

Power Systems

*Adapter placement for the 5105-22E,
9008-22L, 9009-22A, 9009-22G,
9223-22H, or 9223-22S*



Note

Before using this information and the product it supports, read the information in [“Safety notices” on page v](#), [“Notices” on page 27](#), 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.

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Contents

- Safety notices.....V**

- Adapter placement..... 1**
 - Adapter slot descriptions for the system..... 1
 - Adapter placement rules and slot priorities for the system..... 6
 - Adapter placement rules and slot priorities for the EMX0 PCIe Gen3 I/O expansion drawer..... 17
 - Related procedures for adapter placement..... 24
 - Finding the current system configuration in IBM i..... 24

- Notices.....27**
 - Accessibility features for IBM Power Systems servers..... 28
 - Privacy policy considerations 29
 - Trademarks..... 29
 - Electronic emission notices..... 29
 - Class A Notices..... 29
 - Class B Notices..... 33
 - Terms and conditions.....35

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)



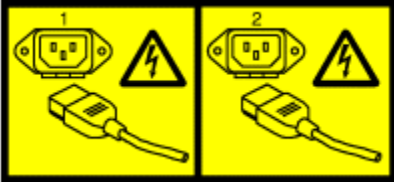
DANGER: Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices. In addition, do not lean on rack-mounted devices and do not use them to stabilize your body position (for example, when working from a ladder). Stability hazard:

- 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

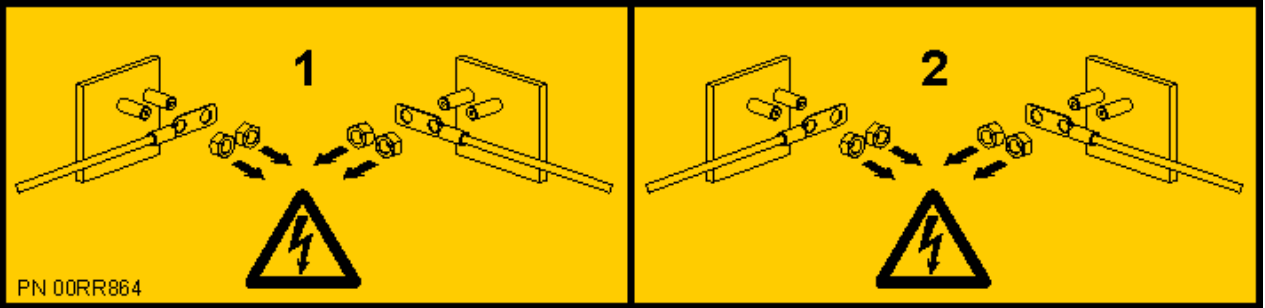



or



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)

x Power Systems: Adapter placement for the 5105-22E, 9008-22L, 9009-22A, 9009-22G, 9223-22H, or 9223-22S



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.

Adapter placement for the 5105-22E, 9008-22L, 9009-22A, 9009-22G, 9223-22H, or 9223-22S

Find information about the placement rules and slot priorities of adapters.

The following features are electromagnetic compatibility (EMC) Class B features. See the [Class B Notices](#) in the Hardware Notices section.

Feature	Description
5269	POWER® GXT145 PCI Express Graphics Accelerator
EN0X	PCIe2 LP 2-port 10 GbE BaseT RJ45 Adapter

Adapter slot descriptions for the 5105-22E, 9008-22L, 9009-22A, 9009-22G, 9223-22H, or 9223-22S

Find information about the slot descriptions for the adapters.

Adapter slot descriptions for the 5105-22E, 9009-22G, or 9223-22S

The 5105-22E, 9009-22G, or 9223-22S system provides PCIe4 slots. These PCIe4 slots are enabled to support the PCIe3 cable adapter (FC EJ05 or EJ1R) that is used to attach the EMX0 PCIe Gen3 I/O expansion drawer.

Slot availability	Description	Adapter size
Five slots (P1-C5, P1-C7, P1-C8, P1-C10, P1-C11)	PCIe4 x8	Half-height, half-length
One slot (P1-C2)	PCIe4 x8 with x16 connector	Half-height, half-length
Three slots (P1-C3, P1-C4, P1-C9)	PCIe4 x16	Half-height, half-length
Two slots (P1-C6, P1-C12)	PCIe4 x16 with x16 connector	Half-height, half-length

Two PCIe4 switches in the system backplane provide PCIe4 buses from the system processor modules that provide connectivity to the following features:

- PCIe slots
- PCIe local area network (LAN) controller
- PCIe3 internal SAS controller

PCIe4 switch 1 and switch 2 provide PCIe4 buses from the system processor module SCM0. [Table 3 on page 2](#) lists the features supported by the PCIe4 switches (Switch 1 and Switch 2). It also lists the requirements of PCIe4 switches to support certain features.

<i>Table 3. PCIe4 switches in the system</i>	
Features provided	Switch 1 and switch 2
Lanes and ports	52-lane, 12-ports, PCIe4 With integrated 8.0 gigatransfers per second (GT/s) Serializer/Deserializer (SerDes) speed negotiation for each port
Lane and polarity reversal	Supported
All ports support concurrent maintenance through I2C bus	Yes
End-to-end cyclic redundancy check (CRC) and poison bit error checking	Supported
Data path parity	Supported
Memory error correction	Supported
Advanced error reporting	Supported
Aggregate full duplex bandwidth	768 GT/s
Designate any port as the upstream port	Yes
27x27 mm, 676-pin FCBGA package	Yes
Power consumption	<ul style="list-style-type: none"> Nominal: 8 watts Maximum: 12 watts

Figure 2 on page 5 shows the rear view of the system with the location codes for the PCIe4 adapter slots.

Table 4 on page 3 lists the PCIe4 adapter slot locations and details for the 5105-22E, 9009-22G, or 9223-22S system.

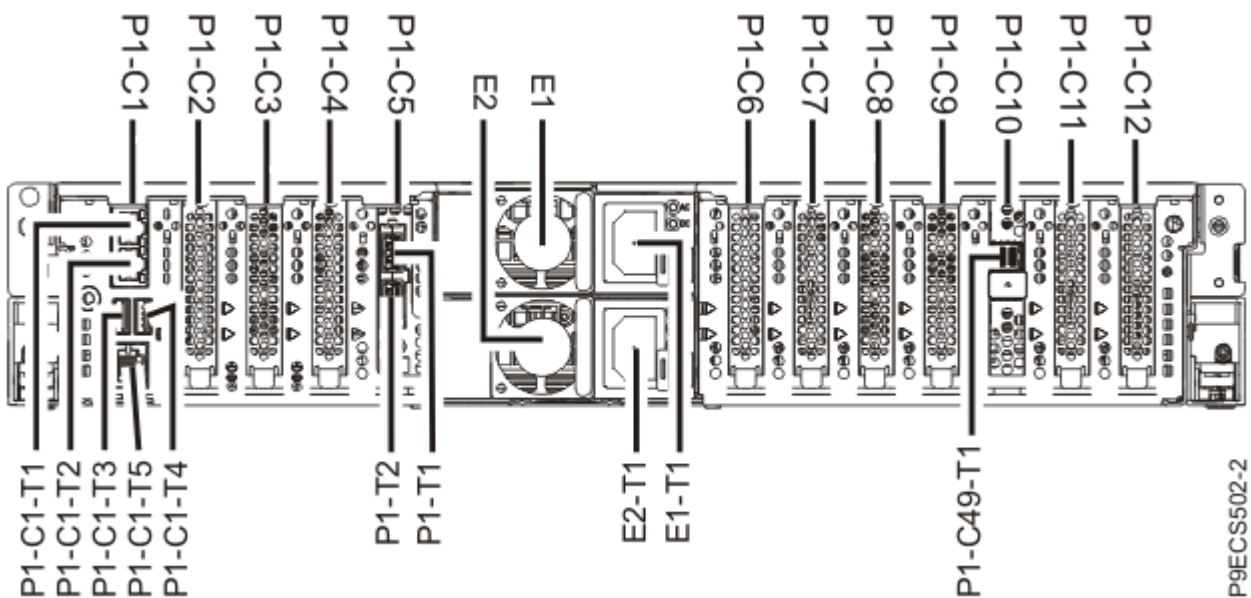


Figure 1. Rear view of a rack-mounted 5105-22E, 9009-22G, or 9223-22S system with PCIe4 slots location codes

Table 4. Slot locations and descriptions for the 5105-22E, 9009-22G, or 9223-22S system

Location code	Description	Processor module	Adapter size	Slot capabilities				Slot availability
				CAPI	SR-IOV	32-bit dynamic direct memory access (DMA) GB	I/O adapter enlarged capacity enablement order ⁶	
P1-C2 ^{1, 3}	PCIe4 x8 with x16 connector	Processor module SCM1	Half-height, half-length	No	Yes	2	5	Yes
P1-C3 ¹	PCIe4 x16	Processor module SCM1	Half-height, half-length	Yes	Yes	2	2	Yes
P1-C4 ¹	PCIe4 x16	Processor module SCM1	Half-height, half-length	Yes	Yes	2	3	Yes
P1-C5 ⁷	PCIe4 x8	PCIe4 switch, STK1P8	Half-height, half-length	No	Yes	2	8	Yes
P1-C6	PCIe4 x16 with x16 connector	PCIe4 switch, STK3P24	Half-height, half-length	No	Yes	2	6	Yes
P1-C7	PCIe4 x8	PCIe4 switch, STK1P12	Half-height, half-length	No	Yes	2	10	Yes
P1-C8 ^{1, 3}	PCIe4 x8	Processor module SCMO	Half-height, half-length	Yes	Yes	2	4	Yes
P1-C9 ^{1, 5}	PCIe4 x16	Processor module SCMO	Half-height, half-length	Yes	Yes	2	1	Yes
P1-C10 ⁸	PCIe4 x8	PCIe4 switch, STK1P8	Half-height, half-length	No	Yes	2	9	Yes
P1-C11	PCIe4 x8 (default LAN slot)	PCIe4 switch, STK1P12	Half-height, half-length	No	Yes	2	11	Yes
P1-C12	PCIe4 x16 with x16 connector	PCIe4 switch, STK1P24	Half-height, half-length	No	Yes	2	7	Yes

¹High-performance slot that is directly connected to the processor module. The connectors in these slots are differently colored than the slots from the PCIe3 switches.

³Slots P1-C2 and P1-C8 have Gen4 x16 connectors, but will only function as Gen4 x8.

⁵If FC EJ05 is installed in this slot, the external SAS port is not allowed in the system.

⁶Enabling the I/O adapter enlarged capacity option will only affect Linux® partitions. If your system doesn't have Linux partitions, the **I/O Adapter Enlarged Capacity** setting should be disabled.

