8 LP with cables (FC EKAB and EKEB)

Learn about the specifications and operating system requirements for feature code (FC) EKAB and EKEB adapters.

Overview

The SMC AOC-K-S3008L-L8i 12 Gbps SAS3/RAID 0,1 and 10 PCIe3.0 x8 LP with cables is a PCI Express (PCIe) generation 3 (Gen3) x8 adapter. The adapter can be placed in either a x8 or x16 PCIe slot in the system. The 12 Gb/s 8-Port SAS Internal RAID Adapter features 8 internal SAS connectors for high-performance storage connectivity.

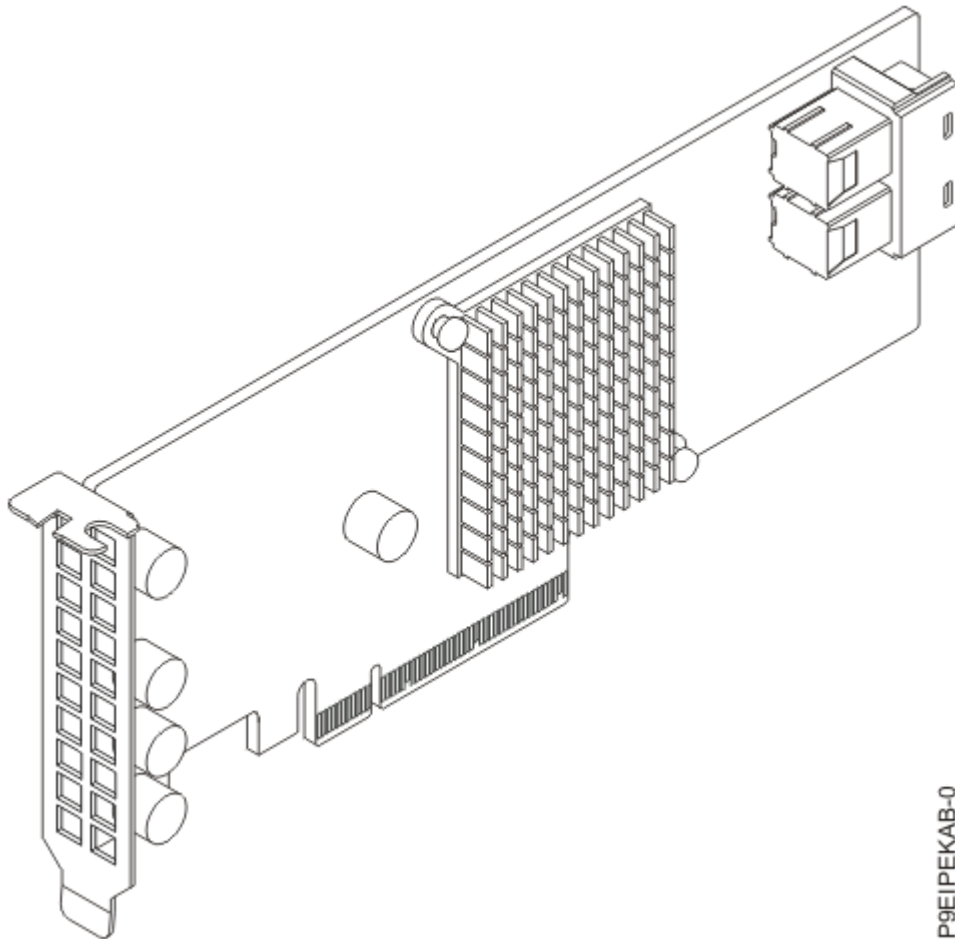


Figure 22. SMC AOC-K-S3008L-L8i 12 Gbps SAS3/RAID 0,1 and 10 PCIe3.0 x8 LP with cables

Specifications

Item

Description

Adapter FRU number

FC EKAB: AOC-K-S3008L-L8iS-IB001

FC EKEB: AOC-K-S3008L-L8iB-IB001

I/O bus architecture

PCIe3 x8

Slot requirement

For more information about slot priorities, maximums, and placement rules, see the [PCIe adapter placement rules for the 9006-12P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) or [PCIe adapter placement rules for the 9006-22P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita)

Voltage

3.3 V, 12 V.

Form factor

Short, low-profile.

Attributes provided

Port-independent auto-negotiation.

Supports MegaRAID Storage Manager software.

Supports 3.0, 6.0 and 12 Gb/s SAS and SATA data transfer rates.

Supports SSP, SMP, STP, and SATA protocols.

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether any prerequisites must be met for this feature and attaching devices. To check for operating system and partition requirements, see one of the following links:

- The latest version of enabling libraries and utilities can be downloaded from the [Fix Central](http://www.ibm.com/support/fixcentral/) website (<http://www.ibm.com/support/fixcentral/>).
- [IBM Prerequisite](http://www14.software.ibm.com/support/customercare/iprt/home) website (www14.software.ibm.com/support/customercare/iprt/home).
- [IBM System Storage Interoperation Center \(SSIC\)](http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss) (<http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss>)
- The latest version of the device driver or the IBM Power RAID adapter utilities (iprutils) can be downloaded from the [IBM Service and Productivity Tools](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html) website (<http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html>).
- For information about important notices for Linux on IBM Power Systems, see the [Linux on IBM](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html) website (www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html).

Important: For a list of known Linux operating system issues that can affect this adapter, see the [IBM Power LC readme](https://ibm.biz/BdrgTZ) (<https://ibm.biz/BdrgTZ>).

Emulex LPE16002B-M6-O Dual-port 16 Gb Fibre Channel Card PCIe3.0 x8 LP (FC EKAF)

Learn about the specifications and operating system requirements for the feature code (FC) EKAF adapter.

Overview

The Emulex LPE16002B-M6-O Dual-port 16 Gb Fibre Channel Card PCIe3.0 x8 LP is a PCI Express (PCIe) generation 3 (Gen3) x8 adapter. The adapter can be used in either a x8 or x16 PCIe slot in the system. The adapter features auto-negotiation, LDAP support and has a data transfer rate of 14.025 Gb/s.

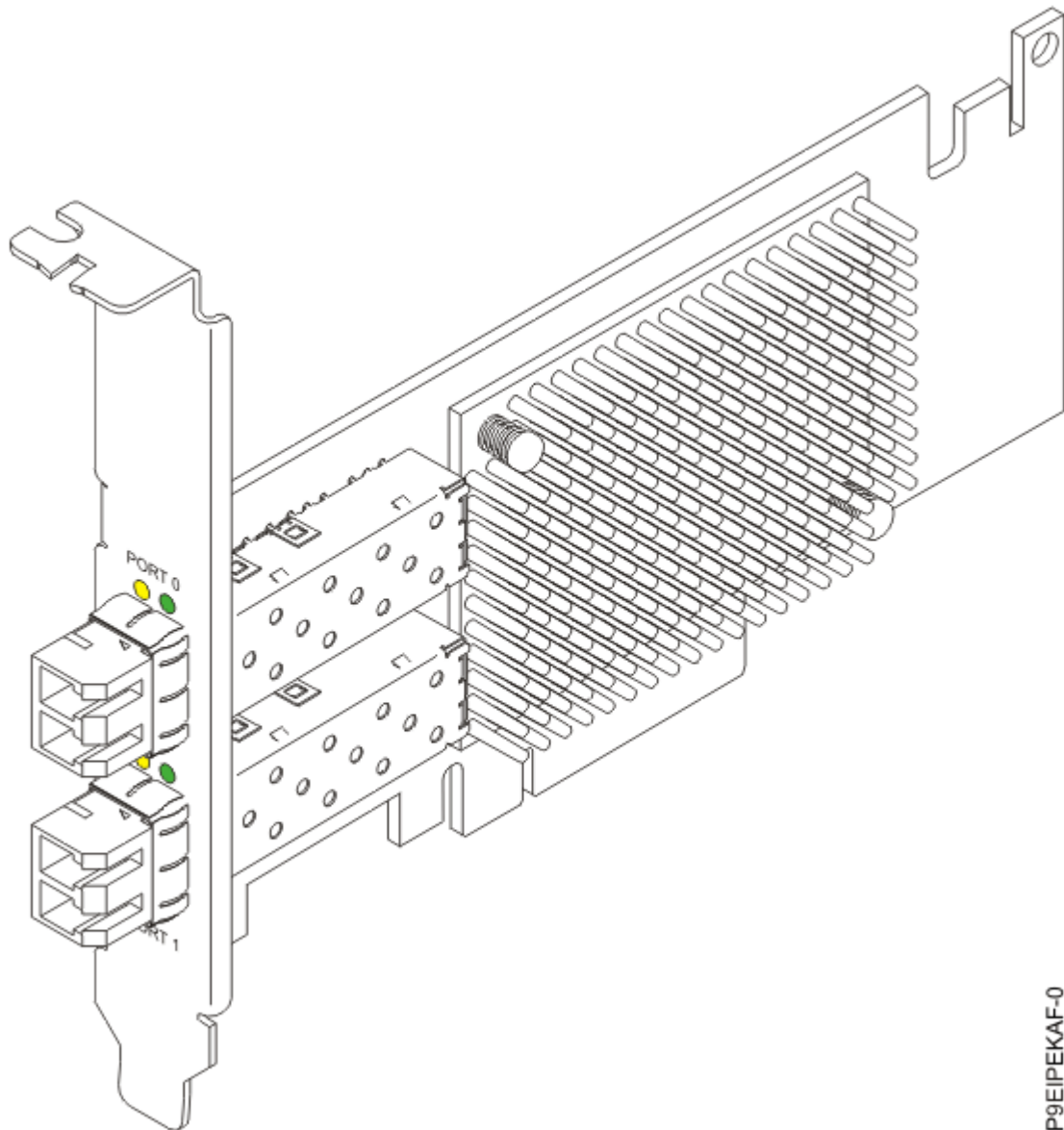


Figure 23. Emulex LPE16002B-M6-O Dual-port 16 Gb Fibre Channel Card PCIe3.0 x8 LP

Specifications

Item

Description

Adapter FRU number

01EM694 (AOC-LPE16002B-M6-O)

I/O bus architecture

PCIe3 x8

Slot requirement

For more information about slot priorities, maximums, and placement rules, see the [PCIe adapter placement rules for the 9006-12P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) or [PCIe adapter placement rules for the 9006-22P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita)

Voltage

3.3 V, 12 V.

Form factor

Short, low-profile.

Attributes provided

Auto-negotiation.

LDAP support.

Data transfer rate of 14.025 Gb/s.

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether any prerequisites must be met for this feature and attaching devices. To check for operating system and partition requirements, see one of the following links:

- The latest version of enabling libraries and utilities can be downloaded from the [Fix Central](http://www.ibm.com/support/fixcentral/) website (<http://www.ibm.com/support/fixcentral/>).
- [IBM Prerequisite](http://www14.software.ibm.com/support/customercare/iprt/home) website (www14.software.ibm.com/support/customercare/iprt/home).
- [IBM System Storage Interoperation Center \(SSIC\)](http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss) (<http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss>)
- The latest version of the device driver or the IBM Power RAID adapter utilities (iprutils) can be downloaded from the [IBM Service and Productivity Tools](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html) website (<http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html>).
- For information about important notices for Linux on IBM Power Systems, see the [Linux on IBM](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html) website (www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html).

Important: For a list of known Linux operating system issues that may affect this adapter, see the [IBM Power LC readme](https://ibm.biz/BdrgTZ) (<https://ibm.biz/BdrgTZ>).

SMC Quad-port NVMe Host Bus Adapter (PEX9733) PCIe3.0 x8 LP with cables (FC EKAG and EKEG)

Learn about the specifications and operating system requirements for feature code (FC) EKAG and EKEG adapters.

Overview

FC EKAG and EKEG are both the same adapter with different feature codes. FC EKAG is supported only on the 9006-12C. FC EKEG, alternatively, is supported only on the 9006-22C, and both include cables.

The SMC Quad-port NVMe Host Bus Adapter (PEX9733) PCIe3.0 x8 LP with cables is a PCI Express (PCIe) generation 3 (Gen3) x8 adapter. The adapter can be used in either a x8 or x16 PCIe slot in the system. The adapter features four internal NVMe connectors for high-performance storage connectivity. This host bus adapter (HBA) card is built on the PLX9733 PCIe switch IC technology and proven NVMe technology.

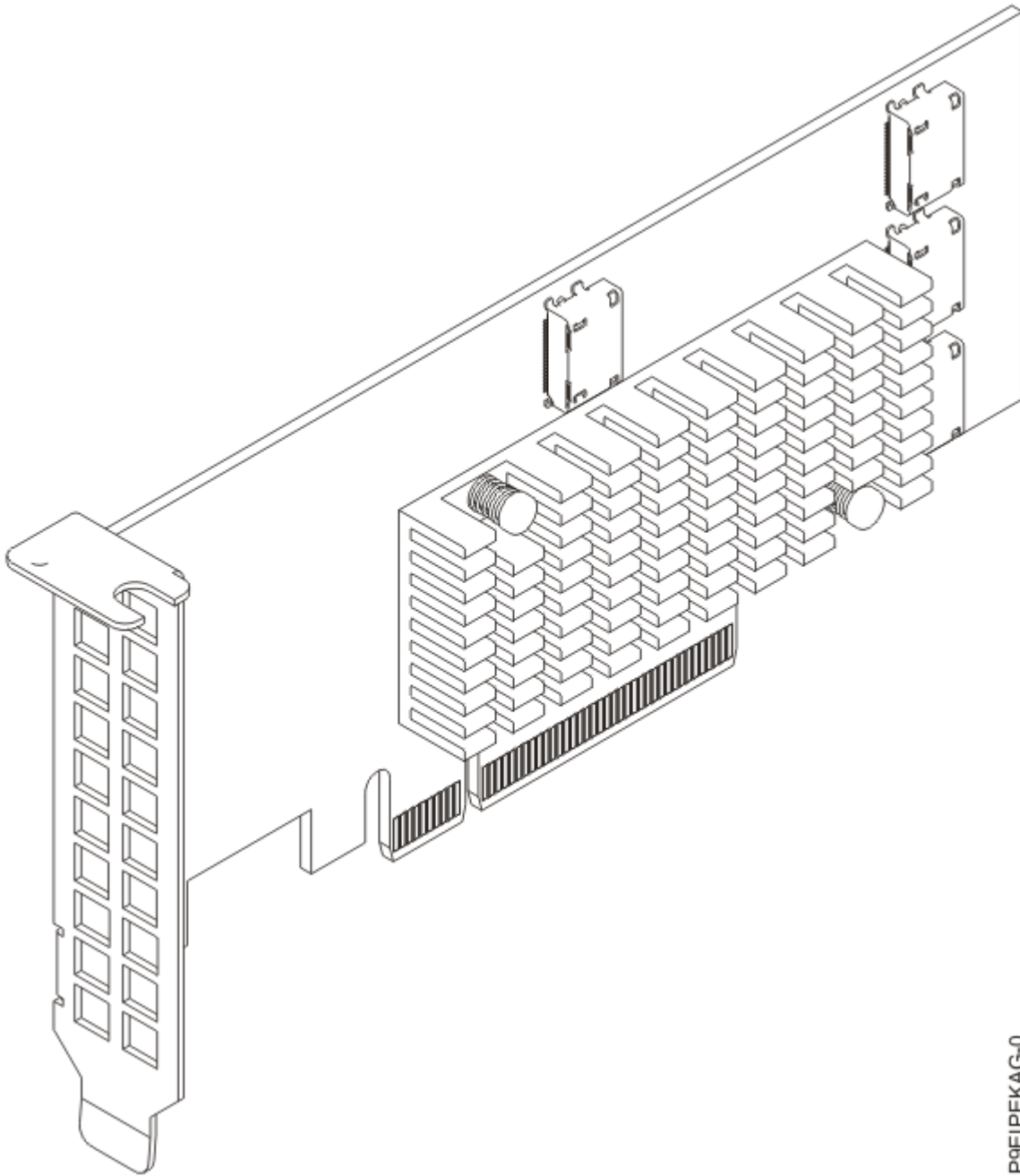


Figure 24. SMC Quad-port NVMe Host Bus Adapter (PEX9733) PCIe3.0 x8 LP with cables

Specifications

Item

Description

Adapter FRU number

FC EKAG: 01EM635 (AOC-K-SLG3-4E2PS-IB001)

FC EKEG: 01EM639 (AOC-K-SLG3-4E2PB-IB001)

I/O bus architecture

PCIe3 x8

Slot requirement

For more information about slot priorities, maximums, and placement rules, see the [PCIe adapter placement rules for the 9006-12P](http://www.ibm.com/support/knowledgecenter/POWER9/) (<http://www.ibm.com/support/knowledgecenter/POWER9/>)

P9E1PEKAG-0

p9eip/p9eip12p_pcie_slot_details.dita) or PCIe adapter placement rules for the 9006-22P (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita)

Voltage

3.3 V, 12 V

Form factor

Short, low-profile

Attributes provided

Supports four physical NVMe devices

Pure host bus adapter (HBA)

Supports 3.0 Gb/s, 6.0 Gb/s, and 12 Gb/s SAS transfer rates

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether any prerequisites must be met for this feature and attaching devices. To check for operating system and partition requirements, see one of the following links:

- The latest version of enabling libraries and utilities can be downloaded from the [Fix Central](http://www.ibm.com/support/fixcentral/) website (<http://www.ibm.com/support/fixcentral/>).
- [IBM Prerequisite website](http://www14.software.ibm.com/support/customercare/iprt/home) (www14.software.ibm.com/support/customercare/iprt/home).
- [IBM System Storage Interoperation Center \(SSIC\)](http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss) (<http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss>)
- The latest version of the device driver or the IBM Power RAID adapter utilities (iprutils) can be downloaded from the [IBM Service and Productivity Tools website](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html) (<http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html>).
- For information about important notices for Linux on IBM Power Systems, see the [Linux on IBM website](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html) (www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html).

Important: For a list of known Linux operating system issues that can affect this adapter, see the [IBM Power LC readme](https://ibm.biz/BdrgTZ) (<https://ibm.biz/BdrgTZ>).

Broadcom (LSI) MegaRAID 9361-8i SAS3 Controller with 8 internal ports (2 GB Cache) PCIe3.0 x8 with cables (FC EKAH and EKEH)

Learn about the specifications and operating system requirements for feature code (FC) EKAH and EKEH adapters.

Overview

FC EKAH and EKEH are both the same adapter with different feature codes.

The Broadcom (LSI) MegaRAID 9361-8i SAS3 Controller with 8 internal ports (2 GB Cache) PCIe3.0 x8 with cables is a PCI Express (PCIe) generation 3 (Gen3) x8 adapter. The adapter can be used in either a x8 or x16 PCIe slot in the system. The adapter features 8 internal SAS connectors for high-performance storage connectivity. This Redundant Array of Independent Disks (RAID) adapter is built on the LSI Logic SAS IC and MegaRAID technology. It also supports high capacity storage applications using high-performance RAID architecture, including hardware RAID 5 and 6.

Important: RAID mode is the adapter default and needs to be configured by the customer before drives are shown to the operating system for installation. For instructions, see [StorCLI commands](#).

Note: This adapter requires an additional PCIe slot to mount the CacheVault supercapacitor.

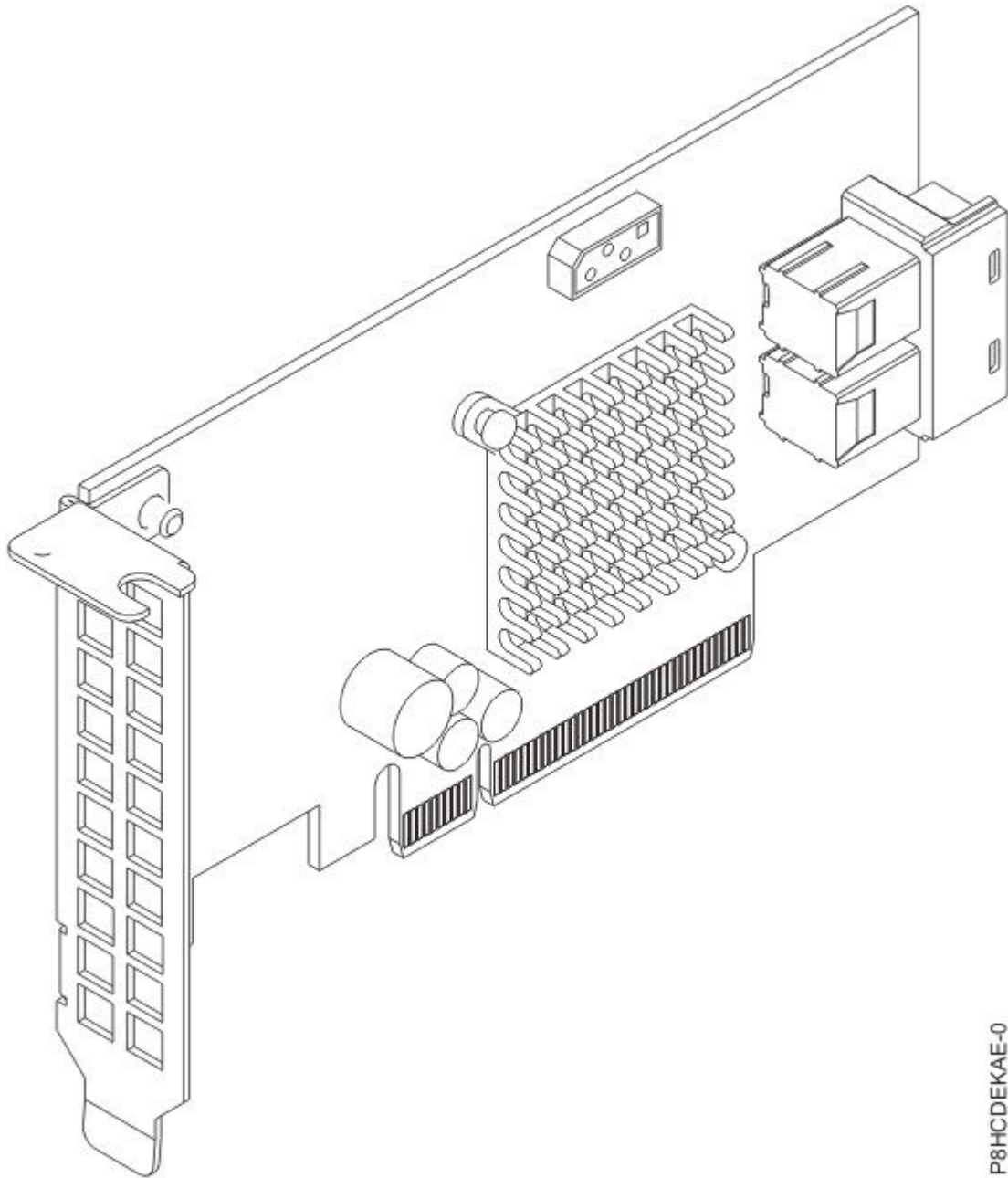


Figure 25. Broadcom (LSI) MegaRAID 9361-8i SAS3 Controller with 8 internal ports (2 GB Cache) PCIe3.0 x8 with cables

Specifications

Item

Description

Adapter FRU number

FC EKAH: 01EM632 (AOC-K-9361-8I2S-IB001)

FC EKEH: 01EM637 (AOC-K-9361-8I2B-IB001)

I/O bus architecture

PCIe3 x8

Slot requirement

For more information about slot priorities, maximums, and placement rules, see the [PCIe adapter placement rules for the 9006-12P](http://www.ibm.com/support/knowledgecenter/POWER9/) (<http://www.ibm.com/support/knowledgecenter/POWER9/>)

p9eip/p9eip12p_pcie_slot_details.dita) or PCIe adapter placement rules for the 9006-22P (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita).

Voltage

3.3 V, 12 V.

Form factor

Short, low-profile.

Attributes provided

Port independent auto-negotiation.

Automatically negotiates PCIe link widths.

Supports 1.5, 3.0, 6.0 and 12 Gb/s SAS and SATA data transfer rates.

Advanced array configuration and management utilities.

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether any prerequisites must be met for this feature and attaching devices. To check for operating system and partition requirements, see one of the following links:

- The latest version of enabling libraries and utilities can be downloaded from the [Fix Central](http://www.ibm.com/support/fixcentral/) website (<http://www.ibm.com/support/fixcentral/>).
- [IBM Prerequisite website](http://www14.software.ibm.com/support/customercare/iprt/home) (www14.software.ibm.com/support/customercare/iprt/home).
- [IBM System Storage Interoperation Center \(SSIC\)](http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss) (<http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss>)
- The latest version of the device driver or the IBM Power RAID adapter utilities (iprutils) can be downloaded from the [IBM Service and Productivity Tools](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html) website (<http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html>).
- For information about important notices for Linux on IBM Power Systems, see the [Linux on IBM](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html) website (www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html).

Important: For a list of known Linux operating system issues that may affect this adapter, see the [IBM Power LC readme](https://ibm.biz/BdrgTZ) (<https://ibm.biz/BdrgTZ>).

Mellanox MCX456A-ECAT ConnectX-4 VPI EDR InfiniBand 100 Gb/s and 100 GbE Dual-port QSFP28 PCIe3.0 x16 LP Adapter (FC EKAL)

Learn about the specifications and operating system requirements for the feature code (FC) EKAL adapter.

Overview

The Mellanox MCX456A-ECAT ConnectX-4 VPI EDR InfiniBand 100 Gb/s and 100 GbE Dual-port QSFP28 PCIe3.0 x16 LP Adapter is a PCI Express (PCIe) generation 3 (Gen3) x16 adapter. The adapter can be used in either a x8 or x16 PCIe slot in the system. The adapter supports EDR 100 Gb/s InfiniBand and 100 Gb/s Ethernet connectivity. It also provides flexible solutions for high-performance, Web 2.0, cloud, data analytics, database, and storage platforms.