⁷If a rear USB 3.0 cable and connector (FC EBK8) is installed in the system, an adapter is not allowed in this slot.

⁸If a rear SAS cable and bracket (FC EJ00) is installed in the system, an adapter is not allowed in this slot.

Notes:

- The peak bandwidths supported by the x16 slots are 16 gigabytes per second (GBps) in simplex mode and 32 GBps in duplex mode.
- The peak bandwidths supported by P1-C2, P1-C5, P1-C6, P1-C7, P1-C8, P1-PC10, 1-C11, and P1-C12 slots are 16 GBps in simplex mode and 32 Gbps in duplex mode.
- The peak bandwidths supported by P1-C3, P1-C4, and P1-C9 slots are 32 GBps in simplex mode and 64 GBps in duplex mode.
- All slots support enhanced error handling (EEH).
- All PCIe slots are hot swappable and support concurrent maintenance.

Slot descriptions for the 9008-22L, 9009-22A, or 9223-22H

The 9008-22L, 9009-22A, and 9223-22H systems provide PCIe3 and PCIe4 slots. The PCIe slots are enabled to support the PCIe3 cable adapter (FC EJ05 or EJ1R) that is used to attach the EMX0 PCIe Gen3 I/O expansion drawer.

Table 5. Slot locations and descriptions for 9008-22L, 9009-22A, and 9223-22H

Slot availability	Description	Adapter size
Two slots (P1-C6, P1-C12)	PCIe3 x8	Half-height, half-length
Two slots (P1-C7, P1-C11)	PCIe3 x8	Half-height, half-length

Table 5. Slot locations and descriptions for 9008-22L, 9009-22A, and 9223-22H (continued)

Slot availability	Description	Adapter size
Three slots (P1-C3, P1-C4, P1-C9)	PCIe4 x16	Half-height, half-length
Two slots (P1-C2, P1-C8)	PCIe4 x8 with x16 connector	Half-height, half-length

Two PCIe3 switches in the system backplane provide PCIe3 buses from the system processor modules that provide connectivity to the following features:

- PCIe slots
- PCIe local area network (LAN) controller
- PCIe3 internal SAS controller

PCIe3 switch 1 and switch 2 provide PCIe3 buses from system processor module SCM0. [Table 6 on page 4](#) lists the features provided by the PCIe3 switches (Switch 1 and Switch 2). It also lists the requirements of PCIe3 switches to support certain features.

Table 6. PCIe3 switches in the system

Features provided	Switch 1 and switch 2
Lanes and ports	48-lane, 12-ports, PCIe3
	With integrated 8.0 gigatransfers per second (GT/s) Serializer/Deserializer (SerDes) speed negotiation for each port
Lane and polarity reversal	Supported
All ports support concurrent maintenance through I2C bus	Yes
End-to-end cyclic redundancy check (CRC) and poison bit error checking	Supported
Data path parity	Supported
Memory error correction	Supported
Advanced error reporting	Supported
Aggregate full duplex bandwidth	768 GT/s
Designate any port as the upstream port	Yes
27x27 mm, 676-pin FCBGA package	Yes
Power consumption	<ul style="list-style-type: none"> • Nominal: 8 watts • Maximum: 12 watts

[Figure 2 on page 5](#) shows the rear view of the system with the location codes for the adapter slots.

[Table 7 on page 5](#) lists the adapter slot locations and details for the 9008-22L, 9009-22A, or 9223-22H system.

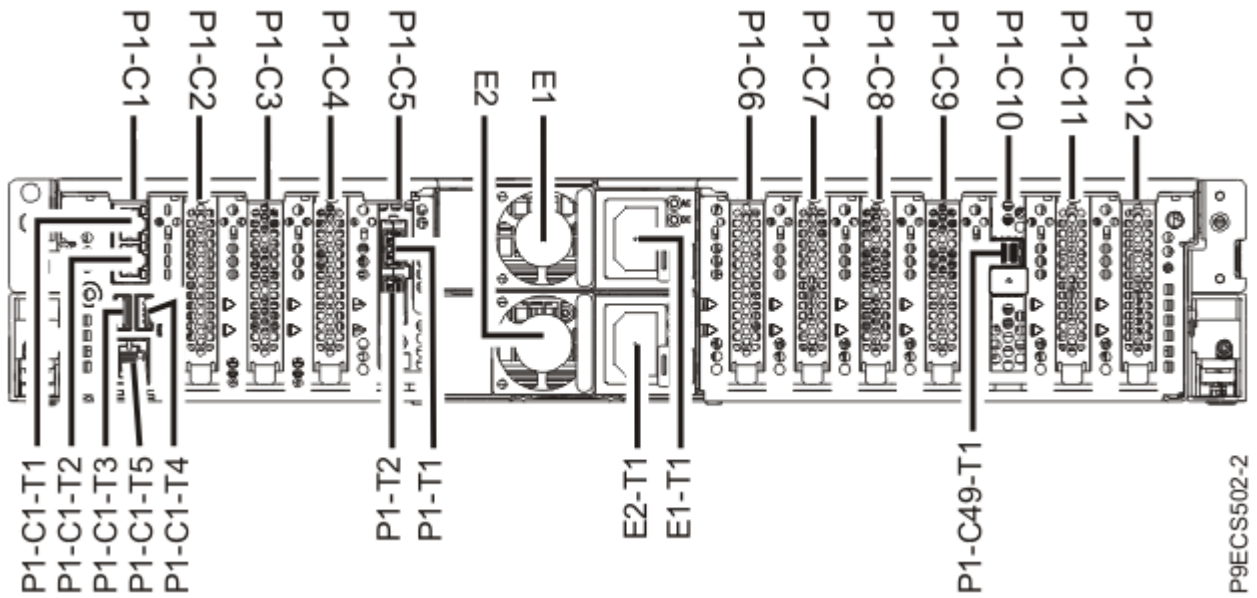


Figure 2. Rear view of a rack-mounted 9008-22L, 9009-22A, or 9223-22H system with PCIe slots location codes

Table 7. Slot locations and descriptions for the 9008-22L, 9009-22A, or 9223-22H system

Location code	Description	Processor module	Adapter size	Slot capabilities				Slot availability
				CAPI	SR-IOV	32-bit dynamic direct memory access (DMA) GB	I/O adapter enlarged capacity enablement order ⁶	
P1-C2 ^{1, 3}	PCIe4 x8 with x16 connector	Processor module SCM1	Half-height, half-length	No	Yes	2	5	Yes
P1-C3 ¹	PCIe4 x16	Processor module SCM1	Half-height, half-length	Yes	Yes	2	2	Yes
P1-C4 ¹	PCIe4 x16	Processor module SCM1	Half-height, half-length	Yes	Yes	2	3	Yes
P1-C6 ^{2, 4}	PCIe3 x8 with x16 connector	Processor module SCM0	Half-height, half-length	No	Yes	2	6	Yes
P1-C7 ⁴	PCIe3 x8	PCIe3 switch, S2P17	Half-height, half-length	No	Yes	2	10	Yes
P1-C8 ^{1, 3}	PCIe4 x8 with x16 connector	Processor module SCM0	Half-height, half-length	Yes	Yes	2	4	Yes
P1-C9 ^{1, 5}	PCIe4 x16	Processor module SCM0	Half-height, half-length	Yes	Yes	2	1	Yes
P1-C11 ⁴	PCIe3 x8 (default LAN slot)	PCIe3 switch, S2P17	Half-height, half-length	No	Yes	2	11	Yes
P1-C12 ^{2, 4}	PCIe3 x8 with x16 connector	PCIe3 switch, S1P8	Half-height, half-length	No	Yes	2	7	Yes

Table 7. Slot locations and descriptions for the 9008-22L, 9009-22A, or 9223-22H system (continued)

Location code	Description	Processor module	Adapter size	Slot capabilities				Slot availability
				CAPI	SR-IOV	32-bit dynamic direct memory access (DMA) GB	I/O adapter enlarged capacity enablement order ⁶	
<p>¹High-performance slot that is directly connected to the processor module. The connectors in these slots are differently colored than the slots from the PCIe3 switches.</p> <p>²Slots P1-C6 and P1-C12 have Gen3 x16 connectors, but will only function as Gen3 x8.</p> <p>³Slots P1-C2 and P1-C8 have Gen4 x16 connectors, but will only function as Gen4 x8.</p> <p>⁴Slot connected by PCIe3 switches.</p> <p>⁵If FC EJ05 is installed in this slot, the external SAS port is not allowed in the system.</p> <p>⁶Enabling the I/O adapter enlarged capacity option will only affect Linux partitions. If your system doesn't have Linux partitions, the I/O Adapter Enlarged Capacity setting should be disabled.</p> <p>Notes:</p> <ul style="list-style-type: none"> • The peak bandwidths supported by the x16 slots are 32 gigabytes per second (GBps) in simplex mode and 64 GBps in duplex mode. • The peak bandwidths supported by P1-C6, P1-C7, P1-C11, and P1-C12 x8 slots are 8 GBps in simplex mode and 16 GBps in duplex mode. • The peak bandwidths supported by P1-C2 and P1-C8 x8 slots are 16 GBps in simplex mode and 32 GBps in duplex mode. • All slots support enhanced error handling (EEH). • All PCIe slots are hot swappable and support concurrent maintenance. 								

Firmware slot capabilities

System PCIe slots are allocated direct memory access (DMA) space using the following algorithm:

- All slots are allocated a 2 GB default DMA window.
- All I/O adapter slots (except the embedded USB) are allocated Dynamic DMA Window (DDW) capability based on installed platform memory. DDW capability is calculated assuming 4 K I/O mappings:
 - For systems with less than 64 GB of memory, slots are allocated 16 GB of DDW capability.
 - For systems with at least 64 GB of memory, but less than 128 GB of memory, slots are allocated 32 GB of DDW capability.
 - For systems with 128 GB or more of memory, slots are allocated 64 GB of DDW capability.
 - Slots can be enabled with Huge Dynamic DMA Window capability (HDDW) using the **I/O Adapter Enlarged Capacity** setting in the Advanced System Management Interface (ASMI).
 - HDDW enabled slots are allocated enough DDW capability to map all of installed platform memory using 64 K I/O mappings.
 - Minimum DMA window size for HDDW enabled slots is 32 GB.
 - Slots that are HDDW enabled are allocated the larger of the calculated DDW capability and HDDW capability.

Adapter placement rules and slot priorities for the 5105-22E, 9008-22L, 9009-22A, 9009-22G, 9223-22H, or 9223-22S

Find information about the placement rules and slot priorities for the adapters that are supported for the 5105-22E, 9008-22L, 9009-22A, 9009-22G, 9223-22H, or 9223-22S system.

Adapter placement rules for 5105-22E, 9009-22G, or 9223-22S

Use this information while selecting slots for installing adapters in the 5105-22E, 9009-22G, or 9223-22S system.

1. The slot P1-C11 must be used to install the local area network (LAN) adapter feature codes (FCs). Any other adapter feature is not supported in this slot.

- The PCIe3 cable adapter (FC EJ05 or FC EJ1R) for the EMX0 PCIe3 expansion drawer is supported in slots P1-C4 and P1-C9.

Note: The EJ05 is a double-wide adapter that requires two adjacent slots.

- CAPI accelerator adapters are supported in slots P1-C3, P1-C4, P1-C8, and P1-C9.
- Slots P1-C2 and P1-C8 are slots with PCIe x8 buses that are directly connected from the system processor modules. The slots can be used to install high-performance adapters. The adapter priority for this slot is for the high-performance adapters followed by any other adapters.
- Slots P1-C3, P1-C4, and P1-C9 are slots with PCIe x16 buses that are directly connected from the system processor modules. These slots can be used to install high-performance adapters. The adapter priority for these slots is for CAPI accelerator adapters, PCI accelerator adapters, high-performance adapters, followed by any other adapters.
- PCIe internal slots are used to install high-performance internal SAS RAID adapters.
- There is no Fibre Channel over Ethernet (FCoE) support for FC EN0J, FC EL38, FC EN0L, FC EL3C, and FC EN0N.
- Configuring an SR-IOV adapter into SR-IOV shared mode may require extra hypervisor memory. If sufficient hypervisor memory is not available, the request to move to SR-IOV shared mode will fail. The user will be instructed to free up extra memory and try the operation again.
- Slot P1-C5 cannot be used if a rear USB 3.0 cable and connector (FC EBK8) is installed in the system.
- Slot P1-C10 cannot be used if a rear SAS cable and bracket (FC EJ00) is installed in the system.

Verify whether the adapter is supported for your system. The feature code (FC) column in the following table lists all of the supported adapters for systems. You can select the FC for more details. To view a list of adapters supported in the POWER9 processor-based systems and the EMX0 PCIe3 expansion drawer, see [Adapter information by feature code for the 9008-22L, 9009-22A, 9009-22G, 9009-41A, 9009-41G, 9009-42A, 9009-42G, 9040-MR9, 9080-M9S, 9223-22H, 9223-22S, 9223-42H, 9223-42S system and EMX0 PCIe3 expansion drawers](http://www.ibm.com/support/knowledgecenter/POWER9/p9hcd/p9hcd_pcibyfeature.htm) (http://www.ibm.com/support/knowledgecenter/POWER9/p9hcd/p9hcd_pcibyfeature.htm).

Note: In the following table, the slot priority numbers 2 - 12 correspond to slot locations P1-C2 through P1-C12.

Feature code	Description	5105-22E, 9009-22G, or 9223-22S (one processor)		5105-22E, 9009-22G, or 9223-22S (two processors)	
		Slot priorities	Maximum number of adapters supported	Slot priorities	Maximum number of adapters supported
5260 ²	PCIe2 4-port 1 GbE adapter (FC 5260, 5899, EL4L, and EL4M; CCIN 576F); Adapter part number: 74Y4064	11, 12, 6, 7, 10, 5, 8, 9	8	11, 12, 6, 7, 5, 10, 8, 2, 9, 4, 3	11
5269 ²	POWER GXT145 PCI Express Graphics Accelerator (FC 5269; CCIN 5269); Adapter part number: 74Y3227	8, 9	2	8, 2, 9, 4, 3	5
5273 ²	PCIe2 8 Gb dual-port Fibre Channel adapter (FC 5273, 5735, EL2N, and EL58); CCIN 577D); Adapter part number: 10N9824	8, 9, 10, 7, 5, 12, 6	7	8, 2, 4, 9, 3, 6, 12, 7, 10, 5	10
EC2R ²	PCIe3 2-port 10 Gb NIC & RoCE SR/Cu adapter (FC EC2R and EC2S; CCIN 58FA); Adapter part number: 01FT759	11, 8, 9, 7, 10, 12, 6, 5	8	11, 7, 12, 6, 2, 5, 10, 8, 4, 3, 9	11

Table 8. Adapter slot priorities and maximum adapters supported in the 5105-22E, 9009-22G, or 9223-22S system (continued)

Feature code	Description	5105-22E, 9009-22G, or 9223-22S (one processor)		5105-22E, 9009-22G, or 9223-22S (two processors)	
		Slot priorities	Maximum number of adapters supported	Slot priorities	Maximum number of adapters supported
EC2T	PCIe3 2-port 25/10 Gb NIC & RoCE SFP28 adapter (FC EC2T and EC2U; CCIN 58FB); Adapter part number: 01FT753	11, 8, 9, 7, 10, 12, 6, 5	8	11, 2, 8, 4, 3, 9, 7, 12, 6, 10, 5	11
EC3A ^{1, 2}	PCIe3 LP 2-Port 40 GbE NIC RoCE QSFP+ adapter (FC EC3A and EC3B; CCIN 57BD); Adapter part number: 00FW105	8, 9, 6, 12, 7, 10, 5	7	8, 2, 4, 9, 3, 6, 12, 7, 10, 5	10
EC3E ^{1, 2}	PCIe3 2-port 100 Gb EDR InfiniBand adapter x16 (FC EC3E and EC3F; CCIN 2CEA); Adapter part number: 00WT075	9	1	4, 3, 9	3
EC3L ^{1, 2}	PCIe3 2-port 100 GbE NIC & RoCE QSFP28 adapter (FC EC3L and EC3M; CCIN 2CEC); Adapter part number: 00WT078	9	1	4, 3, 9	3
EC3T ^{1, 2}	PCIe3 1-port 100 Gb EDR InfiniBand adapter x16 (FC EC3T and EC3U; CCIN 2CEB) Adapter part number: 00WT013	9	1	4, 3, 9	3
EC37 ^{1, 2}	PCIe3 LP 2-port 10 GbE NIC & RoCE SFP+ Copper adapter (FC EC37, EC38, EL3X, and EL53; CCIN 57BC); Adapter part number: 00RX859	11, 12, 6, 7, 10, 5, 8, 9	8	11, 12, 6, 7, 5, 10, 8, 2, 9, 4, 3	11
EC45 ²	PCIe2 4-port USB 3.0 adapter (FC EC45 and EC46; CCIN 58F9); Adapter part number: 00E2932	10, 12, 6, 7, 8, 9	6	10, 12, 6, 7, 8, 2, 9, 4, 3	9
EC51 ²	PCIe2 LP 3D Graphics adapter x16 (FC EC51); Adapter part number: 00WT180	9	1	4, 3, 9	3
EC5C ²	PCIe3 x8 Non-Volatile Memory 3.2 TB SSD NVMe adapter (FC EC5C, EC5D, EC6W, and EC6X; CCIN 58FD); Adapter part number: 01LK431	8, 9, 10, 7, 5, 12, 6	7	2, 8, 3, 9, 4, 6, 12, 5, 10, 7	10
EC5E ²	PCIe3 x8 Non-Volatile Memory 6.4 TB SSD NVMe adapter (FC EC5E, EC5F, EC6Y, and EC6Z; CCIN 58FE); Adapter part number: 01LK435	8, 9, 10, 7, 5, 12, 6	7	2, 8, 3, 9, 4, 6, 12, 5, 10, 7	10
EC5G ²	PCIe3 x8 Non-Volatile Memory 1.6 TB SSD NVMe adapter (FC EC5A, EC5B, EC5G, EC6U, and EC6V; CCIN 58FC); Adapter part number: 01DH570	8, 9, 10, 7, 5, 12, 6	7	2, 8, 3, 9, 4, 6, 12, 5, 10, 7	10

Table 8. Adapter slot priorities and maximum adapters supported in the 5105-22E, 9009-22G, or 9223-22S system (continued)

Feature code	Description	5105-22E, 9009-22G, or 9223-22S (one processor)		5105-22E, 9009-22G, or 9223-22S (two processors)	
		Slot priorities	Maximum number of adapters supported	Slot priorities	Maximum number of adapters supported
EC62 ²	PCIe4 x16 1-Port EDR 100 GB InfiniBand ConnectX-5 CAPI-capable adapter (FC EC62 and EC63; CCIN 2CF1); Adapter part number: 00WT179	9	1	4, 3, 9	3
EC64	PCIe4 x16 2-port EDR 100 GB InfiniBand ConnectX-5 CAPI Capable adapter (FC EC64 and EC65; CCIN 2CF2); Adapter part number: 00WT176	9	1	4, 3, 9	3
EC67	PCIe4 x16, 2-port 100 GB RoCE En ConnectX-5 adapter (FC EC66 and EC67; CCIN 2CF3); Adapter part number: 01FT742	9	1	3, 4, 9	3
EC6G	PCIe4 x16, 2-port HDR 100 Gb InfiniBand ConnectX-6 adapter (FC EC6G; CCIN 590E); Adapter part number: 02CM912	9	1	3, 4, 9	3
EC6J ²	PCIe2 LP 2-Port USB 3.0 Adapter (FC EC6J and FC EC6K; CCIN 590F); Adapter part number: 02JD518	12, 7, 6, 8, 9	5	12, 7, 6, 8, 9, 2, 3, 4	8
EC75 ²	PCIe4 2-port 100 GbE RoCE x16 adapter (FC EC75 and FC EC76; CCIN 2CFB); Adapter part number: 02CM921	9	1	3, 9, 4	3
EC77 ²	PCIe4 2-port 100 GbE RoCE with Crypto x16 adapter (FC EC77 and FC EC78; CCIN 2CFA); Adapter part number: 02CM993	9	1	3, 9, 4	3
EC7A ²	PCIe4 x8 NVMe 1.6 TB Flash Adapter (FC EC7A, EC7B, EC7J, and EC7K; CCIN 594A); Adapter part number: 02DE956	8, 9, 10, 7, 5, 12, 6	7	2, 8, 3, 9, 4, 6, 12, 5, 10, 7	10
EC7C ²	PCIe4 x8 NVMe 3.2 TB Flash Adapter (FC EC7C, EC7D, EC7L, and EC7M; CCIN 594B); Adapter part number: 02DE960	8, 9, 10, 7, 5, 12, 6	7	2, 8, 3, 9, 4, 6, 12, 5, 10, 7	10
EC7E ²	PCIe4 x8 NVMe 6.4 TB Flash Adapter (FC EC7E, EC7F, EC7N, and EC7P; CCIN 594C); Adapter part number: 02DE964	8, 9, 10, 7, 5, 12, 6	7	2, 8, 3, 9, 4, 6, 12, 5, 10, 7	10
EJ05 ²	PCIe3 cable adapter for the EMX0 PCIe Gen3 I/O expansion drawer (FC EJ05; CCIN 2B1C); Adapter part number: 00RR809	9	1	9/10, 4/5	2