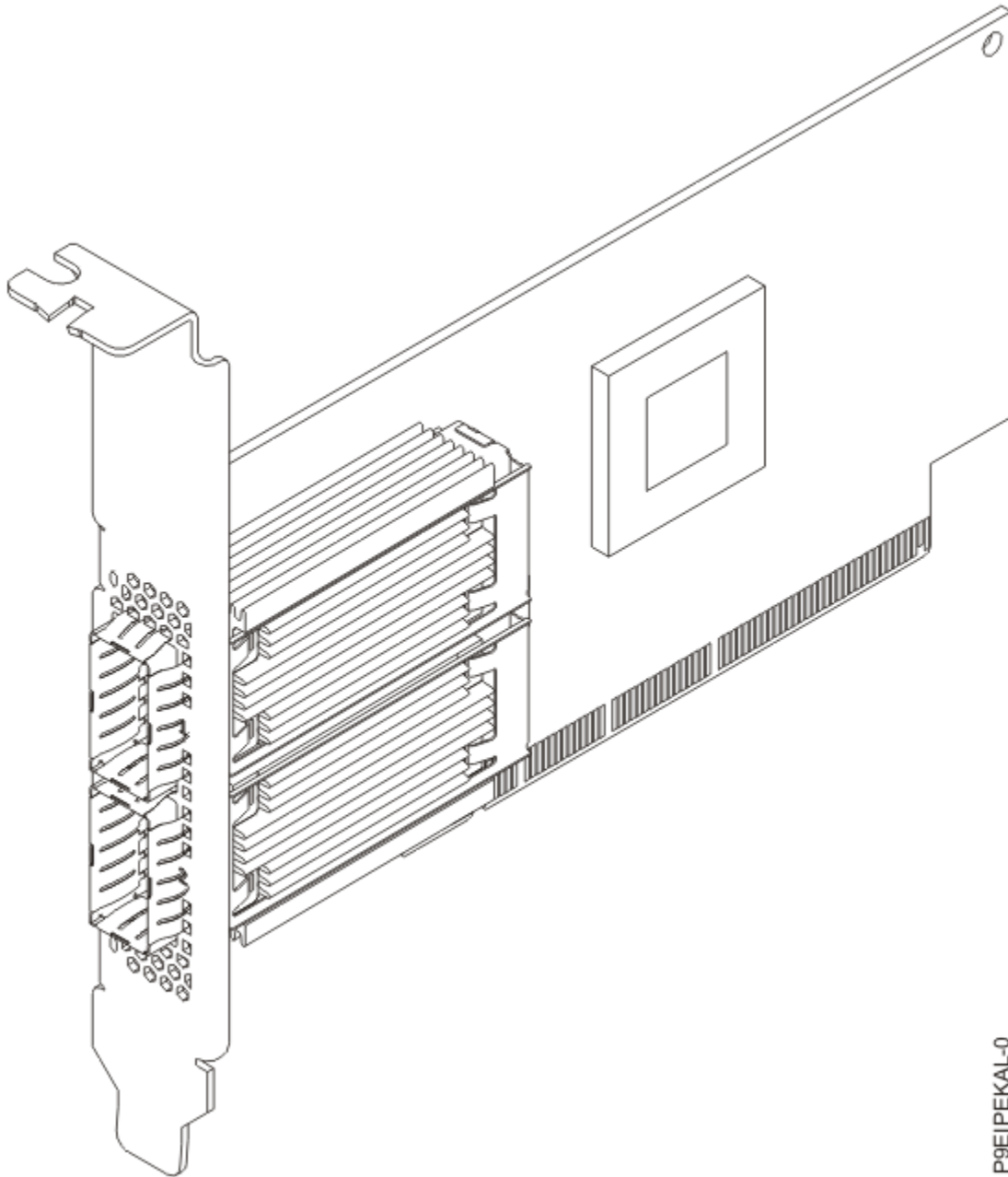


Figure 26. Mellanox MCX456A-ECAT ConnectX-4 VPI EDR InfiniBand 100 Gb/s and 100 GbE Dual-port QSFP28 PCIe3.0 x16 LP Adapter

Specifications

Item

Description

Adapter FRU number

AOC-MCX456A-ECAT-IB001

I/O bus architecture

PCIe3 x16

Slot requirement

For more information about slot priorities, maximums, and placement rules, see the [PCIe adapter placement rules for the 9006-12P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) or [PCIe adapter placement rules for the 9006-22P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita)

Voltage

3.3 V, 12 V.

Form factor

Short, with full-height tailstock

Attributes provided

EDR 100 Gb/s InfiniBand or 100 Gb/s Ethernet per port

Supports 2 physical NVMe Devices

Single and dual-port options available

Hardware-based I/O virtualization

Transceivers and cables

Mellanox LinkX 10, 25, 40, 50 and 100Gb/s Direct Attach Copper cables (DACs), Copper Splitter cables, Active Optical Cables (AOCs) and Transceivers. For information regarding Mellanox LinkX cables and transceivers, see [LinkX™ InfiniBand Direct Attach Copper Cables](http://www.mellanox.com/products/interconnect/infiniband-copper-cables.php) (<http://www.mellanox.com/products/interconnect/infiniband-copper-cables.php>)

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether any prerequisites must be met for this feature and attaching devices. To check for operating system and partition requirements, see one of the following links:

- The latest version of enabling libraries and utilities can be downloaded from the [Fix Central](http://www.ibm.com/support/fixcentral/) website (<http://www.ibm.com/support/fixcentral/>).
- [IBM Prerequisite](http://www14.software.ibm.com/support/customercare/iprt/home) website (www14.software.ibm.com/support/customercare/iprt/home).
- [IBM System Storage Interoperation Center \(SSIC\)](http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss) (<http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss>)
- The latest version of the device driver or the IBM Power RAID adapter utilities (iprutils) can be downloaded from the [IBM Service and Productivity Tools](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html) website (<http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html>).
- For information about important notices for Linux on IBM Power Systems, see the [Linux on IBM](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html) website (www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html).

Mellanox MCX415A-CCAT ConnectX-4 EN 100GbE Single-port QSFP28 PCIe3.0 x16 LP Adapter (FC EKAM)

Learn about the specifications and operating system requirements for the feature code (FC) EKAM adapter.

Overview

The Mellanox MCX415A-CCAT ConnectX-4 EN 100GbE single-port QSFP28 PCIe3.0 x16 LP Adapter is a PCI Express (PCIe) generation 3 (Gen3) x16 adapter. The adapter can be used in either a x8 or x16 PCIe slot in the system. The adapter supports 100 Gb/s Ethernet per port and provides flexible solutions for high-performance, Web 2.0, cloud, data analytics, database, and storage platforms.

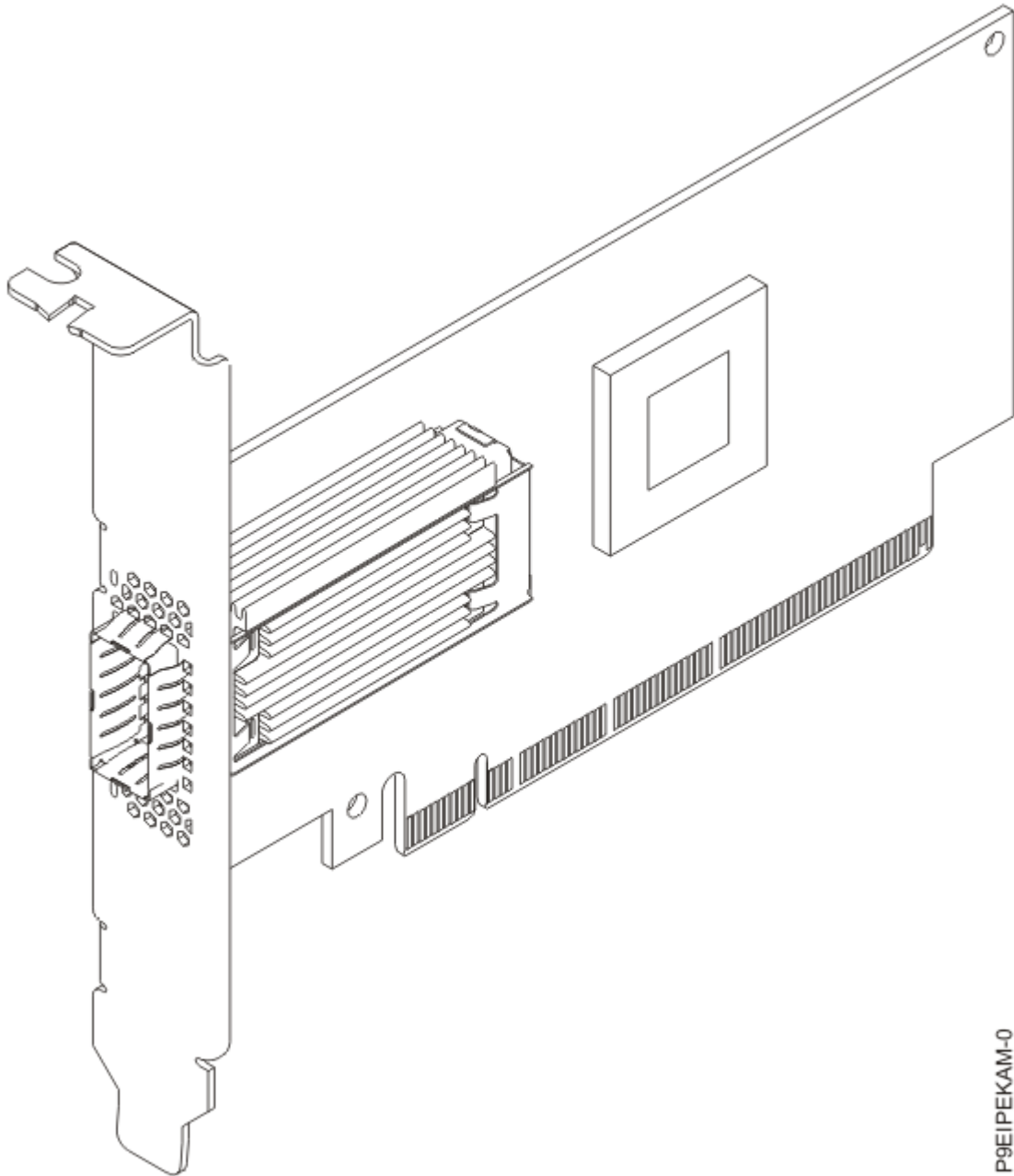


Figure 27. Mellanox MCX415A-CCAT ConnectX-4 EN 100 GbE Single-port QSFP28 PCIe3.0 x16 LP

Specifications

Item

Description

Adapter FRU number

01EM687 (AOC-MCX415A-CCAT-IB001)

I/O bus architecture

PCIe3 x16

Slot requirement

For more information about slot priorities, maximums, and placement rules, see the [PCIe adapter placement rules for the 9006-12P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) or [PCIe adapter placement rules for the 9006-22P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita).

Voltage

3.3 V, 12 V.

Form factor

Short, with full-height tailstock.

Attributes provided

EDR 100 Gb/s InfiniBand or 100 Gb/s Ethernet per port.

Supports two physical NVMe devices.

Single and dual-port options available.

Hardware-based I/O virtualization.

Transceivers and cables

Mellanox LinkX 10, 25, 40, 50 and 100Gb/s Direct Attach Copper cables (DACs), Copper Splitter cables, Active Optical Cables (AOCs) and Transceivers. For information regarding Mellanox LinkX cables and Transceivers, see [LinkX™ InfiniBand Direct Attach Copper Cables](http://www.mellanox.com/products/interconnect/infiniband-copper-cables.php)(<http://www.mellanox.com/products/interconnect/infiniband-copper-cables.php>).

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether any prerequisites must be met for this feature and attaching devices. To check for operating system and partition requirements, see one of the following links:

- The latest version of enabling libraries and utilities can be downloaded from the [Fix Central](http://www.ibm.com/support/fixcentral/) website (<http://www.ibm.com/support/fixcentral/>).
- [IBM Prerequisite](http://www14.software.ibm.com/support/customercare/iprt/home) website (www14.software.ibm.com/support/customercare/iprt/home).
- [IBM System Storage Interoperation Center \(SSIC\)](http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss) (<http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss>)
- The latest version of the device driver or the IBM Power RAID adapter utilities (iprutils) can be downloaded from the [IBM Service and Productivity Tools](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html) website (<http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html>).
- For information about important notices for Linux on IBM Power Systems, see the [Linux on IBM](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html) website (www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html).

Important: For a list of known Linux operating system issues that can affect this adapter, see the [IBM Power LC readme](https://ibm.biz/BdrgTZ) (<https://ibm.biz/BdrgTZ>).

Mellanox MCX415A-CCAT ConnectX-4 EN 100 GbE Single-port QSFP28 PCIe3.0 x16 LP Adapter (FC EKAP)

Learn about the specifications and operating system requirements for the feature code (FC) EKAP adapter.

Overview

The Mellanox MCX415A-CCAT ConnectX-4 EN 100 GbE Single-port QSFP28 PCIe3.0 x16 LP Adapter is a PCI Express (PCIe) generation 3 (Gen2) x8 adapter. The adapter can be used in either a x8 or x16 PCIe slot in the system. The adapter offers dual-channel performance, auto-negotiation and StarPower technology.

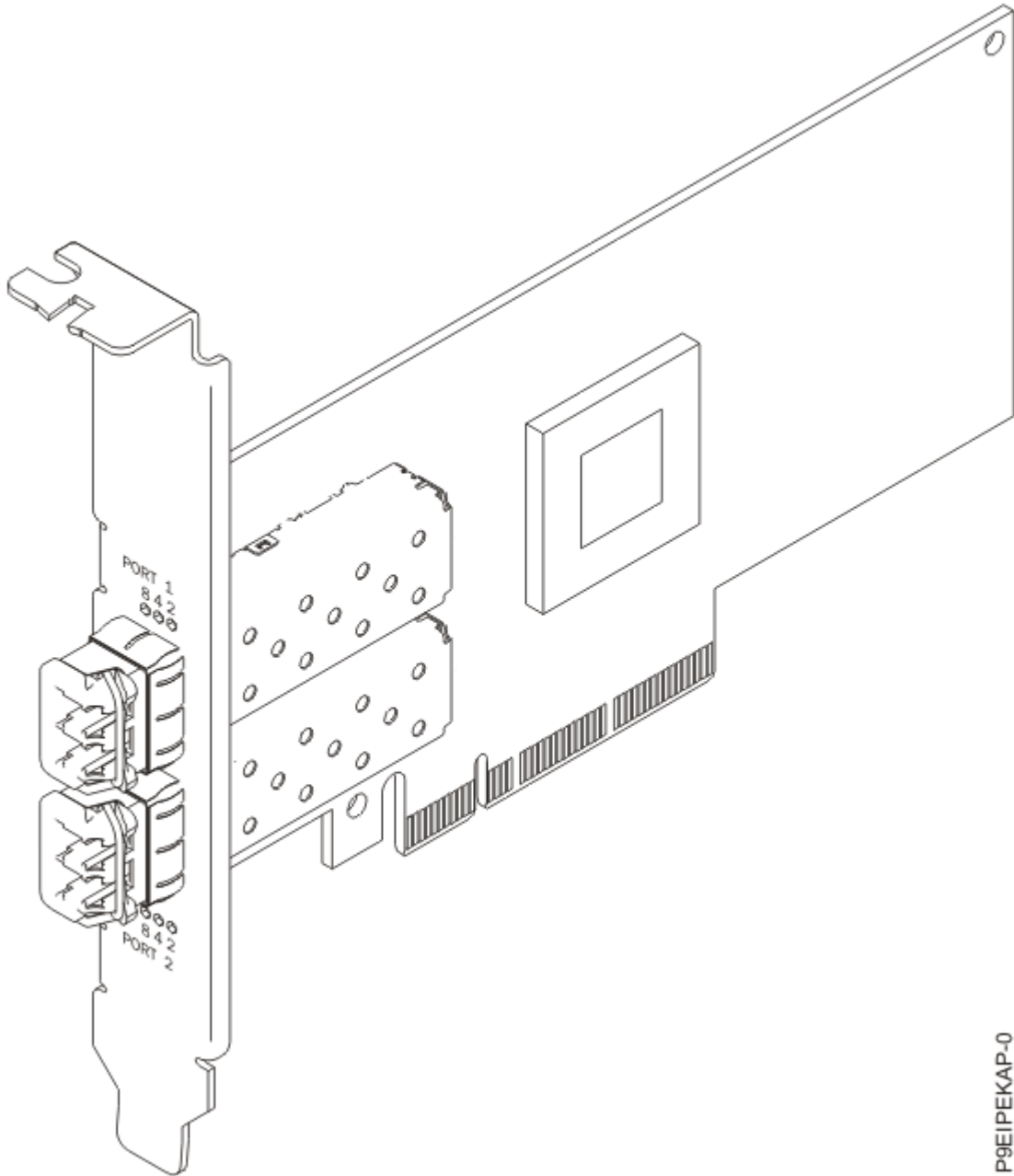


Figure 28. Mellanox MCX415A-CCAT ConnectX-4 EN 100 GbE Single-port QSFP28 PCIe3.0 x16 LP Adapter

Specifications

Item

Description

Adapter FRU number

AOC-QLE2562

I/O bus architecture

PCIe3 x8

Slot requirement

For more information about slot priorities, maximums, and placement rules, see the [PCIe adapter placement rules for the 9006-12P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) or [PCIe adapter placement rules for the 9006-22P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita)

Voltage

3.3 V, 12 V.

Form factor

Short, low-profile

Attributes provided

StarPower technology

Auto-negotiation

Quality of Service (QoS)

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether any prerequisites must be met for this feature and attaching devices. To check for operating system and partition requirements, see one of the following links:

- The latest version of enabling libraries and utilities can be downloaded from the [Fix Central](http://www.ibm.com/support/fixcentral/) website (<http://www.ibm.com/support/fixcentral/>).
- [IBM Prerequisite website](http://www14.software.ibm.com/support/customer/care/iprt/home) (www14.software.ibm.com/support/customer/care/iprt/home).
- [IBM System Storage Interoperation Center \(SSIC\)](http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss) (<http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss>)
- The latest version of the device driver or the IBM Power RAID adapter utilities (iprutils) can be downloaded from the [IBM Service and Productivity Tools](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html) website (<http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html>).
- For information about important notices for Linux on IBM Power Systems, see the [Linux on IBM](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html) website (www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html).

Important: For a list of known Linux operating system issues that may affect this adapter, see the [IBM Power LC readme](https://ibm.biz/BdrgTZ) (<https://ibm.biz/BdrgTZ>).

Qlogic QLE26920P Dual-port 16 Gb Fibre Channel adapter PCIe3 x8 LP (FC EKAQ)

Learn about the specifications and operating system requirements for the feature code (FC) EKAQ adapter.

Overview

The Qlogic QLE26920P Dual-port 16 Gb Fibre Channel adapter PCIe3 x8 LP Adapter is a PCI Express (PCIe) generation 3 (Gen3) x8 adapter. The adapter can be used in either a x8 or x16 PCIe slot in the system. The adapter provides advanced storage networking features capable of supporting demanding virtualized and private cloud environments. The PCIe3 x8 Qlogic QLE26920P Dual-port 16Gb Fibre Channel Adapter can also deliver up to 1.3 million IOPS (Input/Output Operations per Second) fuel high performance in all-flash arrays (AFAs) and high-density virtualized environments.



Figure 29. Qlogic QLE26920P Dual-port 16 Gb Fibre Channel adapter PCIe3 x8 LP Adapter

Specifications

Item

Description

Adapter FRU number

01EM692 (AOC-QLE2692SR-IB001)

I/O bus architecture

PCIe3 x8

Slot requirement

For more information about slot priorities, maximums, and placement rules, see the [PCIe adapter placement rules for the 9006-12P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) or [PCIe adapter placement rules for the 9006-22P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita)

Voltage

3.3 V, 12 V.

Form factor

Short, low-profile

Attributes provided

Up to 1.3 million IOPS fuel high performance in AFAs and high density virtualized environments

Enhanced reliability, diagnostics, and accelerated deployment powered by QLogic StarFusion technology

Port isolation design offers deterministic and scalable performance on each port

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether any prerequisites must be met for this feature and attaching devices. To check for operating system and partition requirements, see one of the following links:

- The latest version of enabling libraries and utilities can be downloaded from the [Fix Central](http://www.ibm.com/support/fixcentral/) website (<http://www.ibm.com/support/fixcentral/>).
- [IBM Prerequisite website](http://www14.software.ibm.com/support/customer/ipt/home) (www14.software.ibm.com/support/customer/ipt/home).
- [IBM System Storage Interoperation Center \(SSIC\)](http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss) (<http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss>)
- The latest version of the device driver or the IBM Power RAID adapter utilities (iprutils) can be downloaded from the [IBM Service and Productivity Tools](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html) website (<http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html>).
- For information about important notices for Linux on IBM Power Systems, see the [Linux on IBM](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html) website (www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html).

Important: For a list of known Linux operating system issues that may affect this adapter, see the [IBM Power LC readme](https://ibm.biz/BdrgTZ) (<https://ibm.biz/BdrgTZ>).

Mellanox MCX4121A-ACAT ConnectX-4 Lx EN 25 GbE Dual-port SFP28 PCIe3.0 x8 LP Adapter (FC EKAU)

Learn about the specifications and operating system requirements for the feature code (FC) EKAU adapter.

Overview

The Mellanox MCX4121A-ACAT ConnectX-4 Lx EN 25 GbE Dual-port SFP28 PCIe3.0 x8 LP Adapter is a PCI Express (PCIe) generation 3 (Gen3) x8 adapter. The adapter can be used in either a x8 or x16 PCIe slot in the system. The adapter provides a combination of 1, 10, 25, 40, and 50 GbE bandwidth, sub-microsecond latency and a 75 million packets per second message rate. It includes native hardware

support for remote direct memory access (RDMA) over converged Ethernet (RoCE), Ethernet stateless offload engines, overlay networks, and GPUDirect® Technology.

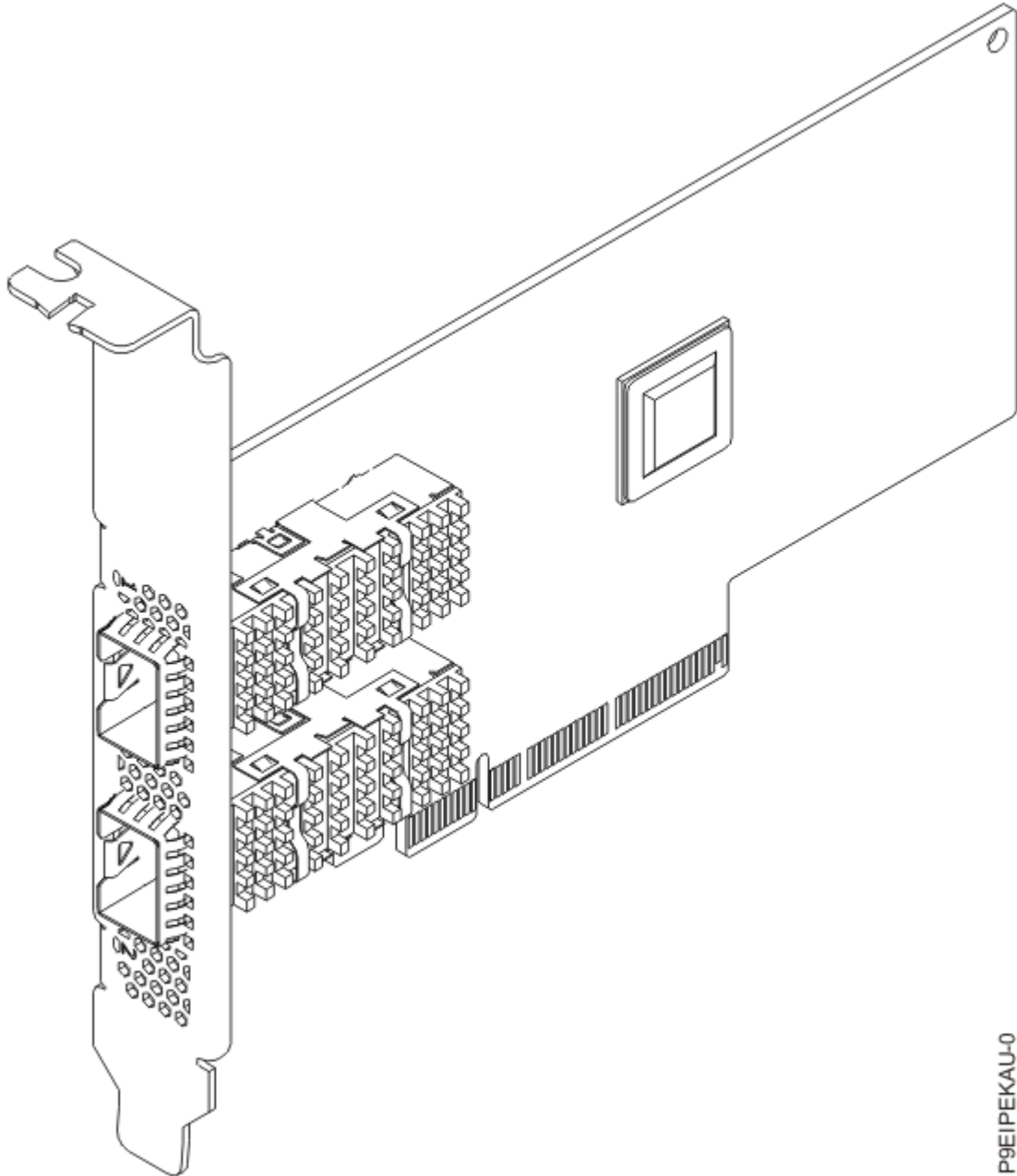


Figure 30. Mellanox MCX4121A-ACAT ConnectX-4 Lx EN 25 GbE Dual-port SFP28 PCIe3.0 x8 LP Adapter

Specifications

Item

Description

Adapter FRU number

01EM688 (AOC-MCX4121A-ACAT-IB001)

I/O bus architecture

PCIe3 x8

Slot requirement

For more information about slot priorities, maximums, and placement rules, see the [PCIe adapter placement rules for the 9006-12P](http://www.ibm.com/support/knowledgecenter/POWER9/) (<http://www.ibm.com/support/knowledgecenter/POWER9/>)

p9eip/p9eip12p_pcie_slot_details.dita) or PCIe adapter placement rules for the 9006-22P (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita)

Voltage

3.3 V, 12 V.

Form factor

Short, with full-height tailstock

Attributes provided

Low latency RDMA over converged Ethernet

Connectivity to up-to 4 independent hosts

Hardware-based I/O virtualization

Transceivers and cables

Mellanox LinkX 10 Gb/s, 25 Gb/s, 40 Gb/s, 50 Gb/s and 100 Gb/s Direct Attach Copper cables (DACs), Copper Splitter cables, Active Optical Cables (AOCs) and Transceivers. For information regarding Mellanox LinkX cables and Transceivers, see [LinkX™ InfiniBand Direct Attach Copper Cables](http://www.mellanox.com/products/interconnect/infiniband-copper-cables.php) (<http://www.mellanox.com/products/interconnect/infiniband-copper-cables.php>).

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether any prerequisites must be met for this feature and attaching devices. To check for operating system and partition requirements, see one of the following links:

- The latest version of enabling libraries and utilities can be downloaded from the [Fix Central](http://www.ibm.com/support/fixcentral/) website (<http://www.ibm.com/support/fixcentral/>).
- [IBM Prerequisite](http://www14.software.ibm.com/support/customer/care/iprt/home) website (www14.software.ibm.com/support/customer/care/iprt/home).
- [IBM System Storage Interoperation Center \(SSIC\)](http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss) (<http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss>)
- The latest version of the device driver or the IBM Power RAID adapter utilities (iprutils) can be downloaded from the [IBM Service and Productivity Tools](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html) website (<http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html>).
- For information about important notices for Linux on IBM Power Systems, see the [Linux on IBM](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html) website (www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html).

Important: For a list of known Linux operating system issues that can affect this adapter, see the [IBM Power LC readme](https://ibm.biz/BdrgTZ) (<https://ibm.biz/BdrgTZ>).

Mellanox MCX414A-BCAT ConnectX-3 Pro EN Dual-port 40/56 GbE PCIe3.0 x8 LP Adapter (FC EKAW)

Learn about the specifications and operating system requirements for the feature code (FC) EKAW adapter.

Overview

The Mellanox MCX414A-BCAT ConnectX-3 Pro EN Dual-port 40/56 GbE PCIe3.0 x8 LP Adapter is a PCI Express (PCIe) generation 3 (Gen3) x16 adapter. The adapter can be used in either a x8 or x16 PCIe slot in the system. The adapter provides a combination of 1, 10, 25, 40, and 50 GbE bandwidth, sub-microsecond latency and a 75 million packets per second message rate. It includes native hardware support for RDMA over Converged Ethernet, Ethernet stateless offload engines, Overlay Networks, and GPUDirect® Technology.