Table 8. Adapter slot priorities and maximum adapters supported in the 5105-22E, 9009-22G, or 9223-22S system (continued)

Feature code	Description	5105-22E, 9009-22G, or 9223-22S (one processor)		5105-22E, 9009-22G, or 9223-22S (two processors)	
		Slot priorities	Maximum number of adapters supported	Slot priorities	Maximum number of adapters supported
EJOM ²	PCIe3 SAS RAID quad-port 6 Gb LP adapter (FC EJOM and EL3B; CCIN 57B4); Adapter part number: 00MH910	8, 9, 6, 7, 5	5	8, 2, 4, 9, 3, 6, 10, 7, 5	9
EJ11 ²	PCIe3 4 x8 SAS Port adapter (FC EL60, EL65, EJ10, and EJ11; CCIN 57B4); Adapter part number: 00MH959	8, 9, 6, 7, 5	5	8, 2, 4, 9, 3, 6, 10, 7, 5	9
EJ1N ²	PCIe1 SAS Tape/DVD dual-port 3 Gb x8 adapter (FC EJ1N and EJ1P; CCIN 57B3); Adapter part number: 44V4852	8, 9	2	8, 2, 4, 9, 3	5
EJ1R ²	PCIe3 cable adapter for the EMX0 PCIe Gen3 I/O expansion drawer (FC EJ1R; CCIN 58FF); Adapter part number: 02AE884	9	1	9, 4, 3	3
ENOB ²	PCIe3 16 Gb 2-port Fibre Channel adapter (FC EL43, EL5B, ENOA, and ENOB; CCIN 577F); Adapter part number: 00E9283	8, 9, 10, 7, 5, 12, 6	7	8, 2, 4, 9, 3, 6, 12, 7, 10, 5	10
ENOF ²	PCIe2 8Gb 2-Port Fibre Channel adapter (FC EL5Y, EL5Z, ENOF, and ENOG; CCIN 578D); Adapter part number: 00WT111	8, 9, 10, 7, 5, 12, 6	7	8, 2, 4, 9, 3, 6, 12, 7, 10, 5	10
EN0J ²	PCIe3 4-port (10 Gb FCoE and 1 GbE) (FC EL38, EL56, ENOH, and EN0J; CCIN 2B93); Adapter part number: 00E3498	11, 12, 6, 7, 10, 5, 8, 9	8	11, 12, 6, 7, 5, 10, 8, 2, 9, 4, 3	11
ENOL ²	PCIe3 4-port (10 Gb FCoE and 1 GbE) copper and RJ45 adapter (FC EL3C, EL57, ENOK, and ENOL; CCIN 2CC1); Adapter part number: 00E8140 (FC ENOK) and 00E3502 (FC ENOL)	11, 12, 6, 7, 10, 5, 8, 9	8	11, 12, 6, 7, 5, 10, 8, 2, 9, 4, 3	11
ENOT ²	PCIe2 LP 4-port (10 Gb + 1 GbE) SR+RJ45 adapter (FC ENOT; CCIN 2CC3); Adapter part number: 00E2715	11, 12, 6, 7, 10, 5, 8, 9	8	11, 12, 6, 7, 5, 10, 8, 2, 9, 4, 3	11
ENOV ²	PCIe2 LP 4-port (10 Gb + 1 GbE) copper SFP+RJ45 adapter (FC ENOV; CCIN 2CC3); Adapter part number: 00E2715	11, 12, 6, 7, 10, 5, 8, 9	8	11, 12, 6, 7, 5, 10, 8, 2, 9, 4, 3	11
ENOX ²	PCIe2 LP 2-port 10 GbE BaseT RJ45 adapter (FC EL3Z or ENOX; CCIN 2CC4); Adapter part number: 00E2714	11, 12, 6, 7, 10, 5, 8, 9	8	11, 12, 6, 7, 5, 10, 8, 2, 9, 4, 3	11

Table 8. Adapter slot priorities and maximum adapters supported in the 5105-22E, 9009-22G, or 9223-22S system (continued)

Feature code	Description	5105-22E, 9009-22G, or 9223-22S (one processor)		5105-22E, 9009-22G, or 9223-22S (two processors)	
		Slot priorities	Maximum number of adapters supported	Slot priorities	Maximum number of adapters supported
<u>EN0Y</u> ²	PCIe2 LP 8 Gb 4-port Fibre Channel adapter (FC EN0Y; CCIN EN0Y); Adapter part number: 74Y3923	8, 9, 10, 7, 5, 12, 6	7	8, 2, 4, 9, 3, 6, 12, 7, 10, 5	10
<u>EN1B</u> ²	PCIe3 x8 2-port Fibre Channel (32 Gb/s); (FC EL5U, EL5V, EN1A, and EN1B); CCIN 578F); Adapter part number: 01FT703	8, 9, 10, 7, 5, 12, 6	7	8, 2, 4, 9, 3, 6, 12, 7, 10, 5	10
<u>EN1D</u> ²	PCIe3 x8 4-port Fibre Channel (16 Gb/s); (FC EL5W, EL5X, EN1C, and EN1D; CCIN 578E); Adapter part number: 01FT698	8, 9, 10, 7, 5, 12, 6	7	8, 2, 4, 9, 3, 6, 12, 7, 10, 5	10
<u>EN1F</u> ²	PCIe3 x8 4-port Fibre Channel (16 Gb/s); (FC EN1E and EN1F; CCIN 579A); Adapter part number: 02JD586	8, 9, 10, 7, 5, 12, 6	7	8, 2, 4, 9, 3, 6, 12, 7, 10, 5	10
<u>EN1H</u> ²	PCIe3 x8 2-port Fibre Channel (16 Gb/s) (EN1G and EN1H; CCIN 579B); Adapter part number: 02CM900 and 02CM903	8, 9, 10, 7, 5, 12, 6	7	8, 2, 4, 9, 3, 6, 12, 7, 10, 5	10
<u>EN1K</u> ²	PCIe4 x8 2-port Fibre Channel (32 Gb/s); (FC EN1J and EN1K; CCIN 579C); Adapter part number: 02CM909	8, 9, 10, 7, 5, 12, 6	7	8, 2, 4, 9, 3, 6, 12, 7, 10, 5	10
<u>EN2B</u> ²	PCIe3 16 Gb 2-port Fibre Channel adapter (FC EN2A and FC EN2B; CCIN 579D); Adapter part number: 02JD564	8, 9, 10, 7, 5, 12, 6	7	8, 2, 4, 9, 3, 6, 12, 7, 10, 5	10

¹The adapters are installed in this order in the system for best performance.
²The adapter is not supported on the 5105-22E system.

Adapter placement rules for 9008-22L, 9009-22A, or 9223-22H

Use this information while selecting slots for installing adapters in the 9008-22L, 9009-22A, or 9223-22H system.

1. The slot P1-C11 must be used to install the local area network (LAN) adapter feature codes (FCs). Any other adapter feature is not supported in this slot.
2. The PCIe3 cable adapter (FC EJ05 or FC EJ1R) for the EMX0 PCIe3 expansion drawer is supported in slots P1-C4 and P1-C9.

Note: The EJ05 adapter is a double-wide adapter that requires two adjacent slots.

3. CAPI accelerator adapters are supported in slots P1-C2, P1-C3, P1-C7, and P1-C9.
4. Slots P1-C2 and P1-C8 are slots with PCIe x8 buses that are directly connected from the system processor modules. The slots can be used to install high-performance adapters. The adapter priority for this slot is for the high-performance adapters followed by any other adapters.
5. Slots P1-C3, P1-C4, and P1-C9 are slots with PCIe x16 buses that are directly connected from the system processor modules. These slots can be used to install high-performance adapters. The adapter

priority for these slots is for CAPI accelerator adapters, PCI accelerator adapters, high-performance adapters, followed by any other adapters.

6. PCIe internal slots are used to install high-performance internal SAS RAID adapters.
7. There is no Fibre Channel over Ethernet (FCoE) support for FC EN0J, FC EL38, FC EN0L, FC EL3C, and FC EN0N.
8. Configuring an SR-IOV adapter into SR-IOV shared mode may require extra hypervisor memory. If sufficient hypervisor memory is not available, the request to move to SR-IOV shared mode will fail. The user will be instructed to free up extra memory and try the operation again.

Verify whether the adapter is supported for your system. The feature code (FC) column in the following table lists all of the supported adapters for systems. You can select the FC for more details. To view a list of adapters supported in the POWER9 processor-based systems and the EMX0 PCIe3 expansion drawer, see Adapter information by feature code for the 9008-22L, 9009-22A, 9009-22G, 9009-41A, 9009-41G, 9009-42A, 9009-42G, 9040-MR9, 9080-M9S, 9223-22H, 9223-22S, 9223-42H, 9223-42S system and EMX0 PCIe3 expansion drawers (http://www.ibm.com/support/knowledgecenter/POWER9/p9hcd/p9hcd_pcibyfeature.htm).

Note: In the following table, the slot priority numbers 2 - 4 correspond to slot locations P1-C2 through P1-C4. And slot priority numbers 6 - 12 correspond to slot locations P1-C6 through P1-C12.