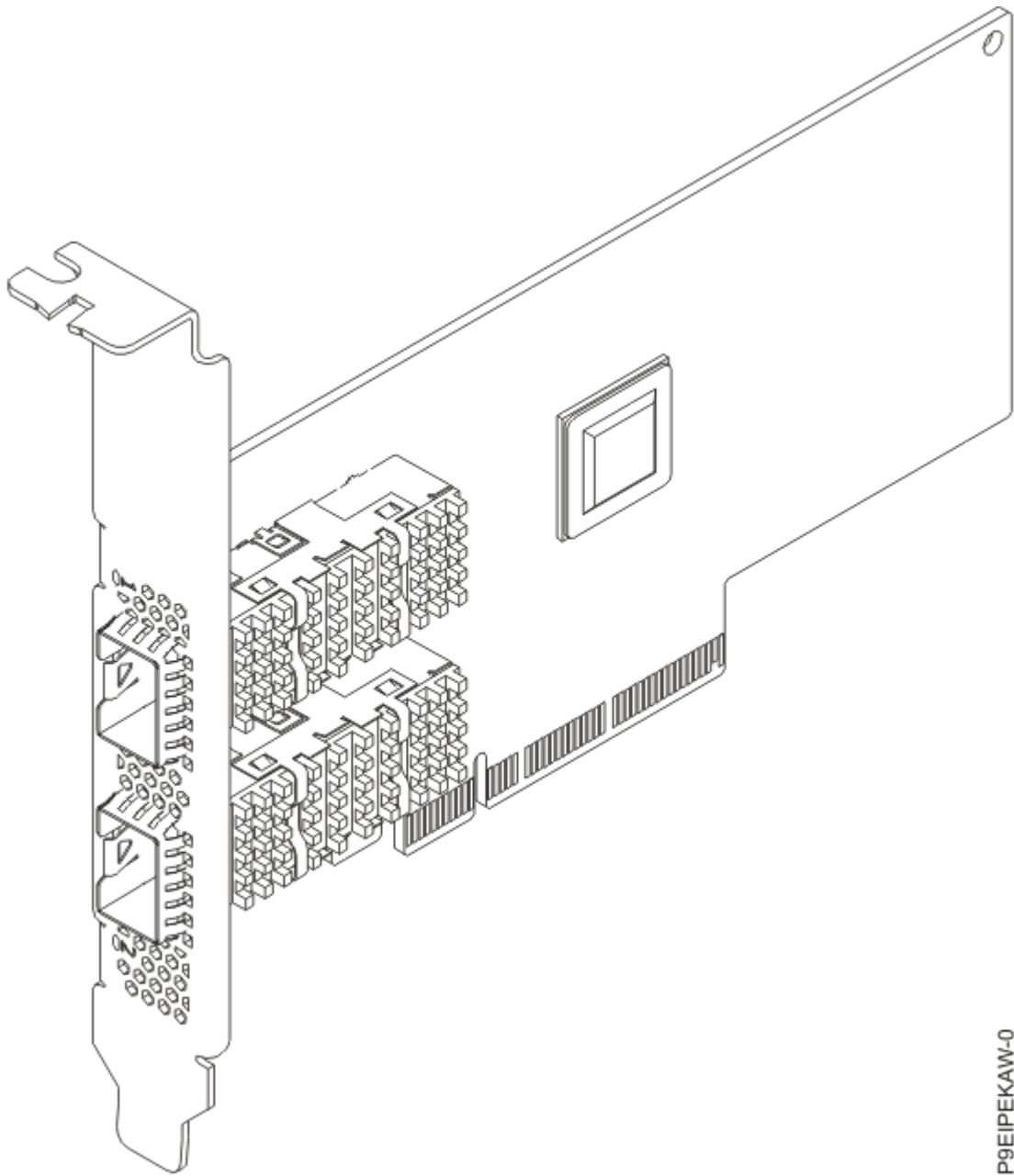


Figure 31. Mellanox MCX414A-BCAT ConnectX-3 Pro EN Dual-port 40/56 GbE PCIe3.0 x8 LP Adapter

Specifications

Item

Description

Adapter FRU number

MCX414A-BCAT-IB001

I/O bus architecture

PCIe3 x16

Slot requirement

For more information about slot priorities, maximums, and placement rules, see the [PCIe adapter placement rules for the 9006-12P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) or [PCIe adapter placement rules for the 9006-22P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita)

Voltage

3.3 V, 12 V.

Form factor

Short, with full-height tailstock

Attributes provided

Single and dual-port options available

Low latency RDMA over Converged Ethernet

Connectivity to up to 4 independent hosts (specific OPNs)

Hardware-based I/O virtualization

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether any prerequisites must be met for this feature and attaching devices. To check for operating system and partition requirements, see one of the following links:

- The latest version of enabling libraries and utilities can be downloaded from the [Fix Central](http://www.ibm.com/support/fixcentral/) website (<http://www.ibm.com/support/fixcentral/>).
- [IBM Prerequisite website](http://www14.software.ibm.com/support/customer/ibm/prerequisite/home) (www14.software.ibm.com/support/customer/ibm/prerequisite/home).
- [IBM System Storage Interoperation Center \(SSIC\)](http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss) (<http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss>)
- The latest version of the device driver or the IBM Power RAID adapter utilities (iprutils) can be downloaded from the [IBM Service and Productivity Tools website](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html) (<http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html>).
- For information about important notices for Linux on IBM Power Systems, see the [Linux on IBM](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html) website (www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html).

Important: For a list of known Linux operating system issues that may affect this adapter, see the [IBM Power LC readme](https://ibm.biz/BdrgTZ) (<https://ibm.biz/BdrgTZ>).

Mellanox MCX556A-EDAT ConnectX-5 VPI EDR InfiniBand 100 Gb/s and 100 GbE Dual-port QSFP28 PCIe4.0 x16 LP (FC EKAY)

Learn about the specifications and operating system requirements for the feature code (FC) EKAY adapter.

Overview

The Mellanox MCX556A-EDAT ConnectX-5 VPI EDR InfiniBand 100 Gb/s and 100 GbE Dual-port QSFP28 PCIe4.0 x16 LP Adapter is a PCI Express (PCIe) generation 4 (Gen4) x16 adapter. The adapter can be used in either a x8 or x16 PCIe slot in the system. The adapter delivers high bandwidth, low latency, and high computation efficiency for high performance, data intensive and scalable compute and storage platforms.

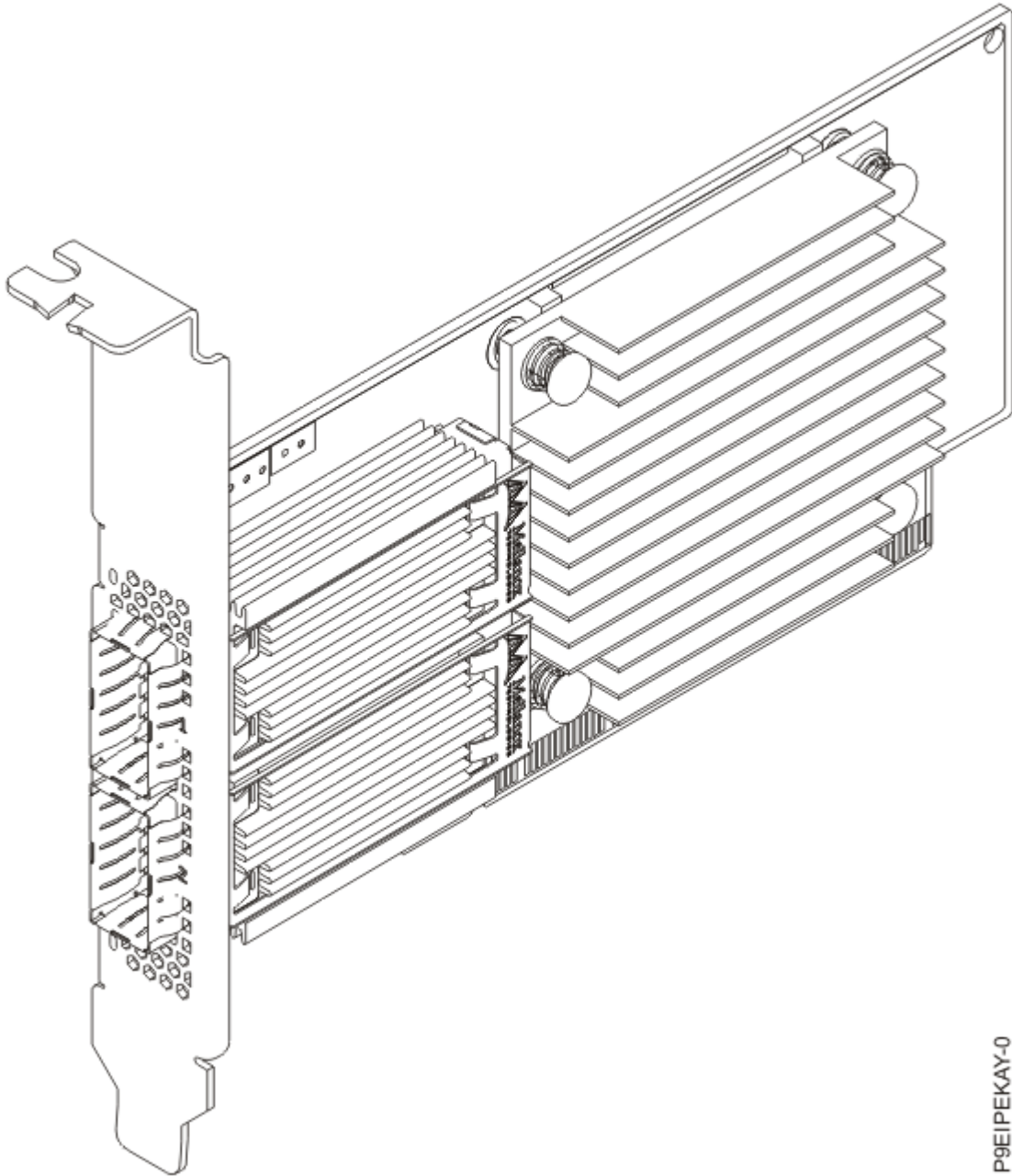


Figure 32. Mellanox MCX556A-EDAT ConnectX-5 VPI EDR InfiniBand 100 Gb/s and 100 GbE Dual-port QSFP28 PCIe4.0 x16 LP Adapter

Specifications

Item

Description

Adapter FRU number

01EM691 (AOC-MCX556A-EDAT-IB001)

I/O bus architecture

PCIe4 x16

Slot requirement

For more information about slot priorities, maximums, and placement rules, see the PCIe adapter placement rules for the 9006-12P (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) or PCIe adapter placement rules for the 9006-22P (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita)

Voltage

3.3 V, 12 V.

Form factor

Short, low-profile

Attributes provided

Tag matching and rendezvous Offloads

Up to 100 Gb/s connectivity per port

Industry-leading throughput, low latency, low CPU utilization and high message rate

RoCE for Overlay Networks

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether any prerequisites must be met for this feature and attaching devices. To check for operating system and partition requirements, see one of the following links:

- The latest version of enabling libraries and utilities can be downloaded from the [Fix Central](http://www.ibm.com/support/fixcentral/) website (<http://www.ibm.com/support/fixcentral/>).
- [IBM Prerequisite website](http://www14.software.ibm.com/support/customer/ibmiprt/home) (www14.software.ibm.com/support/customer/ibmiprt/home).
- [IBM System Storage Interoperation Center \(SSIC\)](http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss) (<http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss>)
- The latest version of the device driver or the IBM Power RAID adapter utilities (iprutils) can be downloaded from the [IBM Service and Productivity Tools website](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html) (<http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html>).
- For information about important notices for Linux on IBM Power Systems, see the [Linux on IBM](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html) website (www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html).

Broadcom (LSI) MegaRAID 9361-8i SAS3 Controller with 8 Internal Ports (1 GB Cache) PCIe3.0 x8 LP with cables (FC EKAA and EKEA)

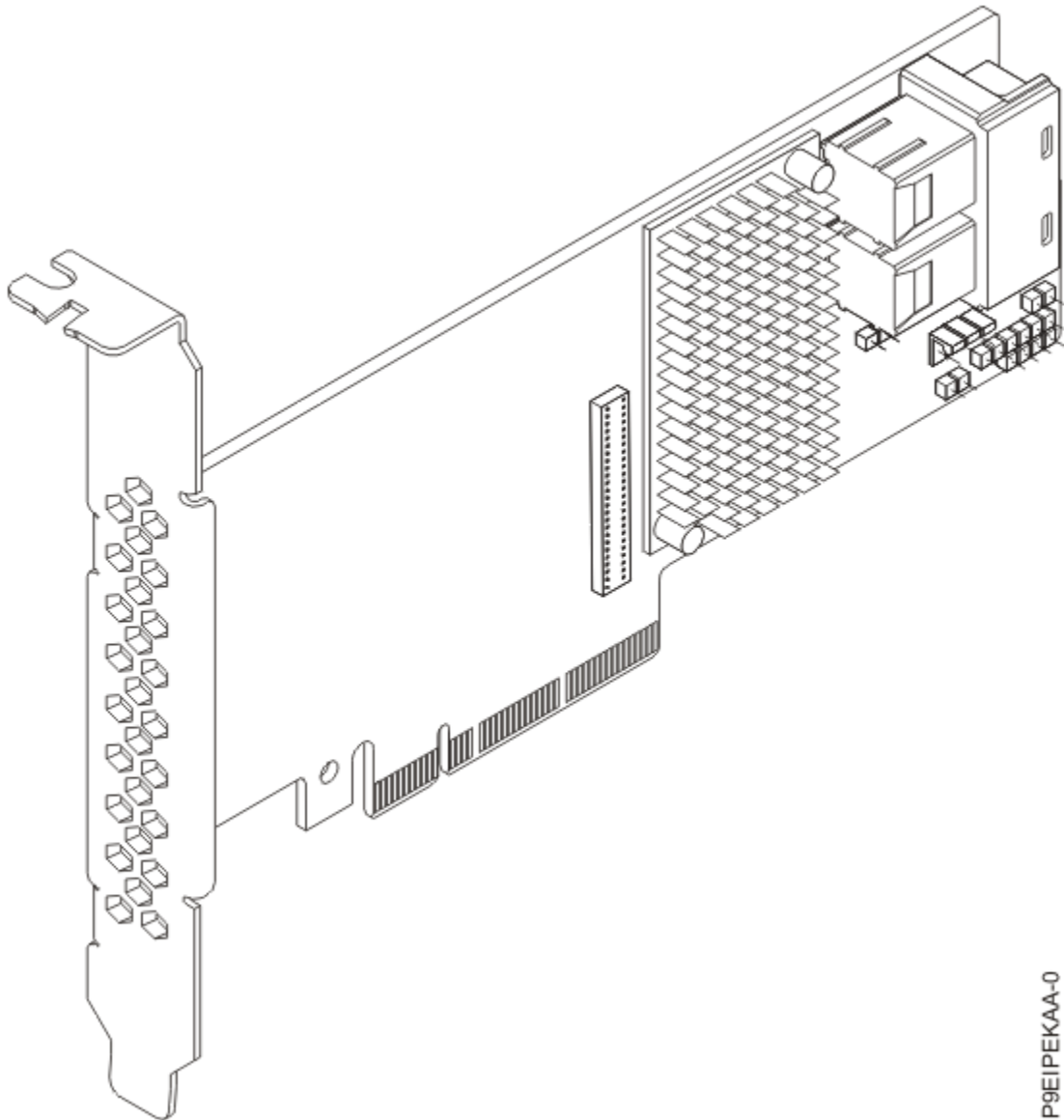
Learn about the specifications and operating system requirements for feature code (FC) EKAA and EKEA adapters.

Overview

The Broadcom (LSI) MegaRAID 9361-8i SAS3 Controller with 8 Internal Ports (1 GB Cache) PCIe3.0 x8 LP with cables is a PCI Express (PCIe) generation 3 (Gen3) x8 adapter. The adapter can be used in either a x8 or x16 PCIe slot in the system. The adapter features 8 internal SAS connectors for high-performance storage connectivity. This Redundant Array of Independent Disks (RAID) adapter is built on the LSI Logic SAS IC and MegaRAID technology. It also supports high capacity storage applications by using high-performance RAID architecture, including hardware RAID 5 and 6.

Important: RAID mode is the adapter default and needs to be configured by the customer before drives are shown to the operating system for installation. For instructions, see [StorCLI commands](#).

Note: This adapter requires an additional PCIe slot to mount the CacheVault supercapacitor.



P9E1PEKAA-0

Figure 33. Broadcom (LSI) MegaRAID 9361-8i SAS3 Controller with 8 Internal Ports (1 GB Cache) PCIe3.0 x8 LP with cables

Specifications

Item

Description

Adapter FRU number

FC ECAA: 01EM631 (AOC-K-9361-8IS-IB001)

FC EKEA: 01EM636 (AOC-K-9361-8IB-IB001)

I/O bus architecture

PCIe3 x8

Slot requirement

For more information about slot priorities, maximums, and placement rules, see the PCIe adapter placement rules for the 9006-12P (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) or PCIe adapter placement rules for the 9006-22P (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita).

Voltage

3.3 V, 12 V.

Form factor

Short, low-profile.

Attributes provided

Port-independent auto-negotiation.

Automatically negotiates PCIe link widths.

Supports 1.5, 3.0, 6.0 and 12 Gb/s SAS and SATA data transfer rates.

Advanced array configuration and management utilities.

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether any prerequisites must be met for this feature and attaching devices. To check for operating system and partition requirements, see one of the following links:

- The latest version of enabling libraries and utilities can be downloaded from the [Fix Central](http://www.ibm.com/support/fixcentral/) website (<http://www.ibm.com/support/fixcentral/>).
- [IBM Prerequisite website](http://www14.software.ibm.com/support/customer/ipt/home) (www14.software.ibm.com/support/customer/ipt/home).
- [IBM System Storage Interoperation Center \(SSIC\)](http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss) (<http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss>)
- The latest version of the device driver or the IBM Power RAID adapter utilities (iprutils) can be downloaded from the [IBM Service and Productivity Tools](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html) website (<http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html>).
- For information about important notices for Linux on IBM Power Systems, see the [Linux on IBM](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html) website (www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html).

Important: For a list of known Linux operating system issues that might affect this adapter, see the [IBM Power LC readme](https://ibm.biz/BdrgTZ) (<https://ibm.biz/BdrgTZ>).

SMC AOC-K-S3008L-L8i 12 Gbps SAS3/RAID 0,1 and 10 PCIe3.0 x8 LP with cables (FC EKAB and EKEB)

Learn about the specifications and operating system requirements for feature code (FC) EKAB and EKEB adapters.

Overview

The SMC AOC-K-S3008L-L8i 12 Gbps SAS3/RAID 0,1 and 10 PCIe3.0 x8 LP with cables is a PCI Express (PCIe) generation 3 (Gen3) x8 adapter. The adapter can be placed in either a x8 or x16 PCIe slot in the system. The 12 Gb/s 8-Port SAS Internal RAID Adapter features 8 internal SAS connectors for high-performance storage connectivity.

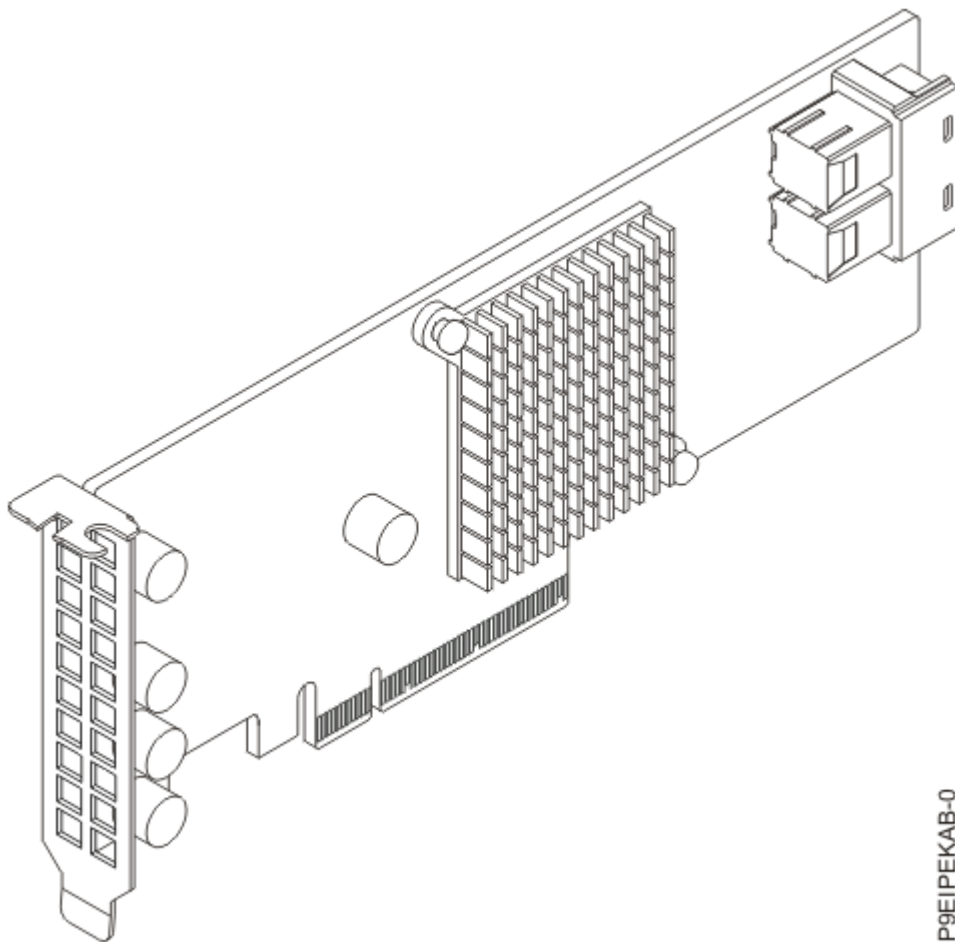


Figure 34. SMC AOC-K-S3008L-L8i 12 Gbps SAS3/RAID 0,1 and 10 PCIe3.0 x8 LP with cables

Specifications

Item

Description

Adapter FRU number

FC EKAB: AOC-K-S3008L-L8iS-IB001

FC EKEB: AOC-K-S3008L-L8iB-IB001

I/O bus architecture

PCIe3 x8

Slot requirement

For more information about slot priorities, maximums, and placement rules, see the [PCIe adapter placement rules for the 9006-12P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) or [PCIe adapter placement rules for the 9006-22P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita)

Voltage

3.3 V, 12 V.

Form factor

Short, low-profile.

Attributes provided

Port-independent auto-negotiation.

Supports MegaRAID Storage Manager software.

Supports 3.0, 6.0 and 12 Gb/s SAS and SATA data transfer rates.

Supports SSP, SMP, STP, and SATA protocols.

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether any prerequisites must be met for this feature and attaching devices. To check for operating system and partition requirements, see one of the following links:

- The latest version of enabling libraries and utilities can be downloaded from the [Fix Central](http://www.ibm.com/support/fixcentral/) website (<http://www.ibm.com/support/fixcentral/>).
- [IBM Prerequisite](http://www14.software.ibm.com/support/customercare/iprt/home) website (www14.software.ibm.com/support/customercare/iprt/home).
- [IBM System Storage Interoperation Center \(SSIC\)](http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss) (<http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss>)
- The latest version of the device driver or the IBM Power RAID adapter utilities (iprutils) can be downloaded from the [IBM Service and Productivity Tools](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html) website (<http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html>).
- For information about important notices for Linux on IBM Power Systems, see the [Linux on IBM](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html) website (www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html).

Important: For a list of known Linux operating system issues that can affect this adapter, see the [IBM Power LC readme](https://ibm.biz/BdrgTZ) (<https://ibm.biz/BdrgTZ>).

Broadcom (LSI) 9300-8E SAS3 HBA PCIe3.0 x8 LP Adapter (FC EKED)

Learn about the specifications and operating system requirements for the feature code (FC) EKED adapter.

Overview

The Broadcom (LSI) 9300-8E SAS3 HBA PCIe3.0 x8 LP Adapter is a PCI Express (PCIe) generation 3 (Gen3) x8 adapter. The adapter can be used in either a x8 or x16 PCIe slot in the system. The adapter provides increased connectivity and maximum performance for high-end servers and appliances.

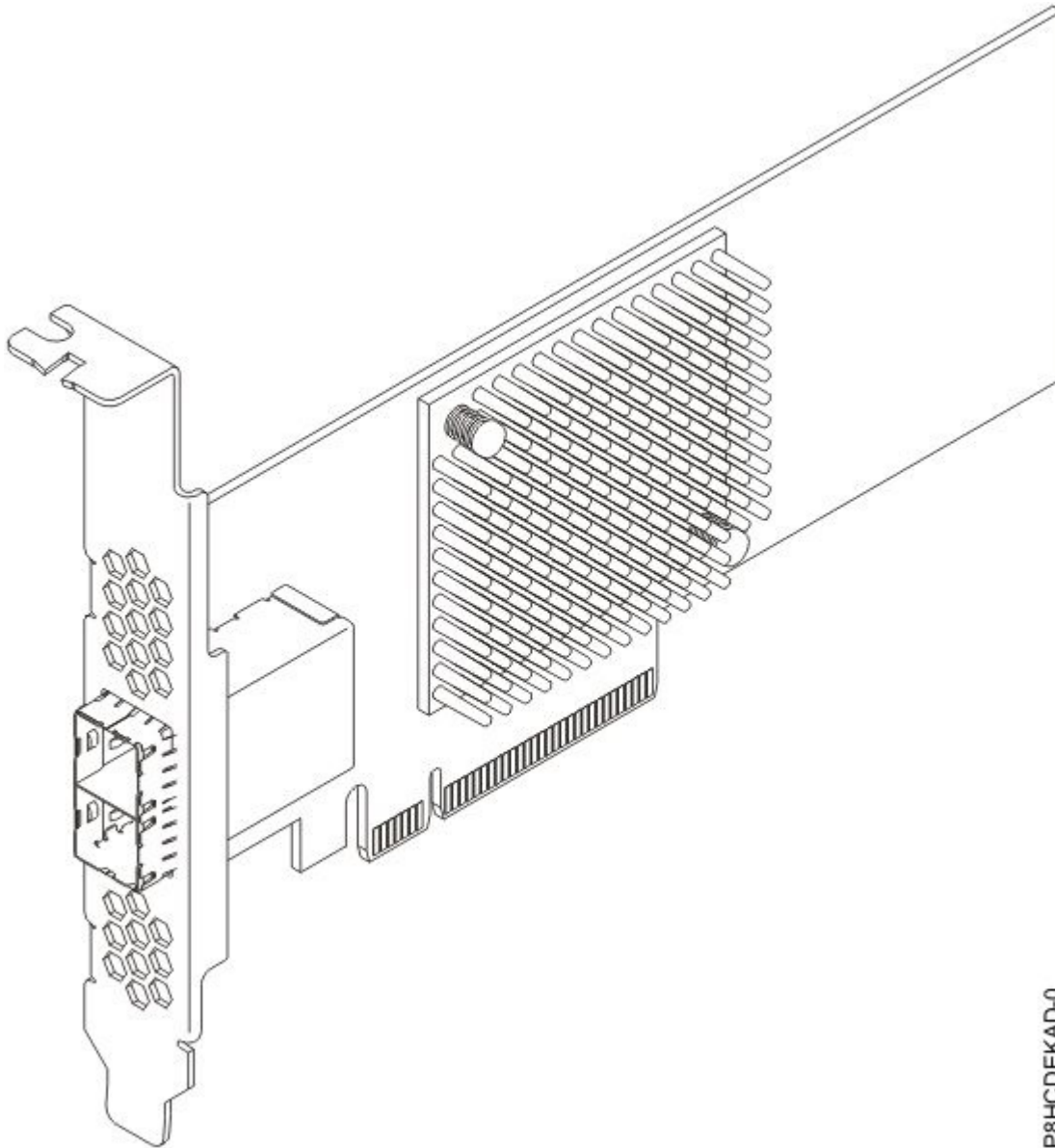


Figure 35. Broadcom (LSI) 9300-8E SAS3 HBA PCIe3.0 x8 LP Adapter

Specifications

Item

Description

Adapter FRU number

01EM634 (AOC-SAS3-9300-8E) .

I/O bus architecture

PCIe3 x8.

Slot requirement

For more information about slot priorities, maximums, and placement rules, see the [PCIe adapter placement rules for the 9006-12P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) or [PCIe adapter placement rules for the 9006-22P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita).

Voltage

3.3 V, 12 V.

Form factor

Short, low-profile.

Attributes provided

Supports SSDs, HDDs, and tape drives.

Eight lanes of PCIe3 provides fast signaling for high bandwidth applications.

Supports 3.0 Gb/s, 6.0 Gb/s and 12 Gb/s SAS data transfer rates per lane.

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether any prerequisites must be met for this feature and attaching devices. To check for operating system and partition requirements, see one of the following links:

- The latest version of enabling libraries and utilities can be downloaded from the [Fix Central](http://www.ibm.com/support/fixcentral/) website (<http://www.ibm.com/support/fixcentral/>).
- [IBM Prerequisite](http://www14.software.ibm.com/support/customercare/iprt/home) website (www14.software.ibm.com/support/customercare/iprt/home).
- [IBM System Storage Interoperation Center \(SSIC\)](http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss) (<http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss>)
- The latest version of the device driver or the IBM Power RAID adapter utilities (iprutils) can be downloaded from the [IBM Service and Productivity Tools](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html) website (<http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html>).
- For information about important notices for Linux on IBM Power Systems, see the [Linux on IBM](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html) website (www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html).

Mellanox MCX414A-BCAT ConnectX-4 EN dual-port 40/56 GbE QFSP28 PCIe3.0 x8 LP adapter (FC EKF1)

Learn about the specifications and operating system requirements for the feature code (FC) EKF1 adapter.

Overview

The Mellanox MCX414A-BCAT ConnectX-4 EN dual-port 40/56GbE QFSP28 PCIe3.0 x8 LP adapter is a PCI Express (PCIe) generation 3 (Gen3) x8 adapter. The adapter supports EDR 40/56 Gb/s Ethernet connectivity. It also provides flexible solutions for high-performance, Web 2.0, cloud, data analytics, database, and storage platforms.

Specifications**Item****Description****Adapter FRU number**

01EM689 (AOC-MCX414A-BCAT-IB001).

I/O bus architecture

PCIe3 x8.

Slot requirement

For more information about slot priorities, maximums, and placement rules, see the [PCIe adapter placement rules for the 9006-12P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) or [PCIe adapter placement rules for the 9006-22P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita).

Form factor

Short, low-profile.

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether any prerequisites must be met for this feature and attaching devices. To check for operating system and partition requirements, see one of the following links:

- The latest version of enabling libraries and utilities can be downloaded from the [Fix Central website](http://www.ibm.com/support/fixcentral/) (<http://www.ibm.com/support/fixcentral/>).
- [IBM Prerequisite website](http://www14.software.ibm.com/support/customercare/iprt/home) (www14.software.ibm.com/support/customercare/iprt/home).
- [IBM System Storage Interoperation Center \(SSIC\)](http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss) (<http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss>)
- The latest version of the device driver or the IBM Power RAID adapter utilities (iprutils) can be downloaded from the [IBM Service and Productivity Tools website](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html) (<http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html>).
- For information about important notices for Linux on IBM Power Systems, see the [Linux on IBM website](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html) (www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html).

Mellanox MCX555A-ECAT ConnectX-5 VPI EDR InfiniBand 100 Gb/s and 100 GbE Single-port QSFP28 PCIe3.0 x16 LP Adapter (FC EKFD)

Learn about the specifications and operating system requirements for the feature code (FC) EKFD adapter.

Overview

The Mellanox MCX555A-ECAT ConnectX-5 VPI EDR InfiniBand 100 Gb/s and 100 GbE Single-port QSFP28 PCIe3.0 x16 LP Adapter is a PCI Express (PCIe) generation 3 (Gen3) x8 adapter. The adapter can be used in either a x8 or x16 PCIe slot in the system. The adapter offers a xx

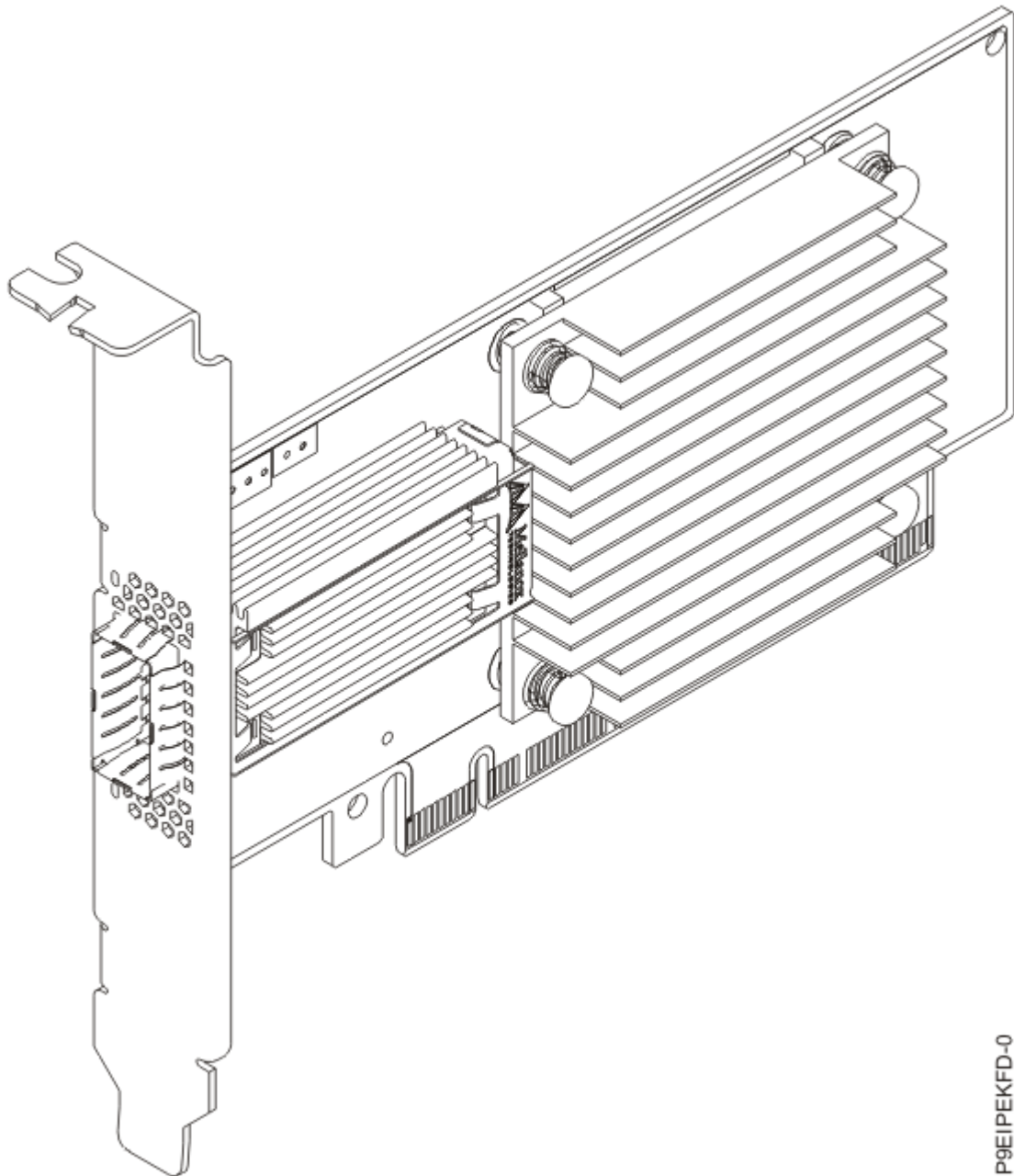


Figure 36. Mellanox MCX555A-ECAT ConnectX-5 VPI EDR InfiniBand 100 Gb/s and 100 GbE Single-port QSFP28 PCIe3.0 x16 LP Adapter

Specifications

Item

Description

Adapter FRU number

01EM690 (AOC-MCX555A-ECAT-IB001)

I/O bus architecture

PCIe3 x8

Slot requirement

For more information about slot priorities, maximums, and placement rules, see the PCIe adapter placement rules for the 9006-12P (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) or PCIe adapter placement rules for the 9006-22P (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita)

Voltage

3.3 V, 12 V.

Form factor

Short, low-profile

Attributes provided**Operating system or partition requirements**

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether any prerequisites must be met for this feature and attaching devices. To check for operating system and partition requirements, see one of the following links:

- The latest version of enabling libraries and utilities can be downloaded from the [Fix Central](http://www.ibm.com/support/fixcentral/) website (<http://www.ibm.com/support/fixcentral/>).
- [IBM Prerequisite website](http://www14.software.ibm.com/support/customer/ipt/home) (www14.software.ibm.com/support/customer/ipt/home).
- [IBM System Storage Interoperation Center \(SSIC\)](http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss) (<http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss>)
- The latest version of the device driver or the IBM Power RAID adapter utilities (iprutils) can be downloaded from the [IBM Service and Productivity Tools website](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html) (<http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html>).
- For information about important notices for Linux on IBM Power Systems, see the [Linux on IBM](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html) website (www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html).

Qlogic QLE2742 32 Gb Fibre Channel adapter PCIe3 x8 2-port LP (FC EKFE)

Learn about the specifications and operating system requirements for the feature code (FC) EKFE adapter.

Overview

The Qlogic QLE2742 32 Gb Fibre Channel adapter PCIe3 x8 2-port LP adapter is a PCI Express (PCIe) generation 3 (Gen3) x8 adapter. The adapter can be used in either a x8 or x16 PCIe slot in the system. The adapter delivers enhanced performance with up to 2.6 million IOPS (650 K per port) and up to 24,000 MB/s of aggregate throughput, and providing unsurpassed reliability and resiliency. It provides advanced storage networking features, capable of supporting the most demanding virtualized and private cloud environments, while fully using the capabilities of high-performance Gen-6 FC, all-flash arrays (AFAs), and demanding enterprise applications.

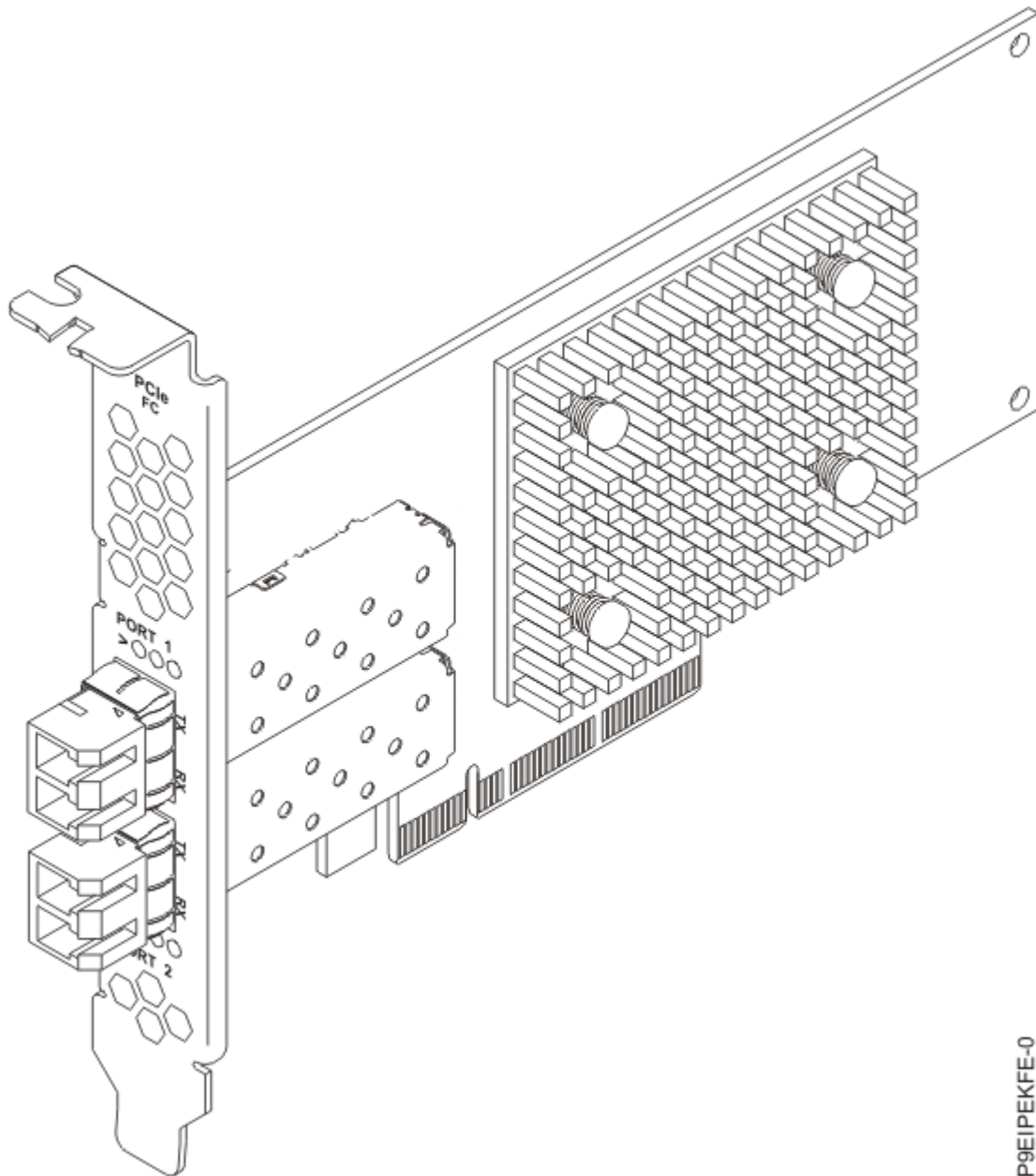


Figure 37. Qlogic QLE2742 32 Gb Fibre Channel adapter PCIe3 x8 2-port LP adapter

Specifications

Item

Description

Adapter FRU number

01EM693 (AOC-QLE2742SR-IB001) .

I/O bus architecture

PCIe3 x8.

Slot requirement

For more information about slot priorities, maximums, and placement rules, see the [PCIe adapter placement rules for the 9006-12P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) or [PCIe adapter placement rules for the 9006-22P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita)

Voltage

3.3 V, 12 V.

Form factor

Short, low-profile.

Attributes provided

Up to 2.6 million IOPS fuel high performance in AFAs and high-density virtualized environments.

Full hardware offloads deliver industry-leading default FC performance with low CPU usage.

Improvements in total cost of ownership (TCO) with QLogic StorFusion technology.

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether any prerequisites must be met for this feature and attaching devices. To check for operating system and partition requirements, see one of the following links:

- The latest version of enabling libraries and utilities can be downloaded from the [Fix Central](http://www.ibm.com/support/fixcentral/) website (<http://www.ibm.com/support/fixcentral/>).
- [IBM Prerequisite website](http://www14.software.ibm.com/support/customer/ipt/home) (www14.software.ibm.com/support/customer/ipt/home).
- [IBM System Storage Interoperation Center \(SSIC\)](http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss) (<http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss>)
- The latest version of the device driver or the IBM Power RAID adapter utilities (iprutils) can be downloaded from the [IBM Service and Productivity Tools](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html) website (<http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html>).
- For information about important notices for Linux on IBM Power Systems, see the [Linux on IBM](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html) website (www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html).

Broadcom 5719 QP 1G (1G/100M/10M) Network Interface Card PCIe x4 LP (FC EKFF)

Learn about the specifications and operating system requirements for the feature code (FC) EKFF adapter.

Overview

The Broadcom 5719 QP 1G (1G/100M/10M) Network Interface Card PCIe x4 LP Adapter is a PCI Express (PCIe) x4 adapter. The adapter can be used in either an x4, x8 or x16 PCIe slot in the system. This adapter provides four 1 Gb Ethernet ports that can be configured to run at 1000 megabits per second (Mbps) or 1 gigabit per second (Gbps), 100 Mbps, or 10 Mbps. The adapter connects to a network that uses unshielded twisted pair (UTP) cable for distances of up to 100 meters (328.08 feet). The adapter supports AIX® Network Installation Management (NIM) boot capability. The adapter conforms to the IEEE 802.3ab 1000Base-T standard. The adapter supports jumbo frames when running at the 1000 Mbps speed.

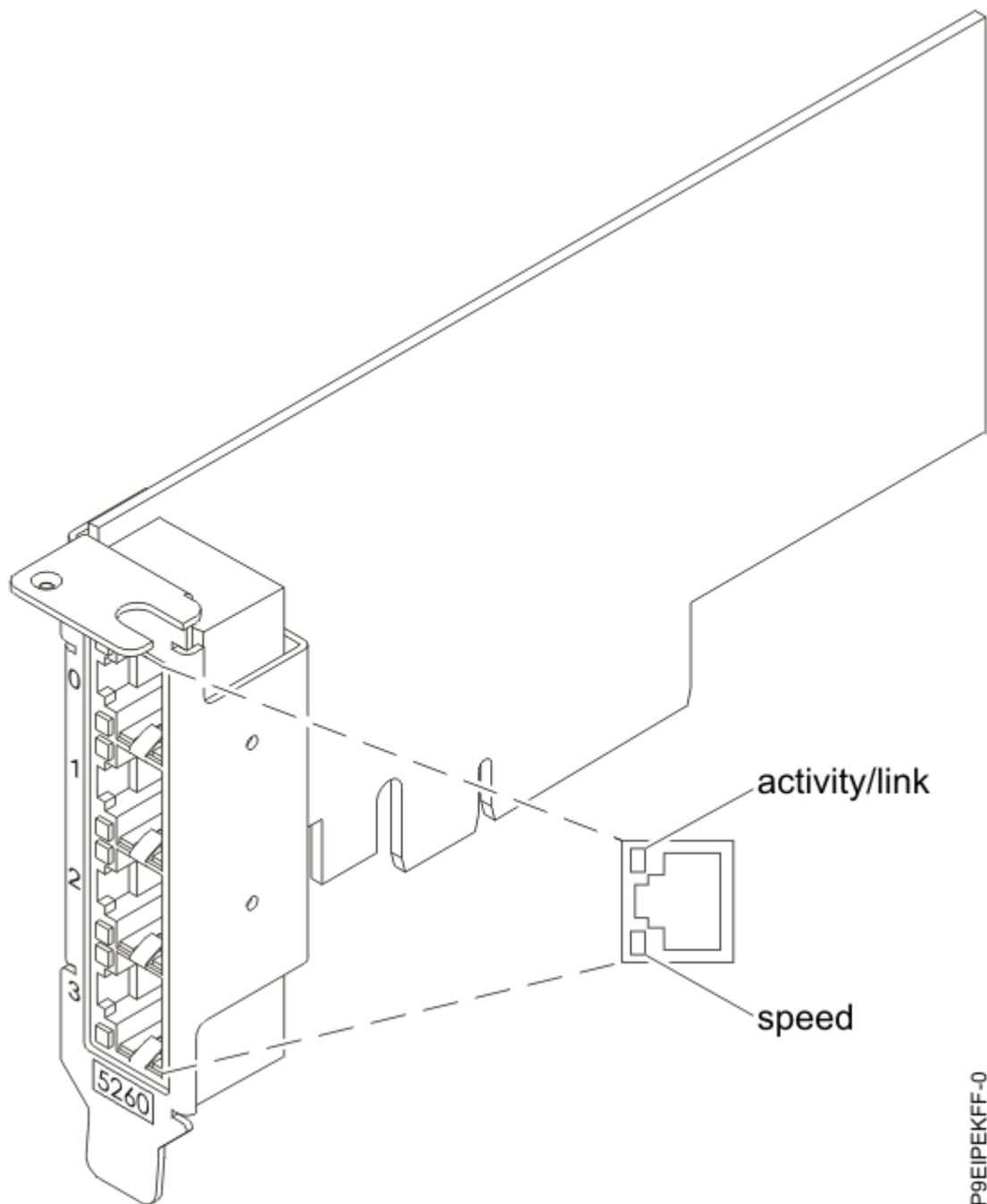


Figure 38. Broadcom 5719 QP 1G (1G/100M/10M) Network Interface Card PCIe x4 LP

Specifications

Item

Description

Adapter FRU number

01EM698 (AOC-BCM5719-4P-BRC)

I/O bus architecture

PCIe x4.

Slot requirement

For more information about slot priorities, maximums, and placement rules, see the [PCIe adapter placement rules for the 9006-12P](http://www.ibm.com/support/knowledgecenter/POWER9/) (<http://www.ibm.com/support/knowledgecenter/POWER9/>)

p9eip/p9eip12p_pcie_slot_details.dita) or PCIe adapter placement rules for the 9006-22P (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita).

Voltage

3.3 V, 12 V.

Form factor

Short, low-profile.

Attributes provided

4-Port machine access code (MAC).

High performance IPV4/IPV6 checksum offload.

Supports large send and large receive.

Multiple queues.

VIOS

Transceivers and cables

Cables 4-pair, CAT5e, UTP cables are connected to copper RJ45 connectors.

Supported cable length is more than 100 M.

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether any prerequisites must be met for this feature and attaching devices. To check for operating system and partition requirements, see one of the following links:

- The latest version of enabling libraries and utilities can be downloaded from the [Fix Central](http://www.ibm.com/support/fixcentral/) website (<http://www.ibm.com/support/fixcentral/>).
- [IBM Prerequisite](http://www14.software.ibm.com/support/customercare/iprt/home) website (www14.software.ibm.com/support/customercare/iprt/home).
- [IBM System Storage Interoperation Center \(SSIC\)](http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss) (<http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss>)
- The latest version of the device driver or the IBM Power RAID adapter utilities (iprutils) can be downloaded from the [IBM Service and Productivity Tools](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html) website (<http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html>).
- For information about important notices for Linux on IBM Power Systems, see the [Linux on IBM](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html) website (www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html).

Intel XL710 Ethernet Converged Network Adapter Quad-port 10G/1G SFP+ PCIe3.0 x8 LP (FC EKFH)

Learn about the specifications and operating system requirements for the feature code (FC) EKFH adapter.

Overview

The Intel XL710 Ethernet Converged Network Adapter Quad-port 10G/1G SFP+ PCIe3.0 x8 LP is a PCI Express (PCIe) x8 adapter. The adapter can be used in either an x4, x8 or x16 PCIe slot in the system. The adapter expands virtualization beyond the server level to the network level and combines with hardware optimizations and offloads. It provides unmatched features for virtualization, flexibility for LAN and SAN networks, and reliable performance.

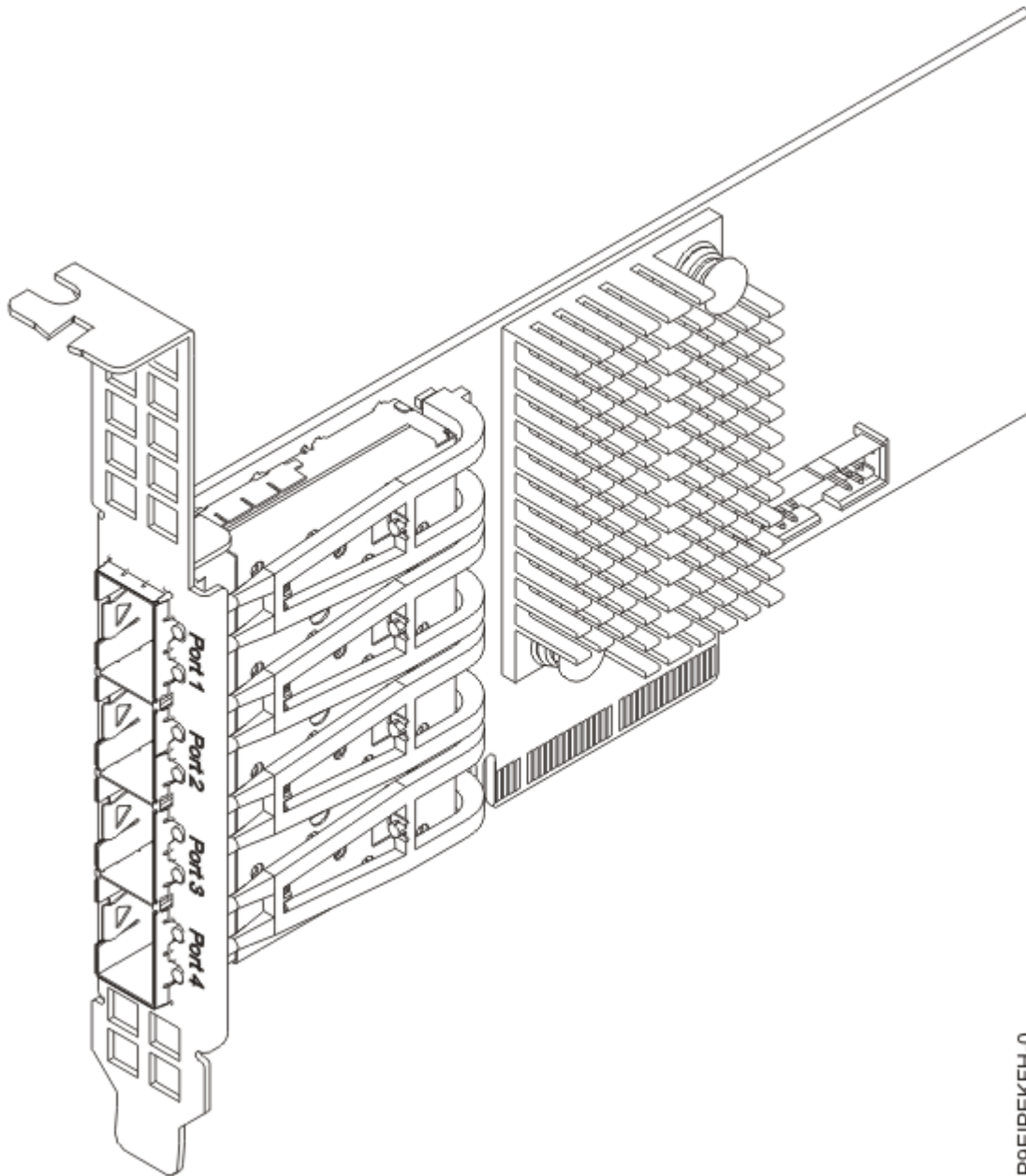


Figure 39. Intel XL710 Ethernet Converged Network Adapter Quad-port 10G/1G SFP+ PCIe3.0 x8 LP

Specifications

Item

Description

Adapter FRU number

01EM695 (AOC-STG-I4S)

I/O bus architecture

PCIe x8

Slot requirement

For more information about slot priorities, maximums, and placement rules, see the [PCIe adapter placement rules for the 9006-12P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) or [PCIe adapter placement rules for the 9006-22P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita)

Voltage

3.3 V, 12 V.

Form factor

Short, low-profile

Attributes provided

Quad SFP+ Connectors

Small Packet Performance

Network Virtualization Offloads including VXLAN and NVGRE

Includes features for virtualization flexibility for LAN and SAN networks and for reliable performance

Transceivers and cables

Supported cable length is more than 100 M

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether any prerequisites must be met for this feature and attaching devices. To check for operating system and partition requirements, see one of the following links:

- The latest version of enabling libraries and utilities can be downloaded from the [Fix Central](http://www.ibm.com/support/fixcentral/) website (<http://www.ibm.com/support/fixcentral/>).
- [IBM Prerequisite](http://www14.software.ibm.com/support/customercare/iprt/home) website (www14.software.ibm.com/support/customercare/iprt/home).
- [IBM System Storage Interoperation Center \(SSIC\)](http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss) (<http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss>)
- The latest version of the device driver or the IBM Power RAID adapter utilities (iprutils) can be downloaded from the [IBM Service and Productivity Tools](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html) website (<http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html>).
- For information about important notices for Linux on IBM Power Systems, see the [Linux on IBM](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html) website (www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html).

Intel XL710/X557 10GBase-T Converged Network Adapter Quad-port (10G/1G/100M speeds) PCIe3.0 x8 LP (FC EKFP)

Learn about the specifications and operating system requirements for the feature code (FC) EKFP adapter.

Overview

The Intel XL710/X557 10GBase-T Converged Network Adapter Quad-port (10G/1G/100M speeds) PCIe3.0 x8 LP is a PCI Express (PCIe) generation 3 (Gen3) x8 adapter. The adapter can be used in either an x8 or x16 PCIe slot in the system. The adapter enables rapid network provisioning in an agile data center.