Feature code	Description	9009-22A or 9223-22H (one processor)		9009-22A or 9223-22H (two processors)		9008-22L (one processor)		9008-22L (two processors)	
		Slot priorities	Maximum number of adapters supported	Slot priorities	Maximum number of adapters supported	Slot priorities	Maximum number of adapters supported	Slot priorities	Maximum number of adapters supported
5260	PCIe2 4-port 1 GbE adapter (FC 5260, 5899, EL4L, and EL4M; CCIN 576F); Adapter part number: 74Y4064	11, 12, 6, 7, 8, 9	6	11, 12, 6, 7, 8, 2, 9, 4, 3	9	11, 12, 6, 7, 8, 9	6 (FC EL4M)	11, 12, 6, 7, 8, 2, 9, 4, 3	9 (FC EL4M)
5269	POWER GXT145 PCI Express Graphics Accelerator (FC 5269; CCIN 5269); Adapter part number: 74Y3227	8, 9	2	8, 2, 9, 4, 3	5	8, 9	2	8, 2, 9, 4, 3	5
5273	PCIe2 8 Gb dual-port Fibre Channel adapter (FC 5273, 5735, EL2N, and EL58); CCIN 577D); Adapter part number: 10N9824	8, 9, 6, 12, 7	8	8, 2, 4, 9, 3, 6, 12, 7	8	8, 9, 6, 12, 7	5 (FC EL2N)	8, 2, 4, 9, 3, 6, 12, 7	8 (FC EL2N)
5277	4-port Async EIA-232 PCIe 1X adapter (FC 5277 and 5785; CCIN 57D2); Adapter FRU number 46K6734	8, 9	2	8, 2, 9, 4, 3	5	8, 9	2	8, 2, 9, 4, 3	5
EC2R	PCIe3 2-port 10 Gb NIC & RoCE SR/Cu adapter (FC EC2R and EC2S; CCIN 58FA); Adapter part number: 01FT759	7, 12, 6, 8, 9	5	7, 12, 6, 2, 8, 4, 3, 9	8	7, 12, 6, 8, 9	5	7, 12, 6, 2, 8, 4, 3, 9	8
EC2T	PCIe3 2-port 25/10 Gb NIC & RoCE SFP28 adapter (FC EC2T and EC2U; CCIN 58FB); Adapter part number: 01FT753	8, 9, 7, 12, 6	5	2, 8, 4, 3, 9, 7, 12, 6	8	8, 9, 7, 12, 6	5	2, 8, 4, 3, 9, 7, 12, 6	8

Table 9. Adapter slot priorities and maximum adapters supported in the 9008-22L, 9009-22A, or 9223-22H system (continued)

Feature code	Description	9009-22A or 9223-22H (one processor)		9009-22A or 9223-22H (two processors)		9008-22L (one processor)		9008-22L (two processors)	
		Slot priorities	Maximum number of adapters supported	Slot priorities	Maximum number of adapters supported	Slot priorities	Maximum number of adapters supported	Slot priorities	Maximum number of adapters supported
EC3A ¹	PCIe3 LP 2-Port 40 GbE NIC RoCE QSFP+ adapter (FC EC3A and EC3B; CCIN 57BD); Adapter part number: 00FW105	8, 9, 7, 12, 6	5	2, 8, 4, 3, 9, 7, 12, 6	8	8, 9, 7, 12, 6	5	2, 8, 4, 3, 9, 7, 12, 6	8
EC3E ¹	PCIe3 2-port 100 Gb EDR InfiniBand adapter x16 (FC EC3E and EC3F; CCIN 2CEA); Adapter part number: 00WT075	9	1	4, 3, 9	3	9	1	4, 3, 9	3
EC3L ¹	PCIe3 2-port 100 GbE NIC & RoCE QSFP28 adapter (FC EC3L and EC3M; CCIN 2CEC); Adapter part number: 00WT078	9	1	4, 3, 9	3	9	1	4, 3, 9	3
EC3T ¹	PCIe3 1-port 100 Gb EDR InfiniBand adapter x16 (FC EC3T and EC3U; CCIN 2CEB) Adapter part number: 00WT013	9	1	4, 3, 9	3	9	1	4, 3, 9	3
EC37 ¹	PCIe3 LP 2-port 10 GbE NIC & RoCE SFP+ Copper adapter (FC EC37, EC38, EL3X, and EL53; CCIN 57BC); Adapter part number: 00RX859	8, 9, 6, 12, 7	5	11, 8, 2, 4, 9, 3, 6, 12, 7	9	11, 8, 9, 6, 12, 7	6 (FC EL3X)	11, 8, 2, 4, 9, 3, 6, 12, 7	11 (FC EL3X)
EC45	PCIe2 4-port USB 3.0 adapter (FC EC45 and EC46; CCIN 58F9); Adapter part number: 00E2932	8	1	8, 2, 4, 3	4	8	1	8, 2, 4, 3	4
EC51	PCIe2 LP 3D Graphics adapter x16 (FC EC51); Adapter part number: 00WT180	9	1	4, 3, 9	3	9	1	4, 3, 9	3
EC5C	PCIe3 x8 Non-Volatile Memory 3.2 TB SSD NVMe adapter (FC EC5C, EC5D, EC6W, and EC6X; CCIN 58FD); Adapter part number: 01LK431	9, 8, 7	3	2, 8, 3, 9, 4	5	9, 8, 7	3	2, 8, 3, 9, 4	5
EC5E	PCIe3 x8 Non-Volatile Memory 6.4 TB SSD NVMe adapter (FC EC5E, EC5F, EC6Y, and EC6Z; CCIN 58FE); Adapter part number: 01LK435	9, 8, 7	3	2, 8, 3, 9, 4	5	9, 8, 7	3	2, 8, 3, 9, 4	5
EC5G	PCIe3 x8 Non-Volatile Memory 1.6 TB SSD NVMe adapter (FC EC5A, EC5B, EC5G, EC6U, and EC6V; CCIN 58FC); Adapter part number: 01DH570	9, 8, 7	3	2, 8, 3, 9, 4	5	9, 8, 7	3	8, 2, 9, 4, 3	5

Table 9. Adapter slot priorities and maximum adapters supported in the 9008-22L, 9009-22A, or 9223-22H system (continued)

Feature code	Description	9009-22A or 9223-22H (one processor)		9009-22A or 9223-22H (two processors)		9008-22L (one processor)		9008-22L (two processors)	
		Slot priorities	Maximum number of adapters supported	Slot priorities	Maximum number of adapters supported	Slot priorities	Maximum number of adapters supported	Slot priorities	Maximum number of adapters supported
EC62	PCIe4 x16 1-Port EDR 100 GB InfiniBand ConnectX-5 CAPI-capable adapter (FC EC62 and EC63; CCIN 2CF1); Adapter part number: 00WT179	9	1	4, 3, 9	3	9	1	4, 3, 9	3
EC64	PCIe4 x16 2-port EDR 100 GB InfiniBand ConnectX-5 CAPI Capable adapter (FC EC64 and EC65; CCIN 2CF2); Adapter part number: 00WT176	9	1	4, 3, 9	3	9	1	4, 3, 9	3
EC67	PCIe4 x16, 2-port 100 GB RoCE En ConnectX-5 adapter (FC EC66 and EC67; CCIN 2CF3); Adapter part number: 01FT742	9	1	4, 3, 9	3	9	1	4, 3, 9	3
EC6G	PCIe4 x16, 2-port HDR 100 Gb InfiniBand ConnectX-6 adapter (FC EC6G; CCIN 590E); Adapter part number: 02CM912	9	1	3, 4, 9	3				
EC6J	PCIe2 LP 2-Port USB 3.0 Adapter (FC EC6J and FC EC6K; CCIN 590F); Adapter part number: 02JD518	12, 7, 6, 8, 9	5	12, 7, 6, 8, 9, 2, 3, 4	8	12, 7, 6, 8, 9	5	12, 7, 6, 8, 9, 2, 3, 4	8
EC75	PCIe4 2-port 100 GbE RoCE x16 adapter (FC EC75 and FC EC76; CCIN 2CFB); Adapter part number: 02CM921	9	1	3, 4, 9	3	9	1	3, 4, 9	3
EC7A	PCIe4 x8 NVMe 1.6 TB Flash Adapter (FC EC7A, EC7B, EC7J, and EC7K; CCIN 594A); Adapter part number: 02DE956	8, 9, 7	3	2, 8, 3, 9, 4	5	8, 9, 7	3	2, 8, 3, 9, 4	5
EC7C	PCIe4 x8 NVMe 3.2 TB Flash Adapter (FC EC7C, EC7D, EC7L, and EC7M; CCIN 594B); Adapter part number: 02DE960	8, 9, 7	3	2, 8, 3, 9, 4	5	8, 9, 7	3	2, 8, 3, 9, 4	5
EC7E	PCIe4 x8 NVMe 6.4 TB Flash Adapter (FC EC7E, EC7F, EC7N, and EC7P; CCIN 594C); Adapter part number: 02DE964	8, 9, 7	3	2, 8, 3, 9, 4	5	8, 9, 7	3	2, 8, 3, 9, 4	5
EJ05	PCIe3 cable adapter for the EMX0 PCIe Gen3 I/O expansion drawer (FC EJ05; CCIN 2B1C); Adapter part number: 00RR809	9	1	9/10, 4/5	2	9	1	9/10, 4/5	2

Table 9. Adapter slot priorities and maximum adapters supported in the 9008-22L, 9009-22A, or 9223-22H system (continued)

Feature code	Description	9009-22A or 9223-22H (one processor)		9009-22A or 9223-22H (two processors)		9008-22L (one processor)		9008-22L (two processors)	
		Slot priorities	Maximum number of adapters supported	Slot priorities	Maximum number of adapters supported	Slot priorities	Maximum number of adapters supported	Slot priorities	Maximum number of adapters supported
EJ0M	PCIe3 SAS RAID quad-port 6 Gb LP adapter (FC EJ0M and EL3B; CCIN 57B4); Adapter part number: 00MH910	8, 9, 6, 7	5	8, 2, 4, 9, 3, 6, 7	8	8, 9, 6, 7	5 (FC EL2N)	8, 2, 4, 9, 3, 6, 7	8 (FC EL2N)
EJ11	PCIe3 4 x8 SAS Port adapter (FC EL60, EL65, EJ10, and EJ11; CCIN 57B4); Adapter part number: 00MH959	8, 9, 6, 7	5	8, 2, 4, 9, 3, 6, 7	8	8, 9, 6, 7	5 (FC EL60)	8, 2, 4, 9, 3, 6, 7	8 (FC EL60)
EJ1N	PCIe1 SAS Tape/DVD dual-port 3 Gb x8 adapter (FC EJ1N and EJ1P; CCIN 57B3); Adapter part number: 44V4852	8, 9	2	8, 2, 9, 4, 3	5	8, 9	2	8, 2, 9, 4, 3	5
EJ1R	PCIe3 cable adapter for the EMX0 PCIe Gen3 I/O expansion drawer (FC EJ1R; CCIN 58FF); Adapter part number: 02AE884	9	1	9, 4, 3	3	9	1	9, 4, 3	3
EN0B	PCIe3 16 Gb 2-port Fibre Channel adapter (FC EL43, EL5B, EN0A, and EN0B; CCIN 577F); Adapter part number: 00E9283	6, 12, 9, 8, 7	5	8, 2, 4, 9, 3, 6, 12, 7	8	6, 12, 9, 8, 7	5	8, 2, 4, 9, 3, 6, 12, 7	8
EN0F	PCIe2 8Gb 2-Port Fibre Channel adapter (FC EL5Y, EL5Z, EN0F, and EN0G; CCIN 578D); Adapter part number: 00WT111	6, 12, 9, 8, 7	5	8, 2, 4, 9, 3, 6, 12, 7	8	6, 12, 9, 8, 7	5 (FC EL5Y)	8, 2, 4, 9, 3, 6, 12, 7	8 (FC EL5Y)
EN0J	PCIe3 4-port (10 Gb FCoE and 1 GbE) (FC EL38, EL56, EN0H, and EN0J; CCIN 2B93); Adapter part number: 00E3498	11, 8, 9, 6, 12, 7	6	11, 8, 2, 4, 9, 3, 6, 12, 7	9	11, 8, 9, 6, 12, 7	6 (FC EL38)	11, 8, 2, 4, 9, 3, 6, 12, 7	9 (FC EL38)
EN0L	PCIe3 4-port (10 Gb FCoE and 1 GbE) copper and RJ45 adapter (FC EL3C, EL57, EN0K, and EN0L; CCIN 2CC1); Adapter part number: 00E8140 (FC EN0K) and 00E3502 (FC EN0L)	11, 8, 9, 6, 12, 7	6	11, 8, 2, 4, 9, 3, 6, 12, 7	9	11, 8, 9, 6, 12, 7	6 (FC EL3C)	11, 8, 2, 4, 9, 3, 6, 12, 7	9 (FC EL3C)
EN0N	PCIe3 4-port (10 Gb FCoE and 1 GbE) LR and RJ45 adapter (FC EN0M and EN0N; CCIN 2CC0); Adapter part number: 00E8143	8, 9, 6, 12, 7	5	8, 2, 4, 9, 3, 6, 12, 7	8	8, 9, 6, 12, 7	5	8, 2, 4, 9, 3, 6, 12, 7	8