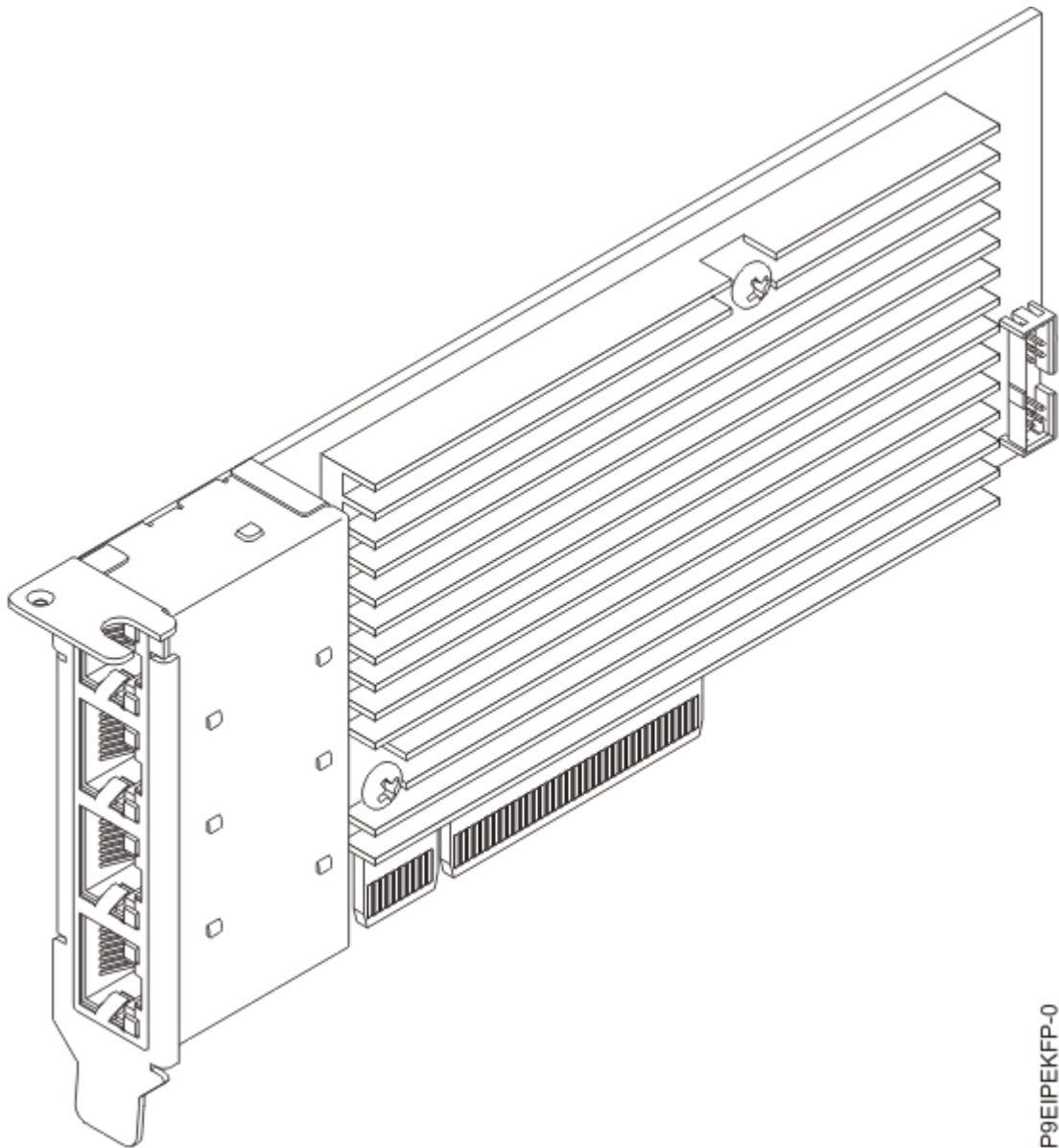


Figure 40. Intel XL710/X557 10GBase-T Converged Network Adapter Quad-port (10G/1G/100M speeds) PCIe3.0 x8 LP

Specifications

Item

Description

Adapter FRU number

01EM696 (AOC-STG-i4T)

I/O bus architecture

PCIe x8

Slot requirement

For more information about slot priorities, maximums, and placement rules, see the [PCIe adapter placement rules for the 9006-12P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) or [PCIe adapter placement rules for the 9006-22P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita)

Voltage

3.3 V, 12 V.

Form factor

Short, low-profile

Attributes provided

Network Virtualization Offloads

Small Packet Performance

NC-SI for Remote Management

Transceivers and cables

Supported cable length is more than 100 M

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether any prerequisites must be met for this feature and attaching devices. To check for operating system and partition requirements, see one of the following links:

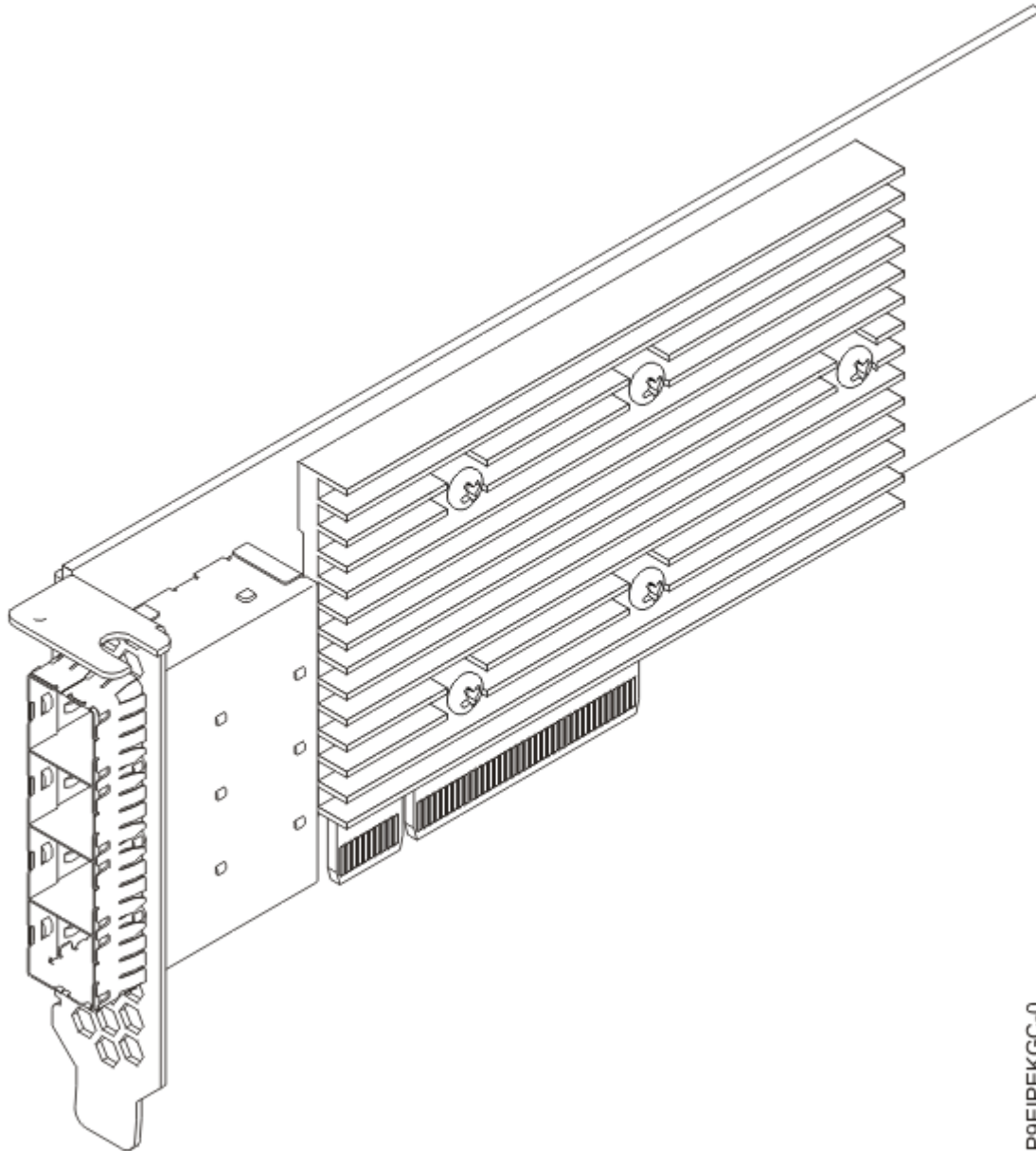
- The latest version of enabling libraries and utilities can be downloaded from the [Fix Central](http://www.ibm.com/support/fixcentral/) website (<http://www.ibm.com/support/fixcentral/>).
- [IBM Prerequisite website](http://www14.software.ibm.com/support/customer/ipt/home) (www14.software.ibm.com/support/customer/ipt/home).
- [IBM System Storage Interoperation Center \(SSIC\)](http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss) (<http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss>)
- The latest version of the device driver or the IBM Power RAID adapter utilities (iprutils) can be downloaded from the [IBM Service and Productivity Tools](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html) website (<http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html>).
- For information about important notices for Linux on IBM Power Systems, see the [Linux on IBM](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html) website (www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html).

Broadcom (LSI) 9305-16E SAS3 HBA PCIe3.0 x8 LP (FC EKG)

Learn about the specifications and operating system requirements for feature code (FC) EKG adapters.

Overview

The Broadcom (LSI) 9305-16E SAS3 HBA PCIe3.0 x8 LP is a PCI Express (PCIe) generation 3 (Gen3) x8 adapter. The adapter can be used in either a x8 or x16 PCIe slot in the system. The adapter is designed for large-scale, data-intensive applications and is ideal for tiered storage or multiple external storage enclosures.



P9EIPKGC-0

Figure 41. Broadcom (LSI) 9305-16E SAS3 HBA PCIe3.0 x8 LP

Specifications

Item

Description

Adapter FRU number

01EM701 (AOC-SAS3-9305-16E)

I/O bus architecture

PCIe3 x8

Slot requirement

For more information about slot priorities, maximums, and placement rules, see the [PCIe adapter placement rules for the 9006-12P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) or [PCIe adapter placement rules for the 9006-22P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita).

Voltage

3.3 V, 12 V.

Form factor

Short, low-profile.

Attributes provided

Performance of over 1.5 million input-output operations per second (IOPS).

Connects up to 1024 SAS and SATA devices with 16 external 12 Gb/s SAS ports.

Provides maximum connectivity and performance for external JBOD and external RAID enclosures.

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether any prerequisites must be met for this feature and attaching devices. To check for operating system and partition requirements, see one of the following links:

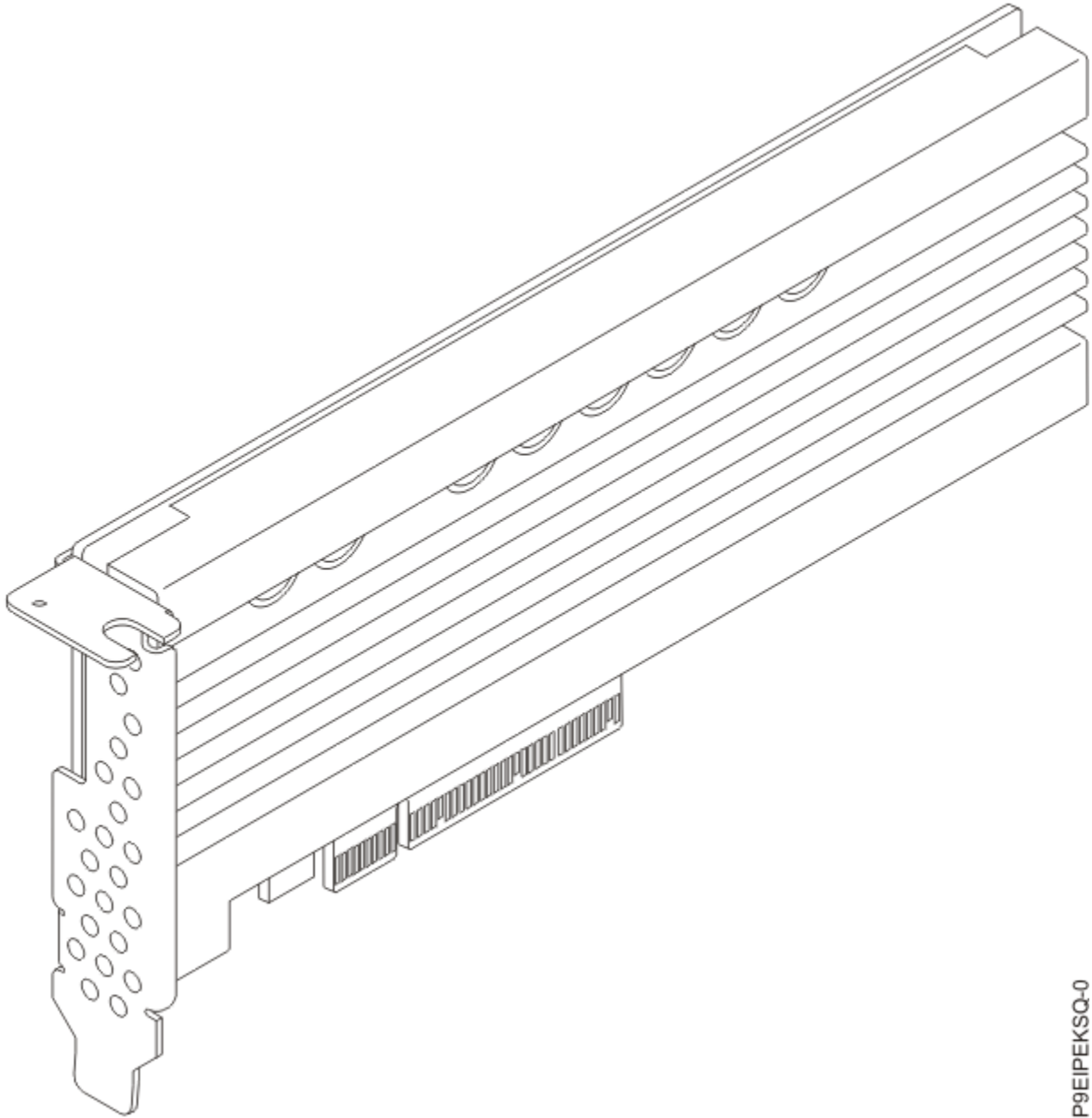
- The latest version of enabling libraries and utilities can be downloaded from the [Fix Central](http://www.ibm.com/support/fixcentral/) website (<http://www.ibm.com/support/fixcentral/>).
- [IBM Prerequisite](http://www14.software.ibm.com/support/customercare/iprt/home) website (www14.software.ibm.com/support/customercare/iprt/home).
- [IBM System Storage Interoperation Center \(SSIC\)](http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss) (<http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss>)
- The latest version of the device driver or the IBM Power RAID adapter utilities (iprutils) can be downloaded from the [IBM Service and Productivity Tools](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html) website (<http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html>).
- For information about important notices for Linux on IBM Power Systems, see the [Linux on IBM](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html) website (www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html).

Samsung PM1725a NVMe 1.6 TB 5DWPD PCIe3.0 x8 LP Adapter (FC EKSQ)

Learn about the specifications and operating system requirements for the feature code (FC) EKSQ adapter.

Overview

The Samsung PM1725a NVMe 1.6 TB 5DWPD PCIe3.0 x8 LP Adapter is a PCI Express (PCIe) generation 3 (Gen3) x8 adapter. The adapter can be used in either a x8 or x16 PCIe slot in the system. The adapter utilizes Samsung V-NAND flash memory, which features a unique design that stacks 48 layers on top of another. It also employs cost-effective TLC (triple-level cell) flash memory, which delivers higher reliability than MLC (multi-level cell) planar NAND flash memory SSDs.



P9E1PEKSQ-0

Figure 42. Samsung PM1725a NVMe 1.6 TB 5DWPD PCIe3.0 x8 LP Adapter

Specifications

Item

Description

Adapter FRU number

01EM677 (HDS-AVT-MZPLL1T6HEHP003)

I/O bus architecture

PCIe3 x8

Slot requirement

For more information about slot priorities, maximums, and placement rules, see the [PCIe adapter placement rules for the 9006-12P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) or [PCIe adapter placement rules for the 9006-22P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita)

Voltage

3.3 V, 12 V.

Form factor

Short, low-profile

Attributes provided

Samsung 3rd-generation TLC V-NAND technology

Five drive writes per day (DWPD)

Delivers a wide bandwidth of up to 6,400/3,000 MB/s sequential R/W speeds respectively

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether any prerequisites must be met for this feature and attaching devices. To check for operating system and partition requirements, see one of the following links:

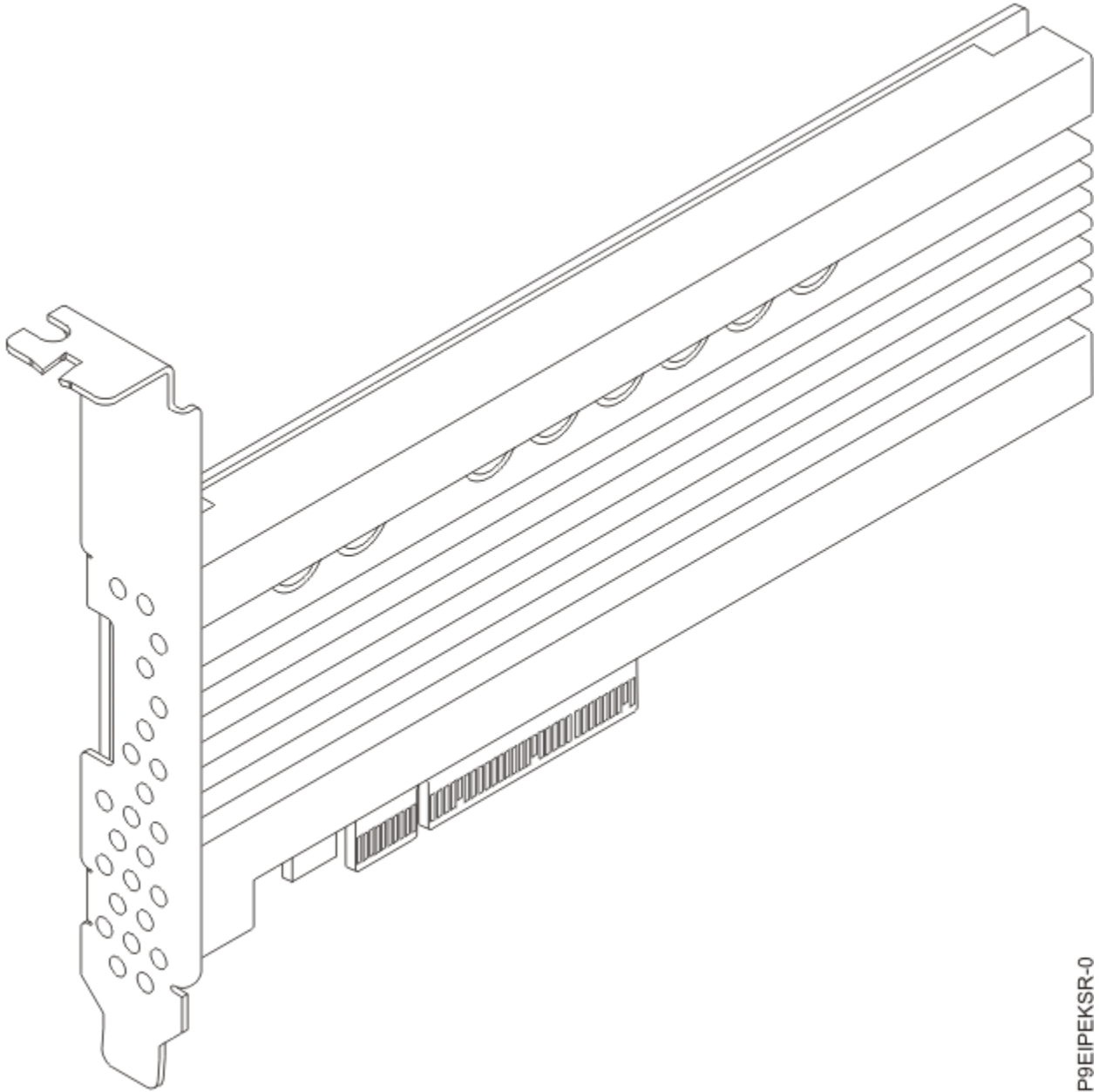
- The latest version of enabling libraries and utilities can be downloaded from the [Fix Central](http://www.ibm.com/support/fixcentral/) website (<http://www.ibm.com/support/fixcentral/>).
- [IBM Prerequisite website](http://www14.software.ibm.com/support/customer/ipt/home) (www14.software.ibm.com/support/customer/ipt/home).
- [IBM System Storage Interoperation Center \(SSIC\)](http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss) (<http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss>)
- The latest version of the device driver or the IBM Power RAID adapter utilities (iprutils) can be downloaded from the [IBM Service and Productivity Tools](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html) website (<http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html>).
- For information about important notices for Linux on IBM Power Systems, see the [Linux on IBM](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html) website (www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html).

Samsung PM1725a NVMe 3.2 TB 5DWPD PCIe3.0 x8 LP Adapter (FC EKSR)

Learn about the specifications and operating system requirements for the feature code (FC) EKSR adapter.

Overview

The Samsung PM1725a NVMe 3.2 TB 5DWPD PCIe3.0 x8 LP Adapter is a PCI Express (PCIe) generation 3 (Gen3) x8 adapter. The adapter can be used in either a x8 or x16 PCIe slot in the system. The adapter utilizes Samsung V-NAND flash memory, which features a unique design that stacks 48 layers on top of another. It also employs cost-effective TLC (triple-level cell) flash memory, which delivers higher reliability than MLC (multi-level cell) planar NAND flash memory SSDs.



P9EIKEKSR-0

Figure 43. Samsung PM1725a NVMe 3.2 TB 5DWPD PCIe3.0 x8 LP Adapter

Specifications

Item

Description

Adapter FRU number

01EM678 (HDS-AVT-MZPLL3T2HMLS003)

I/O bus architecture

PCIe3 x8

Slot requirement

For more information about slot priorities, maximums, and placement rules, see the [PCIe adapter placement rules for the 9006-12P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip12p_pcie_slot_details.dita) or [PCIe adapter placement rules for the 9006-22P](http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eip/p9eip22p_pcie_slot_details.dita)

Voltage

3.3 V, 12 V.

Form factor

Short, low-profile

Attributes provided

Samsung 3rd-generation TLC V-NAND technology

Five drive writes per day (DWPD)

Delivers a wide bandwidth of up to 6,400/3,000 MB/s sequential R/W speeds respectively

Operating system or partition requirements

If you are installing a new feature, ensure that you have the software that is required to support the new feature and that you determine whether any prerequisites must be met for this feature and attaching devices. To check for operating system and partition requirements, see one of the following links:

- The latest version of enabling libraries and utilities can be downloaded from the [Fix Central](http://www.ibm.com/support/fixcentral/) website (<http://www.ibm.com/support/fixcentral/>).
- [IBM Prerequisite website](http://www14.software.ibm.com/support/customer/ipt/home) (www14.software.ibm.com/support/customer/ipt/home).
- [IBM System Storage Interoperation Center \(SSIC\)](http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss) (<http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss>)
- The latest version of the device driver or the IBM Power RAID adapter utilities (iprutils) can be downloaded from the [IBM Service and Productivity Tools](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html) website (<http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html>).
- For information about important notices for Linux on IBM Power Systems, see the [Linux on IBM](http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html) website (www14.software.ibm.com/webapp/set2/sas/f/lopdiags/info/LinuxAlerts.html).

Installing a PCIe adapter in the 9006-12P system

To install a PCIe adapter in the IBM Power System LC921 (9006-12P) system, complete the steps in this procedure.

Before you begin

Power off the system and place it in the service position. For instructions, see [“Preparing the 9006-12P system to remove and replace internal parts”](#) on page 92.

About this task

See [“PCIe adapter placement rules and slot priorities for the 9006-12P system”](#) on page 23 for information and capabilities of the PCIe slots.



Attention: For safety and airflow purposes, if you remove parts from the system, you must ensure that:

- PCIe tail-stock fillers are present.
- System processor airflow baffles are present.

Procedure

1. Attach the electrostatic discharge (ESD) wrist strap.

The ESD wrist strap must be connected to an unpainted metal surface until the service procedure is completed, and if applicable, until the service access cover is replaced.



Attention:

- Attach an electrostatic discharge (ESD) wrist strap to the front ESD jack, to the rear ESD jack, or to an unpainted metal surface of your hardware to prevent the electrostatic discharge from damaging your hardware.

- When you use an ESD wrist strap, follow all electrical safety procedures. An ESD wrist strap is used for static control. It does not increase or decrease your risk of receiving electric shock when using or working on electrical equipment.
 - If you do not have an ESD wrist strap, just prior to removing the product from ESD packaging and installing or replacing hardware, touch an unpainted metal surface of the system for a minimum of 5 seconds. If at any point in this service process you move away from the system, it is important to again discharge yourself by touching an unpainted metal surface for at least 5 seconds before you continue with the service process.
2. An adapter can share a PCIe riser card with other adapters. Label and remove any cables and plugs that extend out of the adapters.

See [Figure 44](#) on page 84.

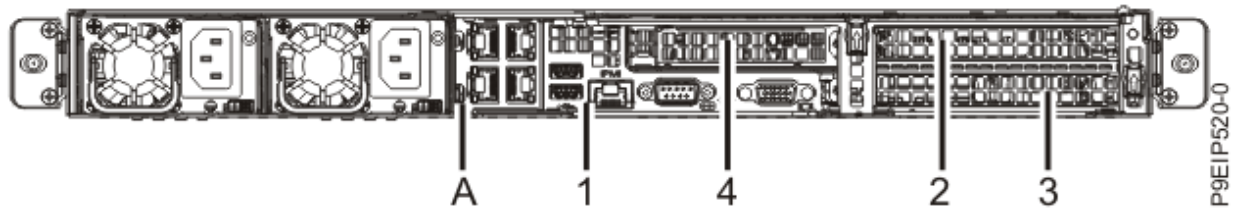
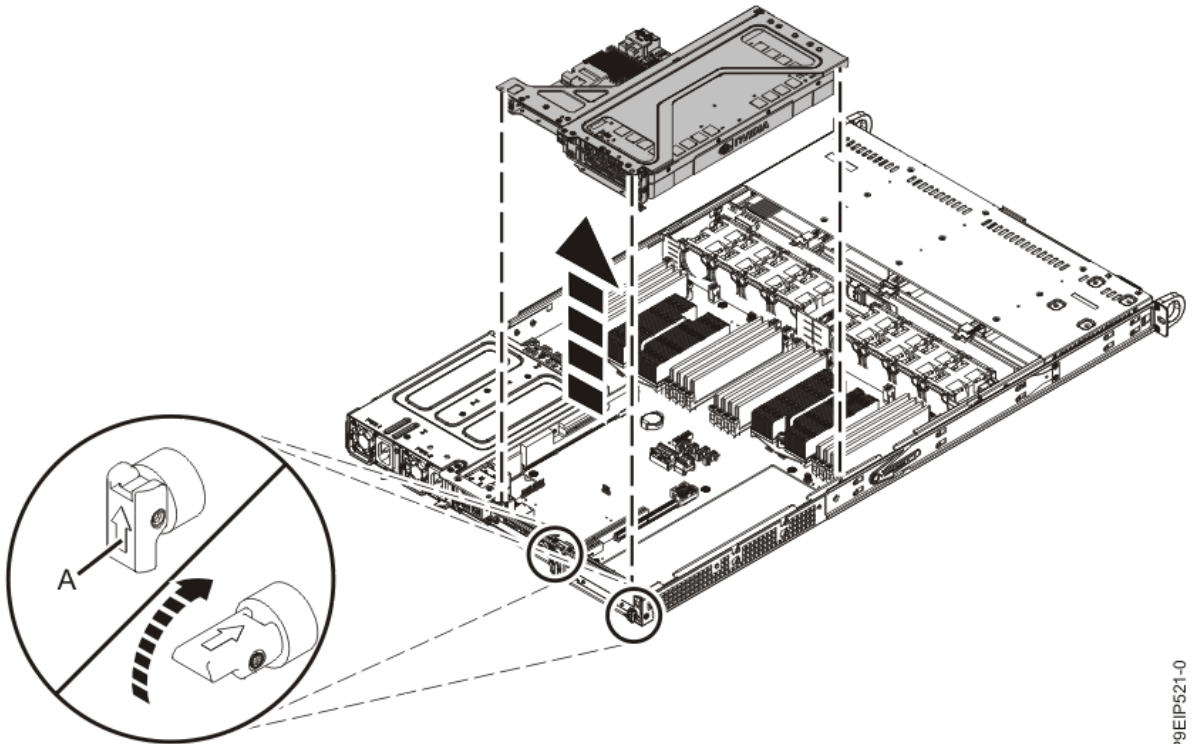


Figure 44. 9006-12P PCIe adapter positions

Position	Step
1 (UIO Slot1)	“3” on page 84
2 (WIO Slot1), 3 (WIO Slot2), 4 (WIO-R Slot)	“4” on page 84

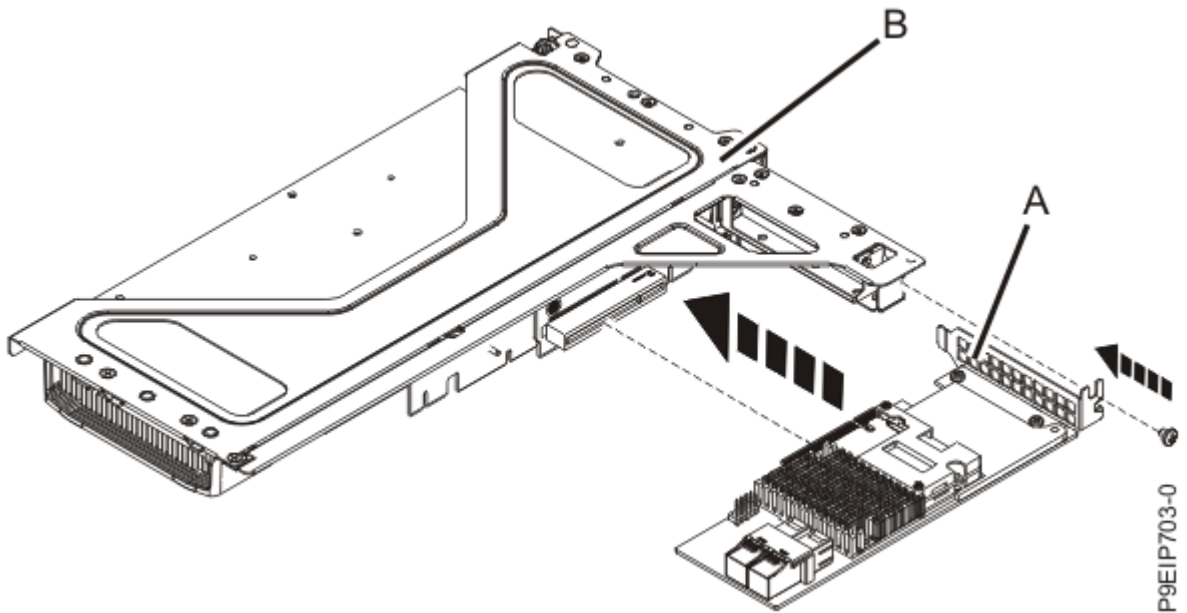
3. If you are working with a PCIe adapter in position 1, do the following:
- Remove the standard tailstock from the adapter.
 - If you are inserting a storage drive adapter, connect the signal cables to the adapter before inserting the adapter. See [“Drive installation options for the 9006-12P system” on page 10](#) for cabling information.
 - If needed, install a support bracket for the PCIe adapter to the system backplane. Also install a special support tailstock to the PCIe adapter.
 - Insert the PCIe adapter into the PCIe riser.
 - If you installed the support bracket for the PCIe adapter, fasten the special support tailstock to that bracket.
4. If the PCIe adapter to install is in positions 2, 3, or 4, you must remove the PCIe cage and riser.
- Remove the PCIe riser as shown in [Figure 45](#) on page 85.
 - Retract the retaining pins (**A**) such that the arrows on the tabs point to the system.
 - Lift the PCIe riser from the system.



P9EIP521-0

Figure 45. Removing the PCIe riser

- b) Place the PCIe riser on an ESD surface.
- c) Remove the screw and the tail-stock filler for that position.
- d) If you are inserting a storage drive adapter, connect the signal cables to the adapter before inserting the adapter.
See “Drive installation options for the 9006-12P system” on page 10 for cabling information.
- e) Insert the PCIe adapter **(A)** into the PCIe riser **(B)** as shown in [Figure 46](#) on page 85 or [Figure 47](#) on page 86, aligning it properly and inserting it fully into the slot. Secure the PCIe adapter tail-stock with 1 or 2 screws as needed.



P9EIP703-0

Figure 46. Inserting an adapter into position 4 of the riser

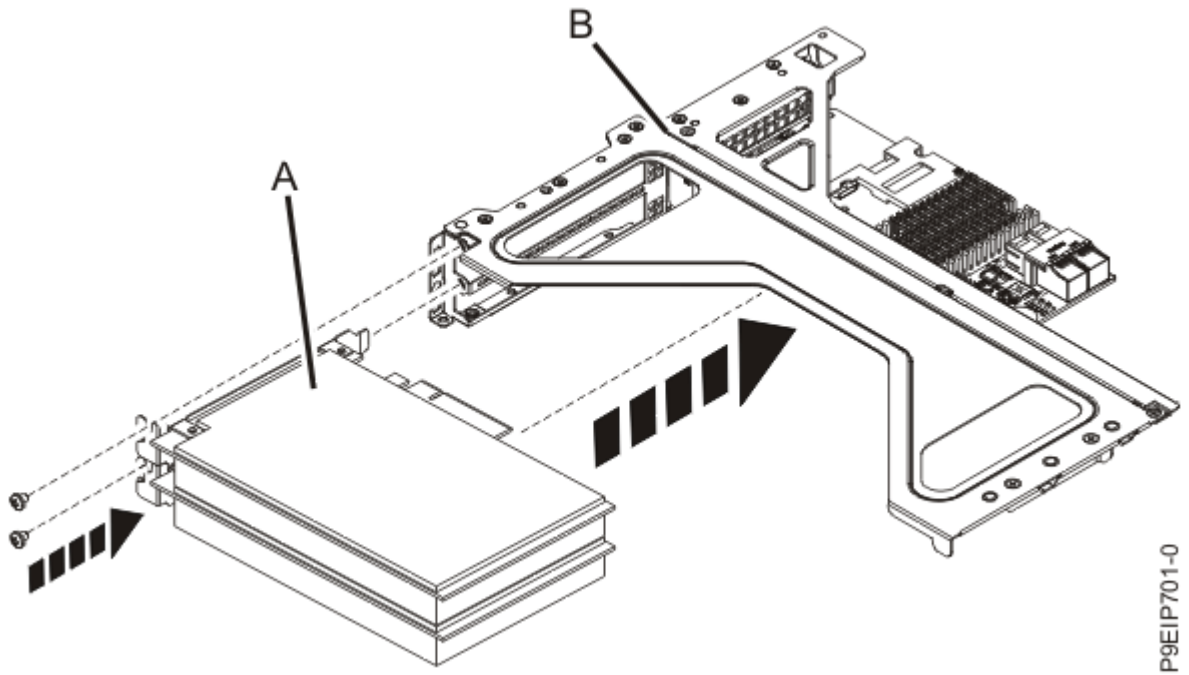


Figure 47. Inserting a PCIe adapter into position 2 or 3 of the PCIe riser

- f) Place the PCIe adapter riser and the PCIe adapters it contains into the system backplane as shown in the following figure.
- i) Ensure that the PCIe holder release pins **(B)** are retracted, such that the arrows point towards the system.
 - ii) Use the alignment pins **(A)** and slots to help you properly insert the PCIe riser cards.
 - iii) Reset the PCIe holder release pins **(B)** to secure the PCIe adapter riser.

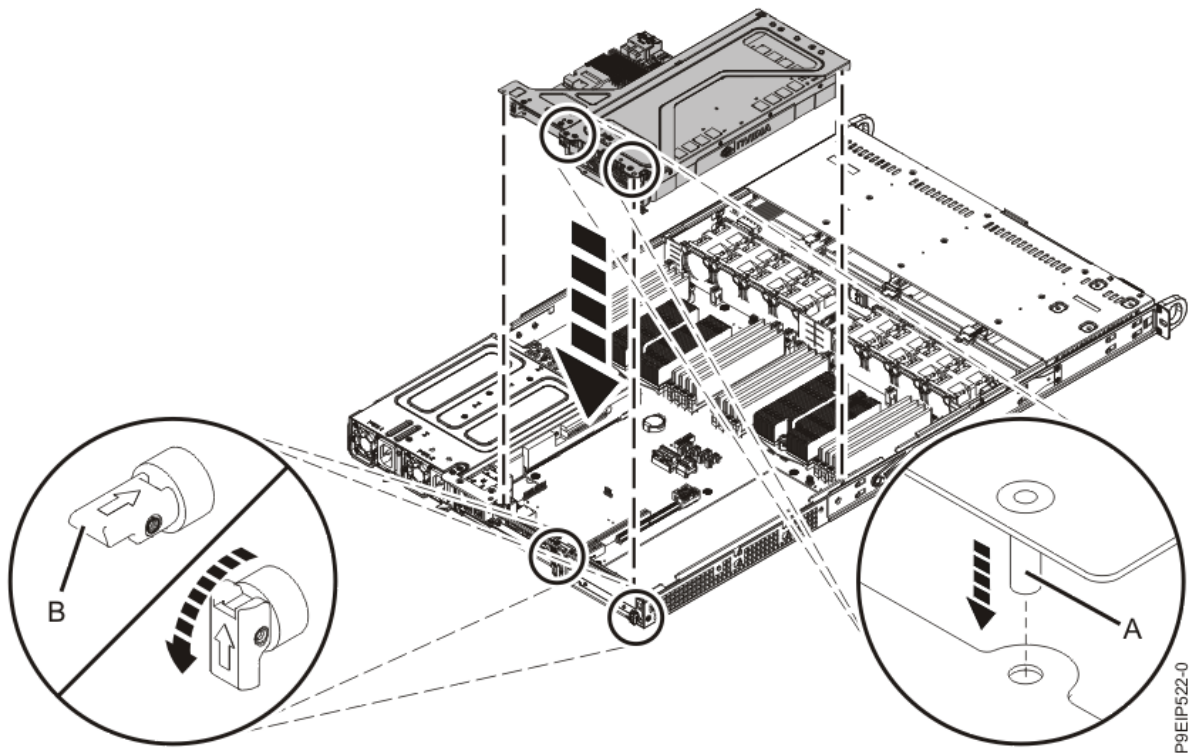


Figure 48. Replacing the PCIe riser

5. Using your labels, replace any cables and plugs that you removed from the PCIe adapters.

What to do next

Prepare the system for operation. For instructions, see [“Preparing the 9006-12P system for operation after you remove and replace internal parts” on page 95.](#)

Common procedures for servicing or installing features in the 9006-12P

Learn about the common procedures related to installing, removing, and replacing features in the IBM Power System LC921 (9006-12P) system.

Before you begin servicing the 5104-22C, 9006-12P, 9006-22C, or 9006-22P system

Observe these precautions when you are installing, removing, or replacing features and parts.

About this task

These precautions are intended to create a safe environment to service your system and do not provide steps for servicing your system. The installation, removal, and replacement procedures provide the step-by-step processes that are required to service your system.



DANGER: When working on or around the system, observe the following precautions:

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard: If IBM supplied the power cord(s), connect power to this unit only with the IBM provided power cord. Do not use the IBM provided power cord for any other product. Do not open or service any power supply assembly. Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.



- The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords. For AC power, disconnect all power cords from their AC power source. For racks with a DC power distribution panel (PDP), disconnect the customer's DC power source to the PDP.
- When connecting power to the product ensure all power cables are properly connected. For racks with AC power, connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate. For racks with a DC power distribution panel (PDP), connect the customer's DC power source to the PDP. Ensure that the proper polarity is used when attaching the DC power and DC power return wiring.
- Connect any equipment that will be attached to this product to properly wired outlets.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Do not attempt to switch on power to the machine until all possible unsafe conditions are corrected.
- When performing a machine inspection: Assume that an electrical safety hazard is present. Perform all continuity, grounding, and power checks specified during the subsystem installation procedures to ensure that the machine meets safety requirements. Do not attempt to switch power to the machine until all possible unsafe conditions are corrected. Before you open the device covers, unless instructed otherwise in the installation and configuration procedures: Disconnect the attached AC power cords, turn off the applicable circuit breakers located in the rack power distribution panel (PDP), and disconnect any telecommunications systems, networks, and modems.
- Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.

To Disconnect: 1) Turn off everything (unless instructed otherwise). 2) For AC power, remove the power cords from the outlets. 3) For racks with a DC power distribution panel (PDP), turn off the circuit breakers located in the PDP and remove the power from the Customer's DC power source. 4) Remove the signal cables from the connectors. 5) Remove all cables from the devices.

To Connect: 1) Turn off everything (unless instructed otherwise). 2) Attach all cables to the devices. 3) Attach the signal cables to the connectors. 4) For AC power, attach the power cords to the outlets. 5) For racks with a DC power distribution panel (PDP), restore the power from the Customer's DC power source and turn on the circuit breakers located in the PDP. 6) Turn on the devices.



- Sharp edges, corners and joints may be present in and around the system. Use care when handling equipment to avoid cuts, scrapes and pinching. (D005)

(R001 part 1 of 2):



DANGER: Observe the following precautions when working on or around your IT rack system:

- Heavy equipment—personal injury or equipment damage might result if mishandled.
- Always lower the leveling pads on the rack cabinet.
- Always install stabilizer brackets on the rack cabinet if provided, unless the earthquake option is to be installed.
- To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.
- Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices. In addition, do not lean on rack mounted devices and do not use them to stabilize your body position (for example, when working from a ladder).



- Stability hazard:
 - The rack may tip over causing serious personal injury.
 - Before extending the rack to the installation position, read the installation instructions.
 - Do not put any load on the slide-rail mounted equipment mounted in the installation position.
 - Do not leave the slide-rail mounted equipment in the installation position.
- Each rack cabinet might have more than one power cord.
 - For AC powered racks, be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.
 - For racks with a DC power distribution panel (PDP), turn off the circuit breaker that controls the power to the system unit(s), or disconnect the customer's DC power source, when directed to disconnect power during servicing.
- Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.
- An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock. (R001 part 1 of 2)

(R001 part 2 of 2):



CAUTION:

- Do not install a unit in a rack where the internal rack ambient temperatures will exceed the manufacturer's recommended ambient temperature for all your rack-mounted devices.
- Do not install a unit in a rack where the air flow is compromised. Ensure that air flow is not blocked or reduced on any side, front, or back of a unit used for air flow through the unit.
- Consideration should be given to the connection of the equipment to the supply circuit so that overloading of the circuits does not compromise the supply wiring or overcurrent protection. To provide the correct power connection to a rack, refer to the rating labels located on the equipment in the rack to determine the total power requirement of the supply circuit.
- *(For sliding drawers.)* Do not pull out or install any drawer or feature if the rack stabilizer brackets are not attached to the rack or if the rack is not bolted to the floor. Do not pull out more than one drawer at a time. The rack might become unstable if you pull out more than one drawer at a time.



- *(For fixed drawers.)* This drawer is a fixed drawer and must not be moved for servicing unless specified by the manufacturer. Attempting to move the drawer partially or completely out of the rack might cause the rack to become unstable or cause the drawer to fall out of the rack. (R001 part 2 of 2)

Procedure

1. If you are installing a new feature, ensure that you have the software that is required to support the new feature. See [IBM Prerequisite](#).
2. If you are installing or replacing something that might put your data at risk, ensure, wherever possible, that you have a current backup of your system or logical partition (including operating systems, licensed programs, and data).
3. Review the installation or replacement procedure for the feature or part.
4. Note the significance of color on your system.

Blue or terra-cotta on a part of the hardware indicates a touch point where you can grip the hardware to remove it from or install it in the system, or open or close a latch. Terra-cotta might also indicate that the part can be removed and replaced with the system or logical partition powered on.

5. Ensure that you have access to a medium flat-blade screwdriver, a Phillips screwdriver, and a pair of scissors.
6. If parts are incorrect, missing, or visibly damaged, do the following steps:
 - If you are replacing a part, contact the provider of your parts or next level of support.
 - If you are installing a feature, contact one of the following service organizations:
 - The provider of your parts or next level of support.
 - In the United States, the IBM Rochester Manufacturing Automated Information Line (R-MAIL) at 1-800-300-8751.

In countries and regions outside of the United States, use the following website to locate your service and support telephone numbers:

<http://www.ibm.com/planetwide>

7. If you encounter difficulties during the installation, contact your service provider, your IBM reseller, or your next level of support.
8. For thermal performance, ensure that the top cover is on when the system is running.

Identifying the 5104-22C, 9006-12P, 9006-22C, or 9006-22P system that contains the part to replace

Learn how to determine which system has the part you want to replace.

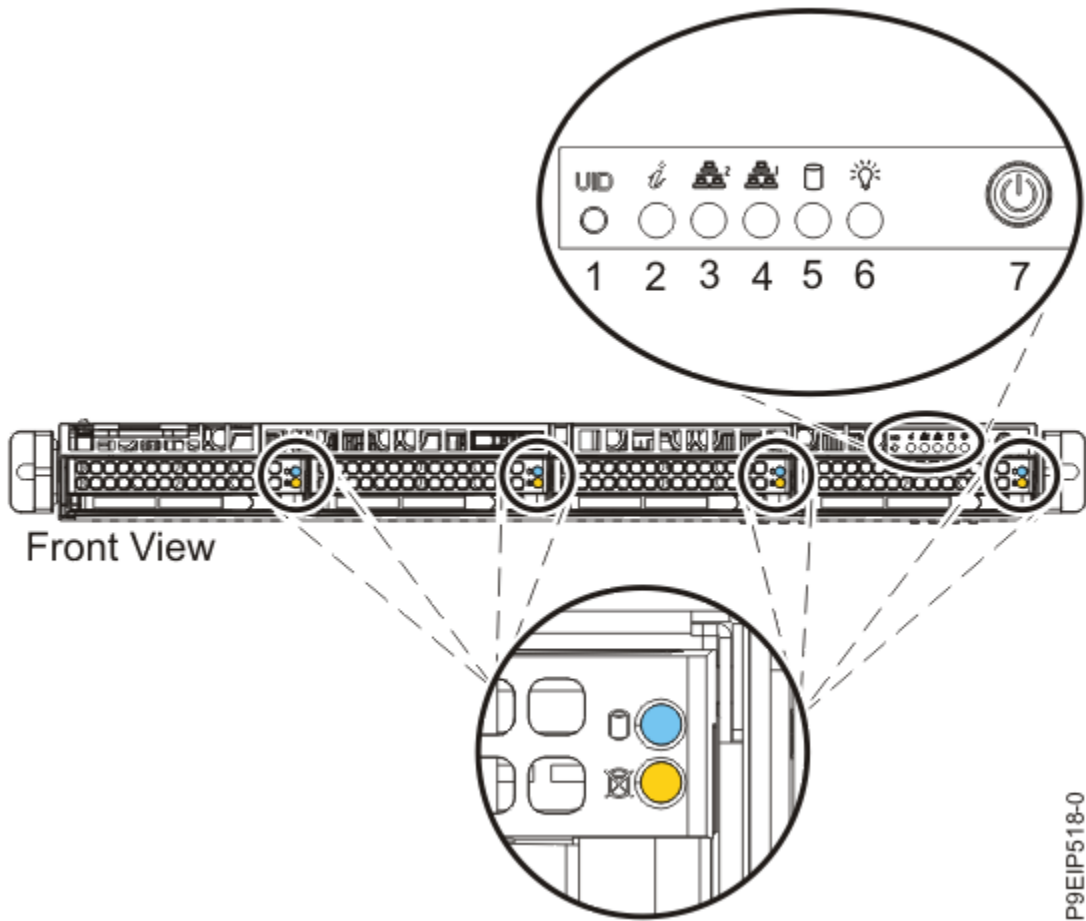
LEDs on the 9006-12P system

Use this information as a guide to the LEDs on the IBM Power System LC921 (9006-12P) system.

The LEDs indicate various system status. If the part does not have a problem indicator LED, you can use a troubleshooting program such as **impitool** to identify the issue.

The front LEDs are shown in [Figure 49 on page 91](#).

- The green LED **(6)** indicates the power status.
- The identify LED **(2)** can indicate the following states:
 - Solid blue indicates that the local UID button was pressed.
 - Flashing blue indicates that a remote UID command was run.
 - Solid red indicates that the system is overheated.
 - Flashing red at 1 Hz indicates that a fan failed.
 - Flashing red at 0.25 Hz indicates that a power supply failed.
- The amber LED **(5)** flashes when there is SATA drive activity, for SATA drives directly attached to the system backplane.
- The network activity LEDs **(3)** and **(4)** flash when there is network activity on the feature EKA6 four port network card.

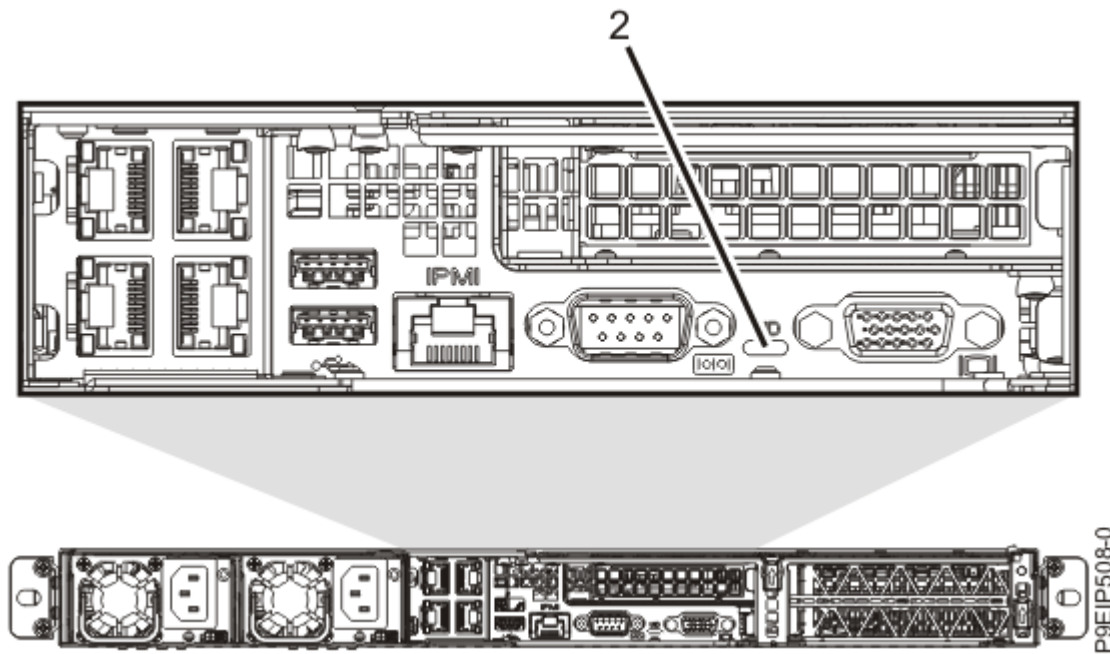


P9EIP518-0

Figure 49. LEDs on the front of the system

LEDs are also located on the rear of the system; see [Figure 50 on page 91](#).

The identify LED is at **(2)**. Turn it on by using a system identify command or by pressing the UID button.



P9EIP508-0

Figure 50. LEDs on the rear of the system

Drive LEDs can indicate the following states:

- Blue activity LED can indicate the following states:
 - When there is no activity, the LED is off for SATA drives; on for SAS drives.
 - Flashing blue indicates activity
- Red status LED can indicate the following states. The status LED does not work when SATA drives are directly attached to the system backplane.
 - Steady red indicates that the drive failed
 - Flashing red at 4 Hz identifies the drive
 - Flashing red at 1 Hz indicates that the drive is rebuilding

Power supply LEDs can indicate the following states:

- Steady green indicates that power is on
- Flashing green indicates that AC is applied, but the system is powered off.
- Steady amber indicates that AC is not applied, or a power fault occurred
- Flashing amber indicates that the power supply is overheating

Identifying the 5104-22C, 9006-12P, 9006-22C, or 9006-22P that needs servicing

Learn how to turn on the blue identify LED to help you find the system that needs servicing.

Procedure

Use the **ipmitool** command to activate the blue system identify LED.

For in-band networks, enter the following chassis identify command:

```
ipmitool -I <interface> chassis identify <interval>
```

interface

The interface that you are using to connect to the system. For example, usb.

interval

The time to turn on the identify LED in seconds. The default value is 15. This means that the LED is on for 15 seconds and then turns off for 15 seconds. A value of zero (0) turns off the LED. A value of force turns on the LED and leaves it on until turned off.

To run the command remotely over the LAN, enter the following chassis identify command:

```
ipmitool -I lanplus -H <hostname> -U <username> -P <password> chassis identify <interval>
```

Preparing the 9006-12P system to remove and replace internal parts

Learn how to prepare the IBM Power System LC921 (9006-12P) system to remove and replace internal parts.

Procedure

1. Complete the prerequisite tasks. For instructions, see [“Before you begin servicing the 5104-22C, 9006-12P, 9006-22C, or 9006-22P system” on page 87.](#)
2. Identify the part and the system that you will be working on. For instructions, see [“Identifying the 5104-22C, 9006-12P, 9006-22C, or 9006-22P system that contains the part to replace” on page 90.](#)
3. Attach the electrostatic discharge (ESD) wrist strap.

The ESD wrist strap must be connected to an unpainted metal surface until the service procedure is completed, and if applicable, until the service access cover is replaced.

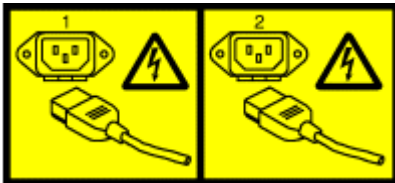


Attention:

- Attach an electrostatic discharge (ESD) wrist strap to the front ESD jack, to the rear ESD jack, or to an unpainted metal surface of your hardware to prevent the electrostatic discharge from damaging your hardware.
 - When you use an ESD wrist strap, follow all electrical safety procedures. An ESD wrist strap is used for static control. It does not increase or decrease your risk of receiving electric shock when using or working on electrical equipment.
 - If you do not have an ESD wrist strap, just prior to removing the product from ESD packaging and installing or replacing hardware, touch an unpainted metal surface of the system for a minimum of 5 seconds. If at any point in this service process you move away from the system, it is important to again discharge yourself by touching an unpainted metal surface for at least 5 seconds before you continue with the service process.
4. Stop the system. For instructions, see [“Stopping the 5104-22C, 9006-12P, 9006-22C, or 9006-22P system”](#) on page 98.
 5. Disconnect the power source from the system by unplugging the system. For instructions, see [“Disconnecting the power cords from the 9006-12P system”](#) on page 109.

Note: The system might be equipped with redundant power supply. Before you continue with this procedure, ensure that all power to your system is disconnected.

(L003)



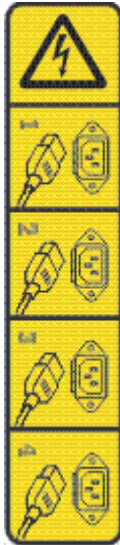
or



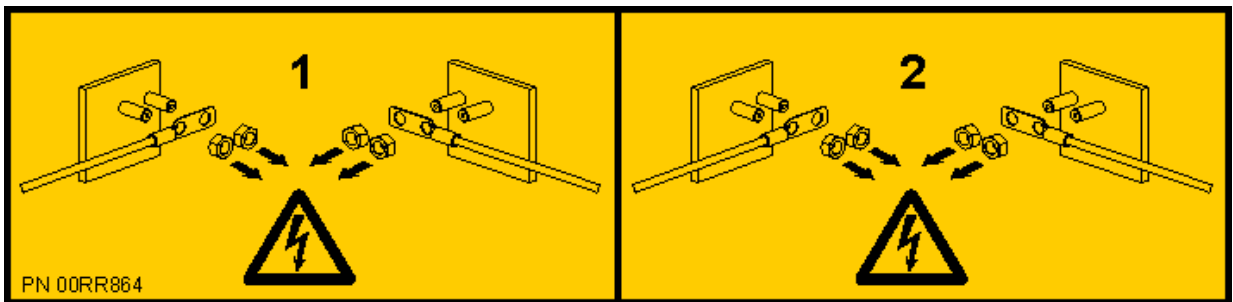
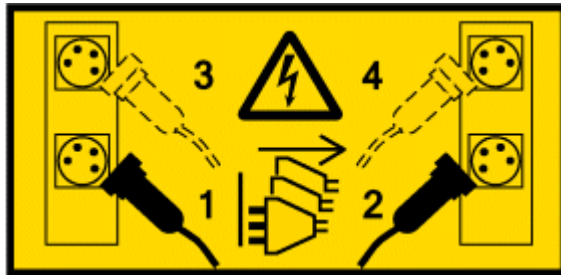
or




or



or



 **DANGER:** Multiple power cords. The product might be equipped with multiple AC power cords or multiple DC power cables. To remove all hazardous voltages, disconnect all power cords and power cables. (L003)

(L005)





CAUTION: Hazardous energy present. Voltages with hazardous energy might cause heating when shorted with metal, which might result in splattered metal, burns, or both. (L005)

6. Place the system into the service position. For instructions, see [“Placing an 9006-12P system into the service position” on page 105.](#)



CAUTION: Do not place any object on top of a rack-mounted device unless that rack-mounted device is intended for use as a shelf. (R008)

(L012)



CAUTION: Pinch hazard. (L012)

7. Remove the service access cover. For instructions, see [“Removing the service access cover from an 9006-12P system” on page 103.](#)

Preparing the 9006-12P system for operation after you remove and replace internal parts

Learn how to prepare the IBM Power System LC921 (9006-12P) system for operation after you remove and replace internal parts.

Procedure

1. Ensure that you have the electrostatic discharge (ESD) wrist strap on and that the ESD clip is plugged into a ground jack or connected to an unpainted metal surface. If not, do so now.
2. Replace the service access cover. For instructions, see [“Installing the service access cover on an 9006-12P system” on page 104.](#)
3. Place the system into the operating position. For instructions, see [“Placing an 9006-12P system into the operating position” on page 108.](#)

(L012)





CAUTION: Pinch hazard. (L012)

4. Reconnect the power cords to the system. For instructions, see [“Connecting the power cords to the 9006-12P system”](#) on page 110.
5. Start the system. For instructions, see [“Starting the 5104-22C, 9006-12P, 9006-22C, or 9006-22P system”](#) on page 96.
6. If you installed or replaced a PCIe adapter, update the adapter firmware.
See [Getting firmware fixes for vendor I/O adapters from the vendor website](#) (www.ibm.com/support/knowledgecenter/POWER9/p9ei8/p9ei8_update_other_adapter.htm).
7. Verify the installed part.
For instructions, see [Verifying a repair](#) (www.ibm.com/support/knowledgecenter/POWER9/p9ei3/p9ei3_verifyrepair.htm).