Table 9. Adapter slot priorities and maximum adapters supported in the 9008-22L, 9009-22A, or 9223-22H system (continued)

Feature code	Description	9009-22A or 9223-22H (one processor)		9009-22A or 9223-22H (two processors)		9008-22L (one processor)		9008-22L (two processors)	
		Slot priorities	Maximum number of adapters supported	Slot priorities	Maximum number of adapters supported	Slot priorities	Maximum number of adapters supported	Slot priorities	Maximum number of adapters supported
ENOT	PCIe2 LP 4-port (10 Gb + 1 GbE) SR+RJ45 adapter (FC ENOT; CCIN 2CC3); Adapter part number: 00E2715	11, 8, 9, 6, 12, 7	6	11, 8, 2, 4, 9, 3, 6, 12, 7	9	11, 8, 9, 6, 12, 7	6	11, 8, 2, 4, 9, 3, 6, 12, 7	9
ENOV	PCIe2 LP 4-port (10 Gb + 1 GbE) copper SFP+RJ45 adapter (FC ENOV; CCIN 2CC3); Adapter part number: 00E2715	11, 8, 9, 6, 12, 7	6	11, 8, 2, 4, 9, 3, 6, 12, 7	9	11, 8, 9, 6, 12, 7	6	11, 8, 2, 4, 9, 3, 6, 12, 7	9
ENOX	PCIe2 LP 2-port 10 GbE BaseT RJ45 adapter (FC EL3Z or ENOX; CCIN 2CC4); Adapter part number: 00E2714	11, 6, 12, 9, 8, 7	6	11, 8, 2, 4, 9, 3, 6, 12, 7	9	11, 6, 12, 9, 8, 7	6 (FC EL3Z)	11, 8, 2, 4, 9, 3, 6, 12, 7	9 (FC EL3Z)
EN0Y	PCIe2 LP 8 Gb 4-port Fibre Channel adapter (FC EN0Y; CCIN EN0Y); Adapter part number: 74Y3923	8, 9, 6, 12, 7	5	8, 2, 4, 9, 3, 6, 12, 7	8	8, 9, 6, 12, 7	5	8, 2, 4, 9, 3, 6, 12, 7	8
EN1B	PCIe3 x8 2-port Fibre Channel (32 Gb/s); (FC EL5U, EL5V, EN1A, and EN1B); CCIN 578F); Adapter part number: 01FT703	8, 9, 6, 12, 7	5	8, 2, 4, 9, 3, 6, 12, 7	8	8, 9, 6, 12, 7	5 (FC EL5V)	8, 2, 4, 9, 3, 6, 12, 7	8 (FC EL5V)
EN1D	PCIe3 x8 4-port Fibre Channel (16 Gb/s); (FC EL5W, EL5X, EN1C, and EN1D; CCIN 578E); Adapter part number: 01FT698	8, 9, 6, 12, 7	5	8, 2, 4, 9, 3, 6, 12, 7	8	8, 9, 6, 12, 7	5 (FC EL5X)	8, 2, 4, 9, 3, 6, 12, 7	8 (FC EL5X)
EN1H	PCIe3 x8 2-port Fibre Channel (16 Gb/s) (EN1G and EN1H; CCIN 579B); Adapter part number: 02CM900 and 02CM903	6, 12, 9, 8, 7	5	8, 2, 4, 9, 3, 6, 12, 7	8				
EN2B	PCIe3 16 Gb 2-port Fibre Channel adapter (FC EN2A and FC EN2B; CCIN 579D); Adapter part number: 02JD564	8, 9, 6, 12, 7	5	8, 2, 4, 9, 3, 6, 12, 7	8	8, 9, 6, 12, 7	5	8, 2, 4, 9, 3, 6, 12, 7	8

¹The adapters are installed in this order in the system for best performance.

Adapter placement rules and slot priorities for the EMX0 PCIe Gen3 I/O expansion drawer

Find information about the placement rules and slot priorities for the adapters that are supported for the EMX0 PCIe Gen3 I/O expansion drawer (EMX0 PCIe3 expansion drawer).

Slot descriptions for the EMX0 PCIe3 expansion drawer

The number of PCIe slots that are provided in the EMX0 PCIe3 expansion drawer depends on the I/O module configuration of the EMX0 PCIe3 expansion drawer. Your configuration might have one or two PCIe3 6-slot fanout modules installed in the rear of the EMX0 PCIe3 expansion drawer. Each PCIe3 6-slot fanout module provides six full-length, full-height, PCIe3 slots. The PCIe3 slots are compatible with PCIe1 and PCIe2 adapters. The PCIe slots use generation 3, single-wide, blind-swap cassettes.

The I/O module in the EMX0 PCIe3 expansion drawer is connected to the system with an expansion drawer cable pair. Each cable pair must be the same length and are attached to the T1 and T2 ports in the I/O module and to the corresponding ports in the PCIe3 cable adapter in the system.

Figure 3 on page 17 shows the rear view of the EMX0 PCIe3 expansion drawer with the location codes for the adapter slots in the PCIe3 6-slot fanout module.

Table 10 on page 18 lists the adapter slot locations and details for the EMX0 PCIe3 expansion drawer.

Note:

The left I/O module bay is configured with the first PCIe3 6-slot fanout module slot location codes P1-C1 through P1-C6.

The right I/O module bay is configured with the second PCIe3 6-slot fanout module slot location codes P2-C1 through P2-C6.

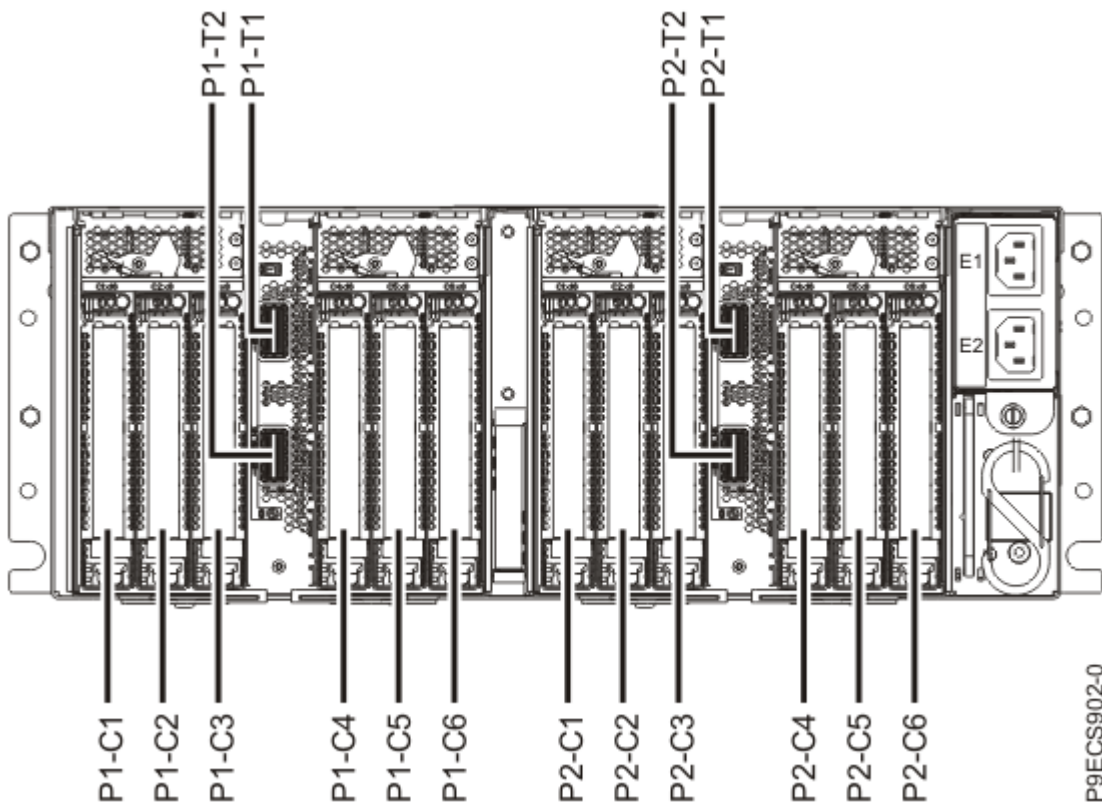


Figure 3. Rear view of a EMX0 PCIe3 expansion drawer with PCIe slot location codes

Table 10. Slot locations and descriptions for the EMX0 PCIe3 expansion drawer

Location code	Description	Slot capabilities		
		SR-IOV	Dynamic direct memory access (DMA) window	I/O adapter enlarged capacity enablement order
P1-C1	PCIe3 x16	Yes	Yes	Yes ¹
P1-C2	PCIe3 x8	Yes	Yes	No
P1-C3	PCIe3 x8	Yes	Yes	No
P1-C4	PCIe3 x16	Yes	Yes	No
P1-C5	PCIe3 x8	Yes	Yes	No
P1-C6	PCIe3 x8	Yes	Yes	No
P2-C1	PCIe3 x16	Yes	Yes	Yes ¹
P2-C2	PCIe3 x8	Yes	Yes	No
P2-C3	PCIe3 x8	Yes	Yes	No
P2-C4	PCIe3 x16	Yes	Yes	No
P2-C5	PCIe3 x8	Yes	Yes	No
P2-C6	PCIe3 x8	Yes	Yes	No

¹Slots P1-C1 and P2-C1 inherit the I/O Adapter Enlarged Capacity attribute from the slot in the system that connects to the EMX0 PCIe3 expansion drawer.

Notes:

- All slots are PCIe3 slots.
- All slots support full-length, full-height adapters or short form-factor with a full-height tailstock in single-wide, generation 3, blind-swap cassettes.
- Slots C1 and C4 in each PCIe3 6-slot fanout module are PCIe3 x16 buses and slots C2, C3, C5, and C6 are PCIe x8 buses.
- All slots support enhanced error handling (EEH).
- All PCIe slots are hot swappable and can be serviced with the power on.
- All six adapters in a PCIe3 6-slot fanout module can be in SR-IOV shared mode.
- If you have a CCIN 50CB PCIe3 6-slot fanout module, the FC EC2S and FC EC2U adapters are only supported in slots C2 and C5. If you have a CCIN 50CD PCIe3 6-slot fanout module, the FC EC2S and FC EC2U adapters are supported in slots C1 through C6, but only four FC EC2S and FC EC2U adapters can be in SR-IOV mode at a time.

Firmware slot capabilities

System PCIe slots are allocated direct memory access (DMA) space using the following algorithm:

- All slots are allocated a 2 GB default DMA window.
- Slots P1-C1 and P2-C1 inherit the I/O Adapter Enlarged Capacity attribute from the slot in the system that connects to the EMX0 PCIe3 expansion drawer.
- All other I/O adapter slots are allocated Dynamic DMA Window (DDW) capability based on installed platform memory. DDW capability is calculated assuming 4K I/O mappings:
 - For systems with less than 64 GB of memory, slots are allocated no DDW capability.

- For systems with at least 64 GB of memory, but less than 128 GB of memory, slots are allocated 16 GB of DDW capability.
- For systems with at least 128 GB of memory, but less than 256GB of memory, slots are allocated 32 GB of DDW capability.
- For systems with 256 GB or more of memory, slots are allocated 64 GB of DDW capability.

Adapters placement rules

Use this information while selecting slots for installing adapters in the EMX0 PCIe3 expansion drawer attached to the system. Use Table 11 on page 19 to identify slot placement priorities and the maximum number of adapters that can be installed in the EMX0 PCIe3 expansion drawer based on the operating system.

Note: You can click the link that appears in the feature code column for more technical information specific to the adapter.

- If the EMX0 PCIe3 expansion drawer is configured with two PCIe3 6-slot fanout modules, distribute the adapters across both I/O modules whenever possible.
- If FC EC46 is driving the internal DVD, it must be installed in the I/O expansion drawer that is closest to the system. The system and IO expansion drawer must be in the same rack.

Note: If slot P1-C2 of the first node contains a controller adapter (CC), it must be the first option to consider for wiring the module with the USB adapter driving the internal DVD. If it is a PCIe3 6-slot fanout module, install FC EC46 in slot Px-C3 of the PCIe3 6-slot fanout module.

- Do not attempt to install x16 adapters in x8 slots. Doing so can damage the x16 connectors in the EMX0 PCIe3 expansion drawer.

Feature code	Description	EMX0 PCIe3 expansion drawer			
		Slot priorities ¹	Maximum number of adapters supported ²		
			AIX®	Linux	IBM i
2893 or 2894	PCIe 2-line WAN with modem (FC 2893, 2894, EN13, EN14; CCIN 576C); Part number: 44V5323	P1-C6, P2-C6	0	1	1
5729	PCIe2 FH 4-port 8 Gb Fibre Channel adapter (FC 5729; CCIN 5729); Adapter part number: 74Y3467	P1-C1, P2-C1, P1-C4, P2-C4, P1-C2, P2-C2, P1-C3, P2-C3, P1-C5, P2-C5, P1-C6, P2-C6	6	6	0
5735	8 Gb PCI Express dual-port Fibre Channel adapter (FC 5273, 5735, EL2N, and EL58); CCIN 577D); Adapter part number: 10N9824	P1-C1, P2-C1, P1-C4, P2-C4, P1-C2, P2-C2, P1-C3, P2-C3, P1-C5, P2-C5, P1-C6, P2-C6	6 (EL58 - 0)	6	6 (EL58 - 0)
5785	4-port Async EIA-232 PCIe 1X adapter (FC 5277 and 5785; CCIN 57D2); Adapter part number: 46K6734	P1-C6, P2-C6	1	1	1

Table 11. Adapter slot priorities and maximum adapters supported in the EMX0 PCIe3 expansion drawer (continued)

Feature code	Description	EMX0 PCIe3 expansion drawer			
		Slot priorities ¹	Maximum number of adapters supported ²		
			AIX [®]	Linux	IBM i
5899	PCIe2 4-port 1 GbE adapter (FC 5260, 5899, EL4L, and EL4M; CCIN 576F); Adapter part number: 74Y4064	P1-C2, P2-C2, P1-C3, P2-C3, P1-C5, P2-C5, P1-C6, P2-C6, P1-C1, P2-C1, P1-C4, P2-C4	6	6	6
EC2N	PCIe3 2-port 10 GbE NIC & RoCE SR adapter (FC EC2M, EC2N, and EL54; CCIN 57BE); Adapter part number: full-height tailstock: 00RX875, low-profile tailstock: 00RX872	P1-C1, P2-C1, P1-C4, P2-C4, P1-C2, P2-C2, P1-C3, P2-C3, P1-C5, P2-C5, P1-C6, P2-C6	6 (EL54 - 0)	6	0
EC2S	PCIe3 2-port 10 Gb NIC & RoCE SR/Cu adapter (FC EC2R and EC2S; CCIN 58FA); Adapter part number: 01FT759	P1-C2, P2-C2, P1-C5, P2-C5, P1-C3, P2-C3, P1-C6, P2-C6, P1-C1, P2-C1, P1-C4, P2-C4	2 or 6 ³	2 or 6 ³	2 or 6 ³
EC2U	PCIe3 2-port 25/10 Gb NIC & RoCE SFP28 adapter (FC EC2T and EC2U; CCIN 58FB); Adapter part number: 01FT753	P1-C2, P2-C2, P1-C5, P2-C5, P1-C3, P2-C3, P1-C6, P2-C6, P1-C1, P2-C1, P1-C4, P2-C4	2 or 6 ³	2 or 6 ³	2 or 6 ³
EC38	PCIe3 LP 2-port 10 GbE NIC & RoCE SFP+ Copper adapter (FC EC37, EC38, EL3X, and EL53; CCIN 57BC); Adapter part number: 00RX859	P1-C1, P2-C1, P1-C4, P2-C4, P1-C2, P2-C2, P1-C3, P2-C3, P1-C5, P2-C5, P1-C6, P2-C6	6 (EL53 - 0)	6	0
EC3B	PCIe3 2-Port 40 GbE NIC RoCE QSFP+ Adapter	P1-C1, P1-C4, P2-C4, P1-C2, P2-C2, P1-C5, P2-C5	4	4	0
EC46	PCIe2 4-Port USB 3.0 Adapter	P1-C2, P2-C2, P1-C5, P2-C5, P1-C3, P2-C3, P1-C6, P2-C6, P1-C1, P2-C1, P1-C4, P2-C4	6	6	6
EC6K	PCIe2 LP 2-Port USB 3.0 Adapter	P1-C2, P2-C2, P1-C5, P2-C5, P1-C3, P2-C3, P1-C6, P2-C6, P1-C1, P2-C1, P1-C4, P2-C4	6	6	6
EJ0J	PCIe3 SAS RAID quad-port 6 Gb adapter (FC EJ0J and EL59); CCIN 57B4); Adapter part number: 00FX846	P1-C1, P2-C1, P1-C4, P2-C4, P1-C3, P2-C3, P1-C6, P2-C6	4	4	4

Table 11. Adapter slot priorities and maximum adapters supported in the EMX0 PCIe3 expansion drawer (continued)

Feature code	Description	EMX0 PCIe3 expansion drawer			
		Slot priorities ¹	Maximum number of adapters supported ²		
			AIX®	Linux	IBM i
EJ0L	PCIe3 12 GB Cache RAID SAS quad-port 6 Gb adapter (FC EJ0L; CCIN 57CE); Adapter part number: 00FX840	P1-C1, P2-C1, P1-C4, P2-C4, P1-C3, P2-C3, P1-C6, P2-C6	4	4	4
EJ10	PCIe3 4 x8 SAS Port adapter (FC EL60, EL65, EJ10, and EJ11; CCIN 57B4); Adapter part number: 00MH959	P1-C1, P2-C1, P1-C4, P2-C4, P1-C3, P2-C3, P1-C6, P2-C6	4	4	4
EJ14	PCIe3 12 GB Cache RAID PLUS SAS adapter quad-port 6 Gb x8 (FC EJ14; CCIN 57B1); Adapter part number 01DH742	P1-C1, P2-C1, P1-C4, P2-C4, P1-C3, P2-C3, P1-C6, P2-C6	4	4	4
EJ1P	PCIe1 SAS Tape/DVD dual-port 3 Gb x8 adapter (FC EJ1N and EJ1P; CCIN 57B3); Adapter part number: 44V4852	P1-C2, P2-C2, P1-C5, P2-C5, P1-C3, P2-C3, P1-C6 P2-C6, P1-C1, P2-C1, P1-C4, P2-C4	6	6	6
EJ28	PCIe Crypto- graphic Coprocessor (FC EJ27 and EJ28; CCIN 476A); Adapter part number: 45D7948	P1-C2, P2-C2, P1-C3, P2-C3, P1-C5, P2-C5, P1-C6, P2-C6, P1-C1, P2-C1, P1-C4, P2-C4	6	0	6
EJ33	4767-001 Crypto- graphic Coprocessor (FC EJ32 and EJ33; CCIN 4767); Adapter part number: 00LV501	P1-C2, P2-C2, P1-C5, P2-C5, P1-C3, P2-C3, P1-C6 P2-C6, P1-C1, P2-C1, P1-C4, P2-C4	6	6	6
EJ37	4769-001 Cryptographic Coprocessor (FC EJ35 and EJ37 for BSC; CCIN C0AF); Adapter part number: 02JD572	P1-C2, P2-C2, P1-C5, P2-C5, P1-C3, P2-C3, P1-C6 P2-C6, P1-C1, P2-C1, P1-C4, P2-C4	6	0	6
EL4L	PCIe2 4-port 1 GbE adapter (FC 5260, 5899, EL4L, and EL4M; CCIN 576F); Adapter part number: 74Y4064	P1-C2, P2-C2, P1-C3, P2-C3, P1-C5, P2-C5, P1-C6, P2-C6, P1-C1, P2-C1, P1-C4, P2-C4	0	6	0
EL54	PCIe3 2-port 10 GbE NIC & RoCE SR adapter (FC EC2M, EC2N, and EL54; CCIN 57BE); Adapter part number: full-height tailstock: 00RX875, low-profile tailstock: 00RX872	P1-C1, P2-C1, P1-C4, P2-C4, P1-C2, P2-C2, P1-C3, P2-C3, P1-C5, P2-C5, P1-C6, P2-C6	0	6	0