Starting and stopping the 5104-22C, 9006-12P, 9006-22C, or 9006-22P

Learn how to start and stop the system to perform a service action or system upgrade.

Starting the 5104-22C, 9006-12P, 9006-22C, or 9006-22P system

To start the system, complete the steps in this procedure.

About this task

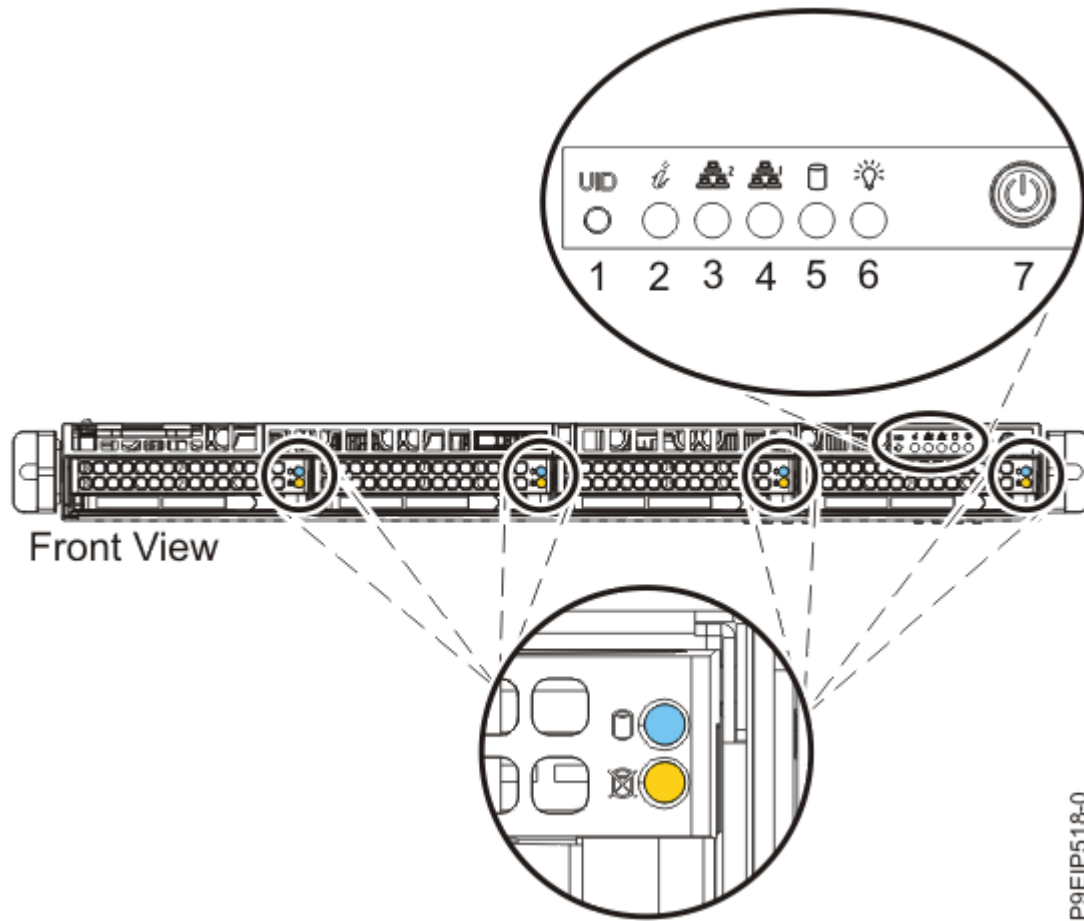


Attention: For safety, airflow purposes and thermal performance, the service access cover must be installed and fully seated before you power on the system.

You can use this procedure to power on the system; or you can use a console and the IPMI tool to power on the system.

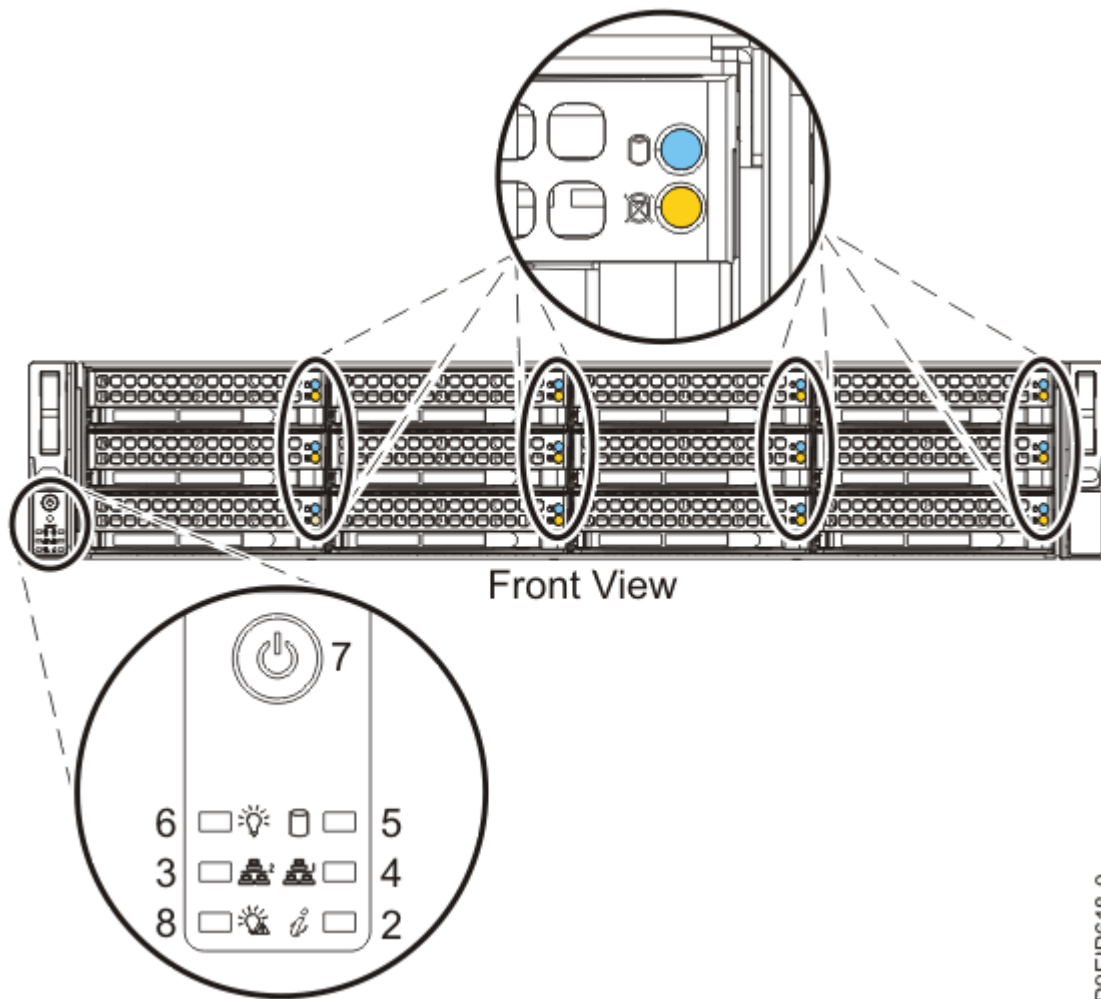
Procedure

1. Before you press the power button, ensure that the power supplies are connected to the system unit and that the power cables are connected to a power source.
2. Press the power button **(7)** shown in [Figure 52 on page 98](#).
You may have to press the switch for 0.5 to 3 seconds.



P9EIP518-0

Figure 51. Power switch for 9006-12P



P9EIP618-0

Figure 52. Power switch for 5104-22C, 9006-22C, or 9006-22P

What to do next

If you press the power button and the system does not start, contact your next level of support or your service provider.

Stopping the 5104-22C, 9006-12P, 9006-22C, or 9006-22P system

To stop the system, complete the steps in this procedure.

Procedure

You can use the Linux **shutdown** command to stop and power down the system.

For example, the following command will shut down the system in 10 minutes and send the message "Repairs coming" to the users.

```
shutdown -P +10 "Repairs coming"
```

The **-P** setting instructs the system to shut down and then power down. The **+** indicates the time in minutes before the shutdown occurs.

Drive commands for 5104-22C, 9006-12P, 9006-22C, or 9006-22P

Learn about the storage drive commands for the IBM Power System LC921 (9006-12P) or IBM Power System LC922 (9006-22P) systems.

arccnf commands

Learn about the **arccnf** commands. They are for SATA drives and drive on modules (DOMs) that are directly connected to the system backplane without using a PCIe adapter.

To list the logical drives and device configurations, use the following **arccnf** command.

```
arccnf getconfig 1
```

Note the Channel and Device numbers of the desired drive. Also note the serial number of the drive. In the following example, the channel number is 0 and the device number is 11.

```
Reported Channel,Device(T:L) : 0,11(11:0)
```

Identify the fault LED on the drive using the following command:

```
arccnf identify 1 device 0 2
```

Take the drive off line. Run the following **arccnf setstate** command that uses the Channel and Device numbers from the **arccnf getconfig** command:

```
arccnf setstate 1 device 0 11 ddd
```

StorCLI commands

Learn about the StorCLI commands. They are for use with the PCIe adapter feature codes EKAA and EKEA.

If the command is not installed, download the utility from Broadcom <https://www.broadcom.com/> (www.broadcom.com). You can find the utility by searching that site for storcli. Get their latest "MegaRAID Storcli" download file. To install, follow their documentation. Unzip the file; then for:

RHEL

1. Navigate to the linux-ppc folder then to the Little Endian folder.
2. Install the package by running this command, where x.xx-x equals the version of the utility:

```
rpm -ivh <StorCLI-x.xx-x.noarch.rpm>
```

Ubuntu:

1. Navigate to the Ubuntu folder.
2. Install the debian file by using this command:

```
dpkg -i storcli_x.xx-x._all.deb
```

Preboot / petitboot:

1. From the petitboot menu, exit to a shell.
2. Download the **storcli64** binary file into the petitboot environment `wget "ftp://ftp.supermicro.com/wdl/Firmware/Openpower/P9DSU-C/Storage/Broadcom/AOC-9361-8i (AOC-K-9361-8Is-IB001)/007.0606.0000.0000_Unified_StorCLI.zip"`.
3. Unzip the following files:
 - 007.0606.0000.0000_Unified_StorCLI.zip
 - MR_SAS_Unified_StorCLI_7.6-007.0606.0000.0000-SCGCQ01639776\ (1\).zip

4. Type the following command.

```
cd versionChangeSet/univ_viva_cli_rel/
```

5. Unzip the **Unified_storcli_all_os.zip** file.

6. Type the following command.

```
cd Unified_storcli_all_os/Linux-PPC/LittleEndian
```

7. Unzip the **storcli64.zip** file.

8. The storcli64 file can now be invoked by specifying the current directory: `./storcli64 -h`

For details on managing RAID arrays, see Chapter 6 in the [MegaRAID SAS Software User Guide](https://docs.broadcom.com/doc/pub-005110) (<https://docs.broadcom.com/doc/pub-005110>).

Helpful StorCLI commands

To upgrade the StorCLI RPM, run:

```
rpm -Uvh <StorCLI-x.xx-x.noarch.rpm>
```

To show a summary of the drive and controller status:

```
storcli show
```

To show a list of all controllers and drives that need attention:

```
storcli show all
```

To show information about the drives:

```
storcli /cx[/eall]/sall show
```

To locate a physical disk by turning on the identify LED:

```
storcli /cx[/ex]/sx start locate
```

To turn off the identify LED:

```
storcli /cx[/ex]/sx stop locate
```

To prepare a drive for removal:

```
storcli /cx[/ex]/sx spindown
```

To view the adapter settings:

```
storcli64 /c0 show personality
```

To change the adapter settings:

```
storcli64 /c0 set personality=JBOD|RAID
```

To change the settings of the adapter to support the self-encrypting drive (SED) function:

```
storcli64 /c0 set personality behavior secured=off/on
```

To check the firmware level of the *MegaRAID* adapter:

```
storcli64 /c0 show all|egrep "Bios Version|Firmware Package|Firmware Version"
```

To update the firmware level of the *MegaRAID* adapter:

```
storcli64 /cx download file=mrxxxxfw.rom
```

sas3ircu commands

Learn about the `sas3ircu` command. This command can be used for the feature code EKAB PCIe adapter.

If the `sas3ircu` command is not installed, download the utility from <ftp://ftp.supermicro.com/driver/P8DTU/>. You can find the download by searching that site for `sas3ircu`; currently: **LSI MegaRAID and HBA (AOC-Utility) > SMC-Broadcom (Supermicro 12Gbs SAS HBA - AOC-S3008L-L8i) > AOC-S3008L-L8i > Tools.**

To install:

1. Download the `sas3ircu` command.
2. Copy the `sas3ircu` command file to the `/usr/local/bin` directory.
3. To enable the command to be executed, as root, run the command:

```
chmod +x sas3ircu
```

General SAS3IRCU command syntax:

```
sas3ircu <controller_#> <command> <parameters>
```

To list the controllers:

```
sas3ircu list
```

To show the controller status:

```
sas3ircu <controller_#> status
```

To turn on the drive light:

```
sas3ircu <controller_#> locate <Enclosure:Bay> ON
```

To turn off the drive light:

```
sas3ircu <controller_#> locate <Enclosure:Bay> OFF
```

To view additional help for the command:

```
sas3ircu help
```

To list all adapters:

```
sas3ircu list
```

To display adapter details and drive details:

```
sas3ircu <controller_#> display
```

NVMe commands

Learn about the NVMe commands. These commands are for NVMe drives together with feature code EKAE using an NVMe PCIe adapter.

If the `nvme` command is not installed, download the utility from [NVMe management command line interface \(github.com/linux-nvme/nvme-cli\)](https://github.com/linux-nvme/nvme-cli). Follow the installation instructions available on that site.

To determine which drive you want to replace, use the command:

```
nvme list
```

If you are searching for a failed drive, you can check each drive using the command:

```
nvme smart-log <device>
```

To turn on the identify LED, use the command:

```
dd if=/dev/nvmeX of=/dev/null
```

You can also use the `ledctl` command from the optional `ledmon` package:

```
ledctl locate=/dev/rsnvmeX
```

To get the device serial number for verification, use the command:

```
nvme id-ctrl /dev/nvmeX | grep -i sn
```

To take the device offline so that it can be removed:

```
sh -c"echo 0 >/sys/block/nvmeX/device/delete"
```

Sensor readings GUI display

The sensor readings GUI display is a way to quickly determine the general health status of the server without having to look at the detailed system event log (SEL) information.

To view the sensor readings GUI display, log in to the BMC web interface. Click **Server Health > Sensor Readings**.

Some occurrences of errors in the system might not appear in the sensor readings GUI. After you view the sensor readings GUI display, use the SEL logs to view any active SEL events that indicate a service action event.

Sensor readings display operation

Most sensors are initially gray, then change status and color during the boot process when the FRU is initialized and either determined to be good (green) or faulty (red). No sensor display is available until you can get to the sensor display selection on the BMC, which means that the system attains a certain power level or that the BMC finishes initializing. The indicator color of the sensor is determined based on the sensor status at time of invocation of the display. The sensor display maintains the sensor status indicator color until the display is refreshed, which updates the sensor value with the latest status. Changes to SEL events changes color of sensor indicator when you refresh or restart the display. Sensor status display also starts over with a reboot or a power cycle.

Sensor status indicator descriptions

Gray indicator:

- FRU not plugged
- Sensor not initialized
- Sensor function is not initialized

Red (faulty) indicator:

- Critical threshold exceeded (an event requires a service action)
- Service action required for hard fail
- Partial function failure that reached a "service action required" state
- A deconfigured resource requires a service action

Green (good) indicator:

- FRU or sensor is plugged in and fully operational
- Recoverable event is below the critical "service action required" threshold
- FRU or sensor returned to "normal" operating range (for threshold sensors)

Removing and replacing covers on an 9006-12P system

Learn how to remove and replace the covers for an IBM Power System LC921 (9006-12P) system so that you can access the hardware parts or service the system.

Removing the service access cover from an 9006-12P system

Learn how to remove the service access cover from an IBM Power System LC921 (9006-12P) system.

About this task



Attention: For safety, airflow purposes and thermal performance, the service access cover must be installed and fully seated before you power on the system.

Procedure

1. Ensure that you removed both power cords from the system. For instructions, see [“Disconnecting the power cords from the 9006-12P system” on page 109](#).

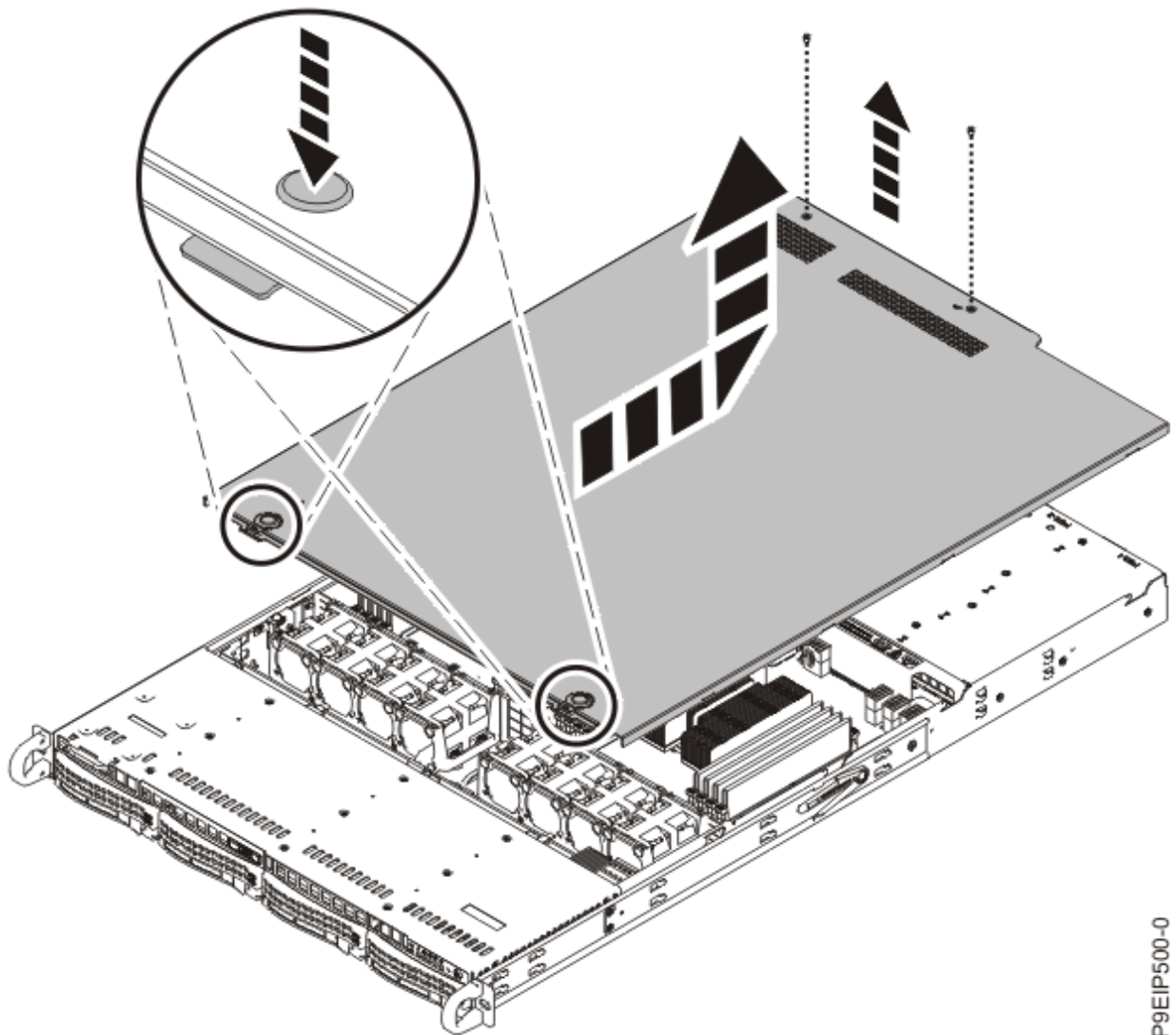
(L005)



CAUTION: Hazardous energy present. Voltages with hazardous energy might cause heating when shorted with metal, which might result in splattered metal, burns, or both. (L005)

2. Remove the two cover screws **(1)**, from the rear of the cover.
3. Press both buttons on the top cover **(2)** to release the latches as shown in [Figure 53 on page 104](#), and push the cover back about 0.5 in (1 cm) until it stops.

If the buttons do not easily press down, partially remove the drives directly under the buttons.



P9EIP500-0

Figure 53. Releasing and opening the cover

4. Lift up the front of the cover up and remove it from the system.

Installing the service access cover on an 9006-12P system

Learn how to install the service access cover on a rack-mounted IBM Power System LC921 (9006-12P) system.

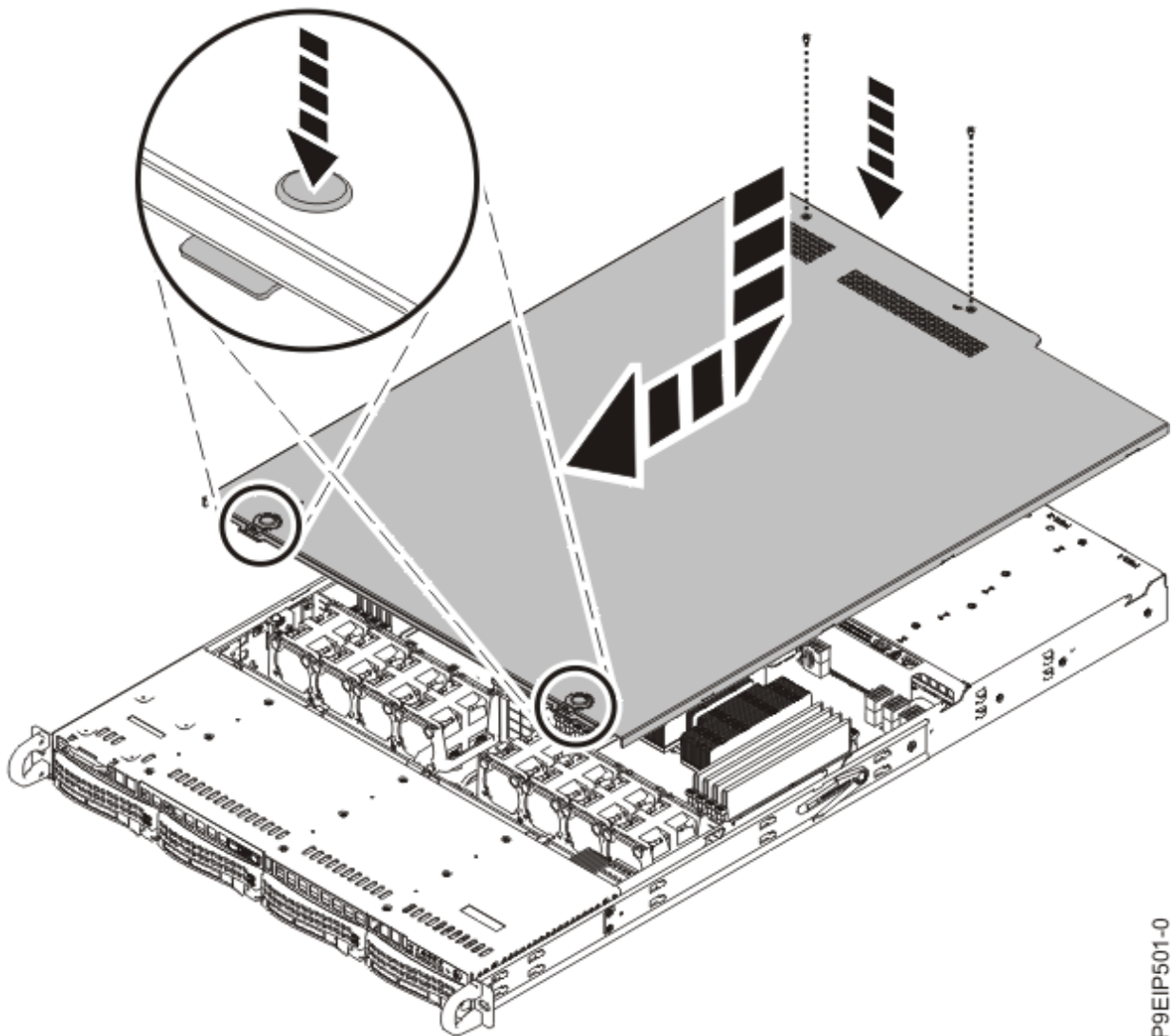
About this task



Attention: For safety, airflow purposes and thermal performance, the service access cover must be installed and fully seated before you power on the system.

Procedure

1. Place the rear of the cover on the system. Pivot to front of the cover down until it rests on the system.
2. Slide the cover forwards until it latches into place as shown in [Figure 54 on page 105](#).



P9EIP501-0

Figure 54. Replacing and securing the cover

3. Replace the two cover screws **(2)** at the rear of the cover.

Service and operating positions for 9006-12P

Learn how to place an IBM Power System LC921 (9006-12P) system into the service or operating position.

Placing an 9006-12P system into the service position

Learn how to place an IBM Power System LC921 (9006-12P) system into the service position.

Before you begin

The systems must be removed from the rails for servicing.



CAUTION:

The weight of this part or unit is between 18 and 32 kg (39.7 and 70.5 lb). It takes two persons to safely lift this part or unit. (C009)

Notes:

- When you slide a system out of a rack, ensure that all stability plates are firmly installed to prevent the rack from toppling. Slide only one system out at a time.
- When the rails are fully extended, the rail safety latches lock into place. This action prevents the system from being pulled out too far.

Procedure

1. Label and remove all cables from the rear of the system.
2. Remove the front screws that secure the system to the rack from both sides of the system as shown in [Figure 55 on page 107](#).

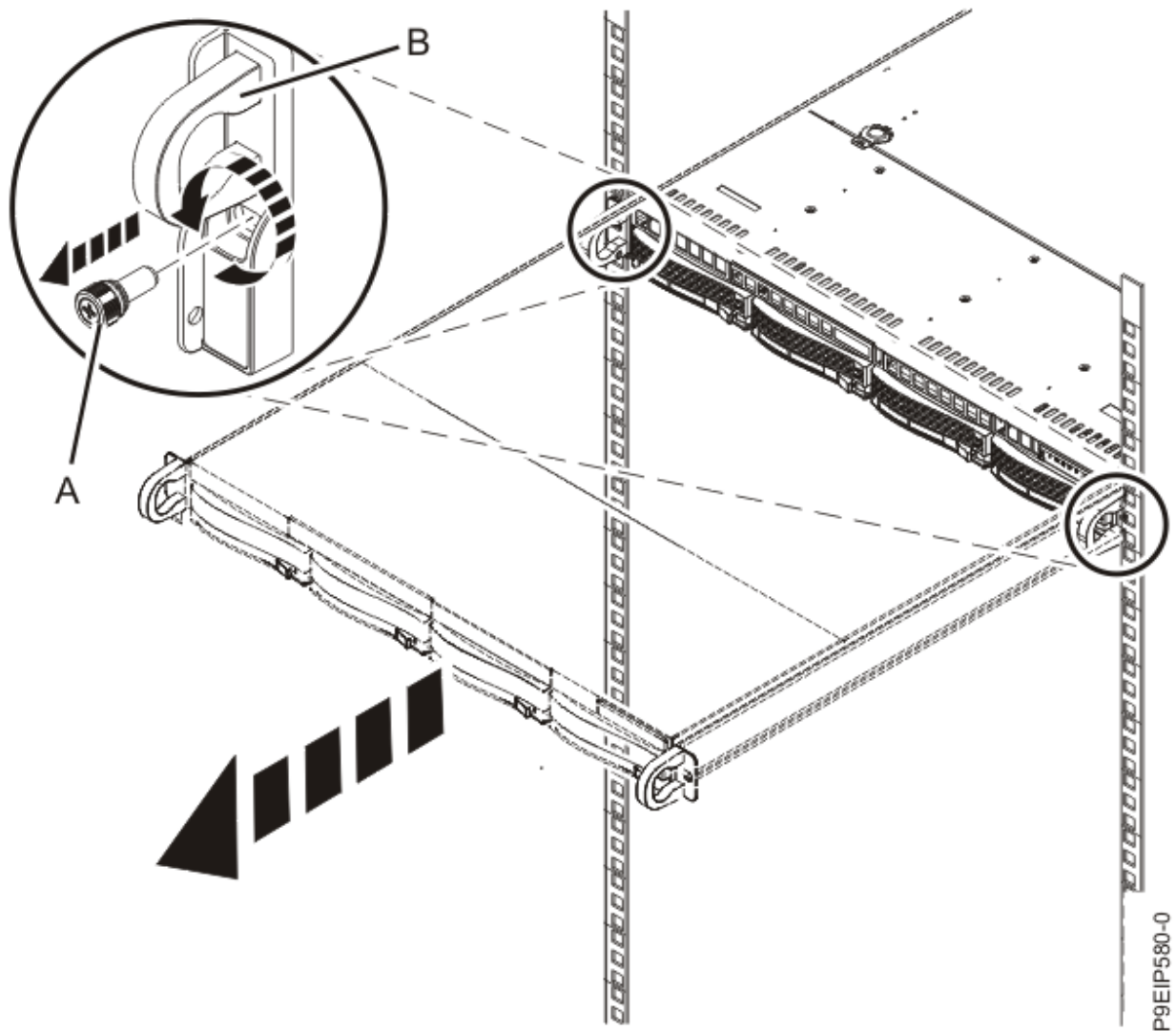


Figure 55. Removing the front screws and removing the system from the rack

3. Pull the system unit out of the rack.



CAUTION:

- The chassis rails only extend about half of the distance of the chassis. Once the safety latches are released, the chassis only slides forward a few inches before disengaging from the rails. Be prepared to support the full weight of the chassis as you remove it from the slide rails.
- The chassis contains most of the weight in the back side of the unit. When you remove the system, take care to be ready to support the weight by grasping the chassis closer to the back of the unit.