Table 11. Adapter slot priorities and maximum adapters supported in the EMX0 PCIe3 expansion drawer (continued)

Feature code	Description	EMX0 PCIe3 expansion drawer			
		Slot priorities ¹	Maximum number of adapters supported ²		
			AIX [®]	Linux	IBM i
EL59	PCIe3 SAS RAID quad-port 6 Gb adapter (FC EJ0J and EL59; CCIN 57B4); Adapter part number: 000E9284	P1-C1, P2-C1, P1-C4, P2-C4, P1-C3, P2-C3, P1-C6, P2-C6	0	4	0
EL5B	PCIe3 16 Gb 2-port Fibre Channel adapter (FC EL5B and EN0A; CCIN 577F); Adapter part number: 00E3496	P1-C1, P2-C1, P1-C4, P2-C4, P1-C2, P2-C2, P1-C3, P2-C3, P1-C5, P2-C5, P1-C6, P2-C6	6 (EL5B - 0)	6	6 (EL5B - 0)
EN0A	PCIe3 16 Gb 2-port Fibre Channel adapter (FC EL43, EL5B, EN0A, and EN0B; CCIN 577F); Adapter part number: 00E3496	P1-C1, P2-C1, P1-C4, P2-C4, P1-C2, P2-C2, P1-C3, P2-C3, P1-C5, P2-C5, P1-C6, P2-C6	6	6	6
ENOG	PCIe2 8 Gb 2-port Fibre Channel adapter	P1-C2, P2-C2, P1-C5, P2-C5, P1-C3, P2-C3, P1-C6 P2-C6, P1-C1, P2-C1, P1-C4, P2-C4	6 (EL5Z - 0)	6	6 (EL5Z - 0)
ENOH	PCIe3 4-port (10 Gb FCoE and 1 GbE) (FC EL38, FC EL56, FC ENOH, and FC ENOJ; CCIN 2B93); Adapter part number: 00E3498	P1-C1, P2-C1, P1-C4, P2-C4, P1-C2, P2-C2, P1-C3, P2-C3, P1-C5, P2-C5, P1-C6, P2-C6	6 (EL56 - 0)	6	0
ENOK	PCIe3 4-port (10 Gb FCoE and 1 GbE) copper and RJ45 adapter (FC EL3C, EL57, ENOK, and ENOL; CCIN 2CC1); Adapter part number: 00E8140 (FC ENOK) and 00E3502 (FC ENOL)	P1-C1, P2-C1, P1-C4, P2-C4, P1-C2, P2-C2, P1-C3, P2-C3, P1-C5, P2-C5, P1-C6, P2-C6	6 (EL57 - 0)	6	0
ENOM	PCIe3 4-port (10 Gb FCoE and 1 GbE) LR and RJ45 adapter (FC ENOM and FC ENON)	P1-C1, P2-C1, P1-C4, P2-C4, P1-C2, P2-C2, P1-C3, P2-C3, P1-C5, P2-C5, P1-C6, P2-C6	6	6	0
ENOS	PCIe2 4-port (10 Gb + 1 GbE) SR+RJ45 adapter (FC ENOS, FC ENOT, FC ENOU, and FC ENOV; CCIN 2CC3); Adapter part number: 00E2715	P1-C1, P2-C1, P1-C4, P2-C4, P1-C2, P2-C2, P1-C3, P2-C3, P1-C5, P2-C5, P1-C6, P2-C6	6	6	0s

Table 11. Adapter slot priorities and maximum adapters supported in the EMX0 PCIe3 expansion drawer (continued)

Feature code	Description	EMX0 PCIe3 expansion drawer			
		Slot priorities ¹	Maximum number of adapters supported ²		
			AIX [®]	Linux	IBM i
EN0U	PCIe2 4-port (10 Gb + 1 GbE) Copper SFP+RJ45 adapter (FC EN0U; CCIN 2CC3); Adapter part number: 00E2715; low-profile tailstock: 00E2720	P1-C1, P2-C1, P1-C4, P2-C4, P1-C2, P2-C2, P1-C3, P2-C3, P1-C5, P2-C5, P1-C6, P2-C6	6	6	0
EN0W	PCIe2 2-port 10 GbE BaseT RJ45 Adapter	P1-C1, P2-C1, P1-C4, P2-C4, P1-C2, P2-C2, P1-C3, P2-C3, P1-C5, P2-C5, P1-C6, P2-C6	6 (EL55 - 0)	6	0
EN12	PCIe2 FH 4-port 8 Gb Fibre Channel adapter (FC EN12; CCIN EN0Y); Adapter part number 00WT107	P1-C1, P2-C1, P1-C4, P2-C4, P1-C2, P2-C2, P1-C3, P2-C3, P1-C5, P2-C5, P1-C6, P2-C6	6	6	0
EN13	PCIe Binary Synchronous adapter (FC EN13 and EN14; CCIN 576C)	P1-C6, P2-C6	0	0	1
EN15	PCIe3 4-port 10 GbE SR adapter (FC EN15 and EN16; CCIN 2CE3); Adapter part number: 00ND466	P1-C1, P2-C1, P1-C4, P2-C4, P1-C2, P2-C2, P1-C3, P2-C3, P1-C5, P2-C5, P1-C6, P2-C6	6	6	6
EN17	PCIe3 4-port 10 GbE SFP+ copper adapter (FC EN17 and EN18, CCIN 2CE4); Adapter part number: 00ND463	P1-C1, P2-C1, P1-C4, P2-C4, P1-C2, P2-C2, P1-C3, P2-C3, P1-C5, P2-C5, P1-C6, P2-C6	6	6	6
EN1A	PCIe3 x8 2-port Fibre Channel (32 Gb/s)	P1-C2, P2-C2, P1-C5, P2-C5, P1-C3, P2-C3, P1-C6, P2-C6, P1-C1, P2-C1, P1-C4, P2-C4	6 (EL5U - 0)	6	6 (EL5U-0)
EN1C	PCIe3 x8 4-port Fibre Channel (16 Gb/s); (FC EL5W, EL5X, EN1C, and EN1D; CCIN 578E); Adapter part number: 01FT698	P1-C2, P2-C2, P1-C5, P2-C5, P1-C3, P2-C3, P1-C6, P2-C6, P1-C1, P2-C1, P1-C4, P2-C4	6 (EL5W - 0)	6	6 (EL5W - 0)
EN1E	PCIe3 x8 4-port Fibre Channel (16 Gb/s); (FC EN1E and EN1F; CCIN 579A); Adapter part number: 02JD586	P1-C2, P2-C2, P1-C5, P2-C5, P1-C3, P2-C3, P1-C6, P2-C6, P1-C1, P2-C1, P1-C4, P2-C4	6	6	6

Table 11. Adapter slot priorities and maximum adapters supported in the EMX0 PCIe3 expansion drawer (continued)

Feature code	Description	EMX0 PCIe3 expansion drawer			
		Slot priorities ¹	Maximum number of adapters supported ²		
			AIX [®]	Linux	IBM i
EN1G	PCIe3 x8 2-port Fibre Channel (16 Gb/s) (EN1G and EN1H; CCIN 579B); Adapter part number: 02CM900 and 02CM903	P1-C1, P2-C1, P1-C4, P2-C4, P1-C2, P2-C2, P1-C3, P2-C3, P1-C5, P2-C5, P1-C6, P2-C6	6	6	6
EN1J	PCIe4 x8 2-port Fibre Channel (32 Gb/s); (FC EN1J and EN1K; CCIN 579C); Adapter part number: 02CM909	P1-C2, P2-C2, P1-C5, P2-C5, P1-C3, P2-C3, P1-C6, P2-C6, P1-C1, P2-C1, P1-C4, P2-C4	6	6	6
EN2A	PCIe3 16 Gb 2-port Fibre Channel adapter (FC EN2A and FC EN2B; CCIN 579D); Adapter part number: 02JD564	P1-C1, P2-C1, P1-C4, P2-C4, P1-C2, P2-C2, P1-C3, P2-C3, P1-C5, P2-C5, P1-C6, P2-C6	6	6	6

¹The slot priority sequence is based on a EMX0 PCIe3 expansion drawer configured with two PCIe3 6-slot fanout modules.

²The maximum number of adapters supported per PCIe3 6-slot fanout module.

³If you have a CCIN 50CB PCIe3 6-slot fanout module, the FC EC2S and FC EC2U adapters are only supported in slots C2 and C5. If you have a CCIN 50CD PCIe3 6-slot fanout module, the FC EC2S and FC EC2U adapters are supported in slots C1 through C6, but only four FC EC2S and FC EC2U adapters can be in SR-IOV mode at a time.

Related procedures for adapter placement

Find procedures that are related to adapter placement rules and slot priorities.

Finding the current system configuration in IBM i

You can use the System Service Tools in the IBM i operating system to find the current system configuration.

Before you begin

Before you begin, you must know the location codes of the PCI adapter slots in the system with which you are working.

About this task

To find the current system configuration, start an IBM i session and sign on. If you have more than one system, start a session on the system that is being upgraded and for which you have service tools authority.

To find the current system configuration, complete the following steps:

Procedure

1. Type **strsst** on the command line of the Main Menu and then press **Enter**.
2. Type your service tools user ID and service tools password on the **Start Service Tools (STRSST) Sign On** display and then press **Enter**.
3. Select **Start a service tool** from the **System Service Tools (SST)** display and then press **Enter**.
4. Select **Hardware service manager** from the **Start a Service Tool** display and then press **Enter**.
5. Select **Packaging hardware resources (system, frames, cards)** from the **Hardware Service Manager** display and then press **Enter**.
6. Type **9** on the **System Unit** line and then press **Enter**.
7. Select **Include empty positions**.
8. Look for the PCI adapter location codes in the **Location** column.
9. Write down the Type-Model number for each PCI adapter location.
Some adapters can show multiple, virtual ports. It is not necessary to write down these virtual locations.
10. Write down any PCI adapter locations that are listed in the **Description** column as an Empty Position.
The Type-Model number is blank for empty positions.
11. Press **F12** to return to the previous window.
12. Do you have an expansion unit attached?
 - **No:** Go to “Adapter placement rules and slot priorities for the 5105-22E, 9008-22L, 9009-22A, 9009-22G, 9223-22H, or 9223-22S” on page 6
 - **Yes:** Do the following tasks:
 - a. Type **9** for the **System Expansion Unit** field and press Enter.
 - b. Repeat steps 7-11 for each expansion unit.
 - c. Select an available slot in the expansion unit.

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

Overview

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- 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.

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Keyboard navigation

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Interface information

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

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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

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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

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- 回路分類：5（3相、PFC回路付）
- 換算係数：0

Japan Voluntary Control Council for Interference (VCCI) Notice

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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

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