4. Using two people, release the rail safety latches and remove the system from the rails.

The safety latches work in opposite directions; the latch on one side moves up while the latch on the other side moves down.

5. Carefully set the system on a table with an appropriate ESD surface.

Placing an 9006-12P system into the operating position

Learn how to place an IBM Power System LC921 (9006-12P) system into the operating position.

About this task



>18 kg (39.7 lb)



18-32 kg (39.7-70.5 lb)

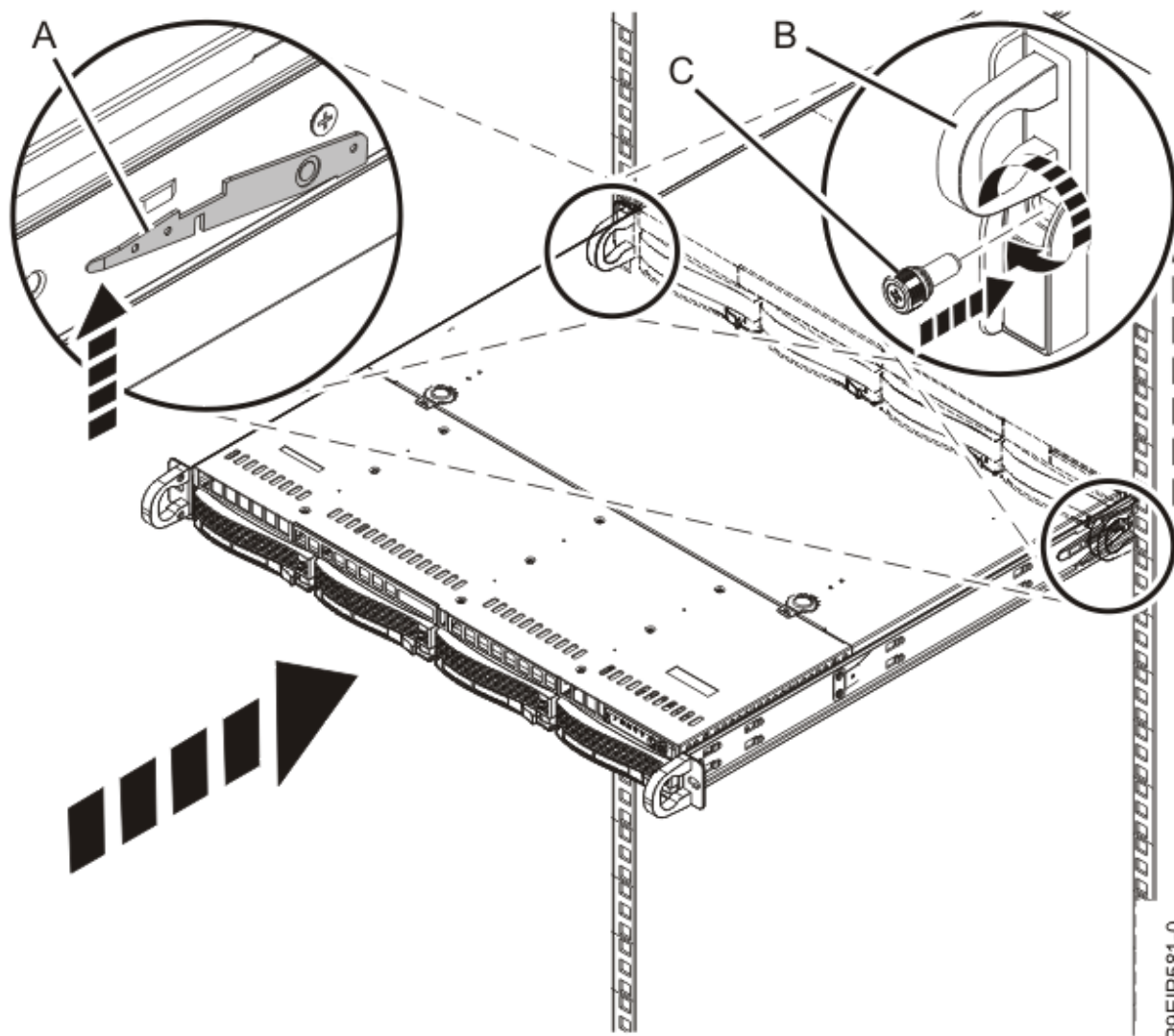
CAUTION:

The weight of this part or unit is between 18 and 32 kg (39.7 and 70.5 lb). It takes two persons to safely lift this part or unit. (C009)

Procedure

1. Using two people, one on each side of the system, lift the system from the table.
2. Align the system rails on each side of the system with the rack rails.
3. Push the system into the rack until you hear each rail click into place.
4. Before releasing your hold on the system, ensure that the rails are engaged by sliding the system forward into service lock position. Check that the rails are properly seated. If the rails are not fully engaged, the system could drop.
5. Release the rail safety latches **(A)** by lifting them upward, as shown in [Figure 56 on page 109](#), then push the system fully into the rack.

The safety latches work in opposite directions; the latch on one side moves up while the latch on the other side moves down.



P9EIP581-0

Figure 56. Placing the system into the operating position

6. Fasten the two front screws (C) to secure the system to the rack.
7. Using your labels, reconnect the cables at the rear of the system unit.

Power cords for the 9006-12P

Learn how to disconnect and connect the power cords on the IBM Power System LC921 (9006-12P) system.

Disconnecting the power cords from the 9006-12P system

To disconnect the power cords from a system, complete the steps in this procedure.

Before you begin

Note: This system might be equipped with two or more power supplies. If the removing and replacing procedures require the power to be off, then ensure that all power sources to the system are disconnected.

Procedure

1. Identify the system unit that you are servicing in the rack.
2. Label and disconnect the power cords from the system unit as shown in [Figure 57](#) on page 110.

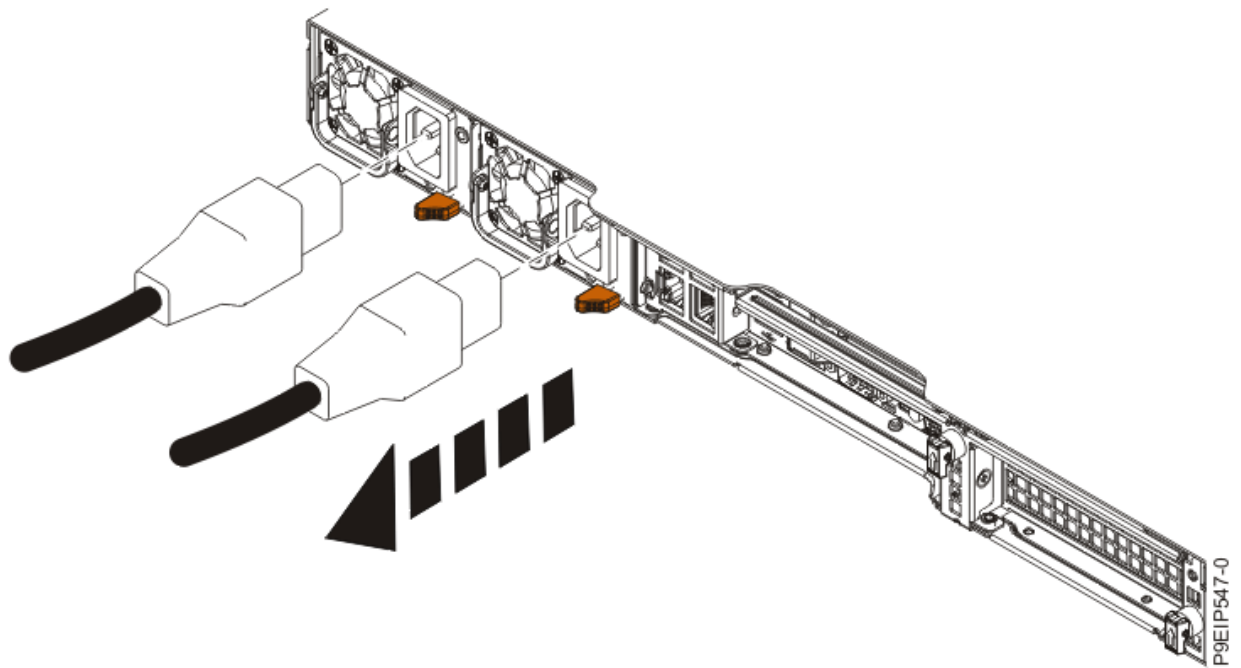


Figure 57. Removing the power cords from the system

Connecting the power cords to the 9006-12P system

To connect the power cords to a system, complete the steps in this procedure.

Procedure

Using your labels, reconnect the power cords to the system unit as shown in [Figure 58 on page 110](#).

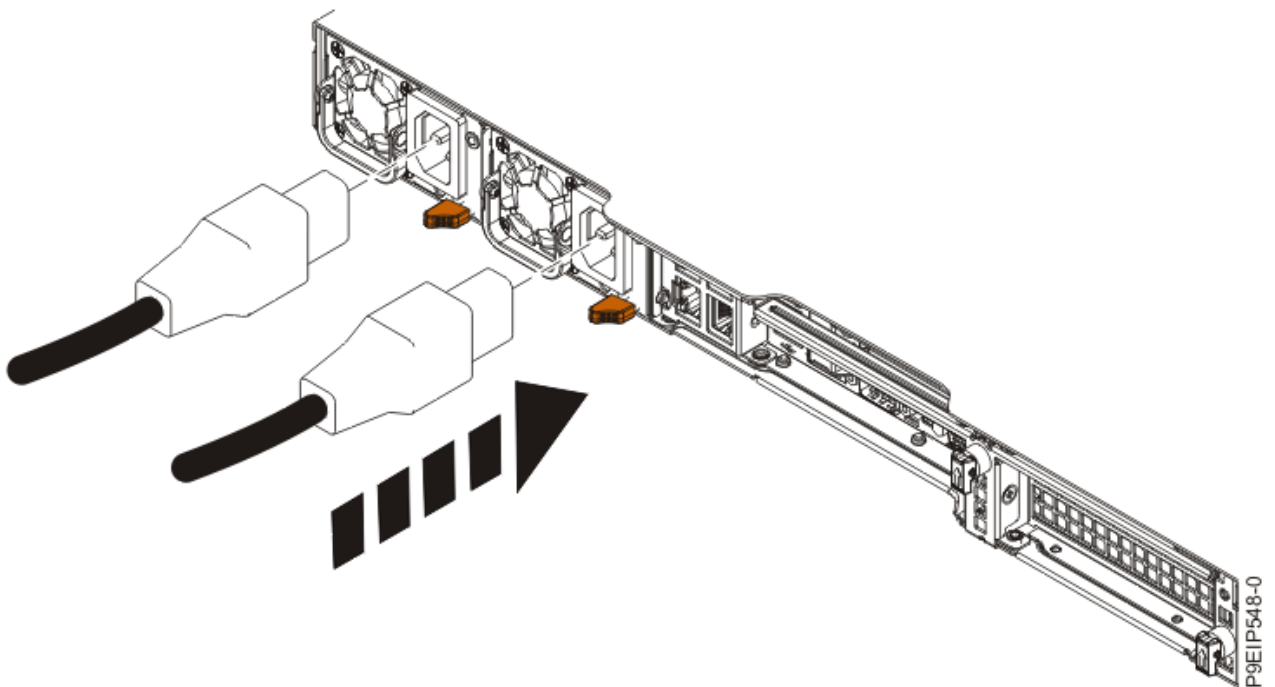


Figure 58. Connecting the power cords to the system

Notices

This information was developed for products and services offered in the US.

IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not grant you any license to these patents. You can send license inquiries, in writing, to:

*IBM Director of Licensing
IBM Corporation
North Castle Drive, MD-NC119
Armonk, NY 10504-1785
US*

INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some jurisdictions do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Any references in this information to non-IBM websites are provided for convenience only and do not in any manner serve as an endorsement of those websites. The materials at those websites are not part of the materials for this IBM product and use of those websites is at your own risk.

IBM may use or distribute any of the information you provide in any way it believes appropriate without incurring any obligation to you.

The performance data and client examples cited are presented for illustrative purposes only. Actual performance results may vary depending on specific configurations and operating conditions.

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

Statements regarding IBM's future direction or intent are subject to change or withdrawal without notice, and represent goals and objectives only.

All IBM prices shown are IBM's suggested retail prices, are current and are subject to change without notice. Dealer prices may vary.

This information is for planning purposes only. The information herein is subject to change before the products described become available.

This information contains examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples include the names of individuals, companies, brands, and products. All of these names are fictitious and any similarity to actual people or business enterprises is entirely coincidental.

If you are viewing this information in softcopy, the photographs and color illustrations may not appear.

The drawings and specifications contained herein shall not be reproduced in whole or in part without the written permission of IBM.

IBM has prepared this information for use with the specific machines indicated. IBM makes no representations that it is suitable for any other purpose.

IBM's computer systems contain mechanisms designed to reduce the possibility of undetected data corruption or loss. This risk, however, cannot be eliminated. Users who experience unplanned outages, system failures, power fluctuations or outages, or component failures must verify the accuracy of operations performed and data saved or transmitted by the system at or near the time of the outage or failure. In addition, users must establish procedures to ensure that there is independent data verification before relying on such data in sensitive or critical operations. Users should periodically check IBM's support websites for updated information and fixes applicable to the system and related software.

Homologation statement

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

Accessibility features for IBM Power Systems servers

Accessibility features assist users who have a disability, such as restricted mobility or limited vision, to use information technology content successfully.

Overview

The IBM Power Systems servers include the following major accessibility features:

- Keyboard-only operation
- Operations that use a screen reader

The IBM Power Systems servers use the latest W3C Standard, [WAI-ARIA 1.0](http://www.w3.org/TR/wai-aria/) (www.w3.org/TR/wai-aria/), to ensure compliance with [US Section 508](http://www.access-board.gov/guidelines-and-standards/communications-and-it/about-the-section-508-standards/section-508-standards) (www.access-board.gov/guidelines-and-standards/communications-and-it/about-the-section-508-standards/section-508-standards) and [Web Content Accessibility Guidelines \(WCAG\) 2.0](http://www.w3.org/TR/WCAG20/) (www.w3.org/TR/WCAG20/). To take advantage of accessibility features, use the latest release of your screen reader and the latest web browser that is supported by the IBM Power Systems servers.

The IBM Power Systems servers online product documentation in IBM Knowledge Center is enabled for accessibility. The accessibility features of IBM Knowledge Center are described in the [Accessibility section of the IBM Knowledge Center help](http://www.ibm.com/support/knowledgecenter/doc/kc_help.html#accessibility) (www.ibm.com/support/knowledgecenter/doc/kc_help.html#accessibility).

Keyboard navigation

This product uses standard navigation keys.

Interface information

The IBM Power Systems servers user interfaces do not have content that flashes 2 - 55 times per second.

The IBM Power Systems servers web user interface relies on cascading style sheets to render content properly and to provide a usable experience. The application provides an equivalent way for low-vision users to use system display settings, including high-contrast mode. You can control font size by using the device or web browser settings.

The IBM Power Systems servers web user interface includes WAI-ARIA navigational landmarks that you can use to quickly navigate to functional areas in the application.

Vendor software

The IBM Power Systems servers include certain vendor software that is not covered under the IBM license agreement. IBM makes no representation about the accessibility features of these products. Contact the vendor for accessibility information about its products.

Related accessibility information

In addition to standard IBM help desk and support websites, IBM has a TTY telephone service for use by deaf or hard of hearing customers to access sales and support services:

TTY service
800-IBM-3383 (800-426-3383)
(within North America)

For more information about the commitment that IBM has to accessibility, see [IBM Accessibility \(www.ibm.com/able\)](http://www.ibm.com/able).

Privacy policy considerations

IBM Software products, including software as a service solutions, (“Software Offerings”) may use cookies or other technologies to collect product usage information, to help improve the end user experience, to tailor interactions with the end user, or for other purposes. In many cases no personally identifiable information is collected by the Software Offerings. Some of our Software Offerings can help enable you to collect personally identifiable information. If this Software Offering uses cookies to collect personally identifiable information, specific information about this offering’s use of cookies is set forth below.

This Software Offering does not use cookies or other technologies to collect personally identifiable information.

If the configurations deployed for this Software Offering provide you as the customer the ability to collect personally identifiable information from end users via cookies and other technologies, you should seek your own legal advice about any laws applicable to such data collection, including any requirements for notice and consent.

For more information about the use of various technologies, including cookies, for these purposes, see IBM’s Privacy Policy at <http://www.ibm.com/privacy> and IBM’s Online Privacy Statement at <http://www.ibm.com/privacy/details/us/en/> in the section entitled “Cookies, Web Beacons and Other Technologies”.

Trademarks

IBM, the IBM logo, and [ibm.com](http://www.ibm.com)[®] are trademarks or registered trademarks of International Business Machines Corp., registered in many jurisdictions worldwide. Other product and service names might be trademarks of IBM or other companies. A current list of IBM trademarks is available on the web at [Copyright and trademark information](#).

Intel, Intel logo, Intel Inside, Intel Inside logo, Intel Centrino, Intel Centrino logo, Celeron, Intel Xeon, Intel SpeedStep, Itanium, and Pentium are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

The registered trademark Linux is used pursuant to a sublicense from the Linux Foundation, the exclusive licensee of Linus Torvalds, owner of the mark on a worldwide basis.

Red Hat, JBoss, OpenShift, Fedora, Hibernate, Ansible, CloudForms, RHCA, RHCE, RHCSA, Ceph, and Gluster are trademarks or registered trademarks of Red Hat, Inc. or its subsidiaries in the United States and other countries.

Electronic emission notices

Class A Notices

The following Class A statements apply to the IBM servers that contain the POWER9 processor and its features unless designated as electromagnetic compatibility (EMC) Class B in the feature information.

When attaching a monitor to the equipment, you must use the designated monitor cable and any interference suppression devices supplied with the monitor.

Canada Notice

CAN ICES-3 (A)/NMB-3(A)

European Community and Morocco Notice

This product is in conformity with the protection requirements of Directive 2014/30/EU of the European Parliament and of the Council on the harmonization of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-IBM option cards.

This product may cause interference if used in residential areas. Such use must be avoided unless the user takes special measures to reduce electromagnetic emissions to prevent interference to the reception of radio and television broadcasts.

Warning: This equipment is compliant with Class A of CISPR 32. In a residential environment this equipment may cause radio interference.

Germany Notice

Deutschsprachiger EU Hinweis: Hinweis für Geräte der Klasse A EU-Richtlinie zur Elektromagnetischen Verträglichkeit

Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2014/30/EU zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022 / EN 55032 Klasse A ein.

Um dieses sicherzustellen, sind die Geräte wie in den Handbüchern beschrieben zu installieren und zu betreiben. Des Weiteren dürfen auch nur von der IBM empfohlene Kabel angeschlossen werden. IBM übernimmt keine Verantwortung für die Einhaltung der Schutzanforderungen, wenn das Produkt ohne Zustimmung von IBM verändert bzw. wenn Erweiterungskomponenten von Fremdherstellern ohne Empfehlung von IBM gesteckt/eingebaut werden.

EN 55032 Klasse A Geräte müssen mit folgendem Warnhinweis versehen werden:

"Warnung: Dieses ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funk-Störungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen zu ergreifen und dafür aufzukommen."

Deutschland: Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Geräten

Dieses Produkt entspricht dem "Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG)". Dies ist die Umsetzung der EU-Richtlinie 2014/30/EU in der Bundesrepublik Deutschland.

Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) (bzw. der EMC Richtlinie 2014/30/EU) für Geräte der Klasse A

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen.

Verantwortlich für die Einhaltung der EMV Vorschriften ist der Hersteller:
International Business Machines Corp.

New Orchard Road
Armonk, New York 10504
Tel: 914-499-1900

Der verantwortliche Ansprechpartner des Herstellers in der EU ist:
IBM Deutschland GmbH
Technical Relations Europe, Abteilung M456
IBM-Allee 1, 71139 Ehningen, Germany
Tel: +49 (0) 800 225 5426
email: HalloIBM@de.ibm.com

Generelle Informationen:

Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 / EN 55032 Klasse A.

Japan Electronics and Information Technology Industries Association (JEITA) Notice

(一社) 電子情報技術産業協会 高調波電流抑制対策実施
要領に基づく定格入力電力値： Knowledge Centerの各製品の
仕様ページ参照

This statement applies to products less than or equal to 20 A per phase.

高調波電流規格 JIS C 61000-3-2 適合品

This statement applies to products greater than 20 A, single phase.

高調波電流規格 JIS C 61000-3-2 準用品

本装置は、「高圧又は特別高圧で受電する需要家の高調波抑制対策ガイドライン」対象機器（高調波発生機器）です。

- 回路分類：6（単相、PFC回路付）
- 換算係数：0

This statement applies to products greater than 20 A per phase, three-phase.

高調波電流規格 JIS C 61000-3-2 準用品

本装置は、「高圧又は特別高圧で受電する需要家の高調波抑制対策ガイドライン」対象機器（高調波発生機器）です。

- 回路分類：5（3相、PFC回路付）
- 換算係数：0

Japan Voluntary Control Council for Interference (VCCI) Notice

この装置は、クラスA 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

VCCI-A

Korea Notice

이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다.

People's Republic of China Notice

声 明

此为 A 级产品, 在生活环境中, 该产品可能会造成无线电干扰。在这种情况下, 可能需要用户对其干扰采取切实可行的措施。

Russia Notice

ВНИМАНИЕ! Настоящее изделие относится к классу А. В жилых помещениях оно может создавать радиопомехи, для снижения которых необходимы дополнительные меры

Taiwan Notice

警告使用者：
此為甲類資訊技術設備，
於居住環境中使用時，可
能會造成射頻擾動，在此
種情況下，使用者會被要
求採取某些適當的對策。

IBM Taiwan Contact Information:

台灣IBM 產品服務聯絡方式：
台灣國際商業機器股份有限公司
台北市松仁路7號3樓
電話：0800-016-888

United States Federal Communications Commission (FCC) Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Proper cables and connectors are available from IBM-authorized dealers. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors

or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Responsible Party:
International Business Machines Corporation
New Orchard Road
Armonk, NY 10504
Contact for FCC compliance information only: fccinfo@us.ibm.com

Class B Notices

The following Class B statements apply to features designated as electromagnetic compatibility (EMC) Class B in the feature installation information.

When attaching a monitor to the equipment, you must use the designated monitor cable and any interference suppression devices supplied with the monitor.

Canada Notice

CAN ICES-3 (B)/NMB-3(B)

European Community and Morocco Notice

This product is in conformity with the protection requirements of Directive 2014/30/EU of the European Parliament and of the Council on the harmonization of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-IBM option cards.

German Notice

Deutschsprachiger EU Hinweis: Hinweis für Geräte der Klasse B EU-Richtlinie zur Elektromagnetischen Verträglichkeit

Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2014/30/EU zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022/ EN 55032 Klasse B ein.

Um dieses sicherzustellen, sind die Geräte wie in den Handbüchern beschrieben zu installieren und zu betreiben. Des Weiteren dürfen auch nur von der IBM empfohlene Kabel angeschlossen werden. IBM übernimmt keine Verantwortung für die Einhaltung der Schutzanforderungen, wenn das Produkt ohne Zustimmung von IBM verändert bzw. wenn Erweiterungskomponenten von Fremdherstellern ohne Empfehlung von IBM gesteckt/eingebaut werden.

Deutschland: Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Geräten

Dieses Produkt entspricht dem "Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG)". Dies ist die Umsetzung der EU-Richtlinie 2014/30/EU in der Bundesrepublik Deutschland.

Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) (bzw. der EMC Richtlinie 2014/30/EU) für Geräte der Klasse B

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen.

Verantwortlich für die Einhaltung der EMV Vorschriften ist der Hersteller:
International Business Machines Corp.
New Orchard Road

Armonk, New York 10504
Tel: 914-499-1900

Der verantwortliche Ansprechpartner des Herstellers in der EU ist:
IBM Deutschland GmbH
Technical Relations Europe, Abteilung M456
IBM-Allee 1, 71139 Ehningen, Germany
Tel: +49 (0) 800 225 5426
email: HalloIBM@de.ibm.com

Generelle Informationen:

Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55032 Klasse B

Japan Electronics and Information Technology Industries Association (JEITA) Notice

(一社) 電子情報技術産業協会 高調波電流抑制対策実施
要領に基づく定格入力電力値 : Knowledge Centerの各製品の
仕様ページ参照

This statement applies to products less than or equal to 20 A per phase.

高調波電流規格 JIS C 61000-3-2 適合品

This statement applies to products greater than 20 A, single phase.

高調波電流規格 JIS C 61000-3-2 準用品

本装置は、「高圧又は特別高圧で受電する需要家の高調波抑制対策ガイドライン」対象機器（高調波発生機器）です。

- 回路分類 : 6 (単相、PFC回路付)
- 換算係数 : 0

This statement applies to products greater than 20 A per phase, three-phase.

高調波電流規格 JIS C 61000-3-2 準用品

本装置は、「高圧又は特別高圧で受電する需要家の高調波抑制対策ガイドライン」対象機器（高調波発生機器）です。

- 回路分類 : 5 (3相、PFC回路付)
- 換算係数 : 0

Japan Voluntary Control Council for Interference (VCCI) Notice

この装置は、クラスB情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。

取扱説明書に従って正しい取り扱いをして下さい。

VCCI-B

Taiwan Notice

台灣IBM 產品服務聯絡方式：
台灣國際商業機器股份有限公司
台北市松仁路7號3樓
電話：0800-016-888

United States Federal Communications Commission (FCC) Notice

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult an IBM-authorized dealer or service representative for help.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Proper cables and connectors are available from IBM-authorized dealers. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Responsible Party:

International Business Machines Corporation
New Orchard Road
Armonk, New York 10504
Contact for FCC compliance information only: fccinfo@us.ibm.com

Terms and conditions

Permissions for the use of these publications are granted subject to the following terms and conditions.

Applicability: These terms and conditions are in addition to any terms of use for the IBM website.

Personal Use: You may reproduce these publications for your personal, noncommercial use provided that all proprietary notices are preserved. You may not distribute, display or make derivative works of these publications, or any portion thereof, without the express consent of IBM.

Commercial Use: You may reproduce, distribute and display these publications solely within your enterprise provided that all proprietary notices are preserved. You may not make derivative works of these publications, or reproduce, distribute or display these publications or any portion thereof outside your enterprise, without the express consent of IBM.

Rights: Except as expressly granted in this permission, no other permissions, licenses or rights are granted, either express or implied, to the publications or any information, data, software or other intellectual property contained therein.

IBM reserves the right to withdraw the permissions granted herein whenever, in its discretion, the use of the publications is detrimental to its interest or, as determined by IBM, the above instructions are not being properly followed.

You may not download, export or re-export this information except in full compliance with all applicable laws and regulations, including all United States export laws and regulations.

IBM MAKES NO GUARANTEE ABOUT THE CONTENT OF THESE PUBLICATIONS. THE PUBLICATIONS ARE PROVIDED "AS-IS" AND WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY, NON-INFRINGEMENT, AND FITNESS FOR A PARTICULAR PURPOSE.

