IBM 4769 PCIe Cryptographic Coprocessor Installation Manual

Note: Before using this information and the product it supports, read the information in “Safety and environmental notices” on page 8 and “Notices” on page 21. Also read *IBM Systems Environmental Notices and User Guide,* Z125-5823, and *IBM Systems Safety Notices*, G229-9054. Both of the documents are available at the IBM Knowledge Center.

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This edition describes installation of the IBM 4769-001 PCIe Cryptographic Coprocessor. This and other publications related to the IBM 4769-001 PCIe Cryptographic Coprocessor can be obtained in PDF format from https://www.ibm.com/security/cryptocards.

Readers' comments can be communicated to IBM by using the product support link on the product website at: https://www.ibm.com/security/cryptocards.

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Contents

Figures

Tables

About this document

This manual is written for personnel installing the IBM 4769-001 PCIe Cryptographic Coprocessor hardware. The coprocessor is a hardware security module (HSM).

How this manual is organized

This manual is organized as follows:

- “Safety and environmental notices”, on page 8, describes important general safety and environmental information.
- “Introduction”, on page 11, describes the contents of the coprocessor packages; shipping, handling, and storage considerations; and requirements and specifications of the IBM 4769-001 PCIe Cryptographic Coprocessor.
- “Installing the coprocessor”, on page 14, describes the procedure to physically install the IBM 4769.
- “Replacing coprocessor batteries”, on page 15, describes the way to replace the batteries on the IBM 4769.
- “Transporting a coprocessor”, on page 19, provides guidance for shipping or traveling with the IBM 4769.
- “Notices”, on page 21, contains notices for various countries, trademark information, and information about the product warranty extended by IBM.
- A glossary and an index complete the manual.

Where to find more information

Visit the IBM product website’s 4769 Library page to obtain IBM 4769 publications. This and other publications are available as Adobe PDF files that you can read and print with the Adobe Acrobat Reader.

Before installing a coprocessor, check the x64 servers page on the IBM CryptoCards website.

Safety and environmental notices

Pay close attention to these safety and environmental notices, to ensure safe handling and disposal of the IBM 4769-001 PCIe Cryptographic Coprocessor and its batteries.

Safety notices

For safety information in your national language, refer to the *IBM Systems Safety Notices*, G229-9054, available from the IBM Knowledge Center and also included in the publications package shipped with the product. Safety notices may be printed throughout this guide. DANGER notices warn you of conditions or procedures that can result in death or severe personal injury. CAUTION notices warn you of conditions or procedures that can cause personal injury that is neither lethal nor extremely hazardous. Attention notices warn you of conditions or procedures that can cause damage to machines, equipment, or programs.

The following DANGER notices appear in this manual:

Danger Notice D005

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 a 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.
- 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.
- 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.
- 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 continue with the inspection if any unsafe conditions are present.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- 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. Remove the power cords from the outlets.
3. Remove the signal cables from the connectors.
4. 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. Attach the power cords to the outlets.
5. 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)

The following CAUTION notices appear in this manual:

Caution Notice C049

CAUTION: The battery used in this device contains Lithium, which might present a risk of fire or chemical burn if mistreated. Do not disassemble, heat above 100 degrees Celsius, burn, incinerate, or crush. Dispose or recycle promptly and properly as instructed by local regulations. Replace battery with an equivalent type or module recommended by the manufacturer only. Use of another battery might present a risk of fire or explosion. (C049)

Exchange only with Renata CR2477N Coin cell batteries, other brands will not work with the battery connector. Recycle or discard the battery as instructed by local regulations.

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.

Environmental notices

For environmental information in your national language, refer to the *IBM Systems Environmental Notices and User Guide*, Z125-5823, available from the IBM Knowledge Center.

Introduction

This section details the contents of the IBM 4769-001 PCIe Cryptographic Coprocessor package, special considerations for handling and storage, and coprocessor requirements and specifications.

The coprocessor uses dedicated hardware to process cryptographic keys, certificates, and bulk data. These cryptographic functions are performed within a tamper-resistant module that is validated to the Federal Information Processing Standard (FIPS) PUB 140-2 Level 4, as established by the National Institute of Standards and Technology. This is a standard of detecting and responding to unauthorized attempts at physical access and security compromise due to environmental conditions such as voltage and temperature.

Before installing a coprocessor, check the IBM product website for the list of x86 servers. Refer to “Where to find more information” on page 7. You can install the coprocessor, a half-height, half-length PCIe adapter card, only in a compatible x64 server. Refer to “Where to find more information” on page 7.

Contents of the coprocessor package

Your IBM 4769-001 PCIe Cryptographic Coprocessor package includes the following items:

- The IBM 4769-001 PCIe Cryptographic Coprocessor
- IBM License Agreement for Machine Code (Contains Form Z125-5468-06), SC28-6872-03 (multi-language)
- IBM License Agreement for Machine Code Addendum for Cryptography (Contains Form Z125-8449-01), GC27-2635-00 (multi-language)
- IBM Systems Safety Notices, G299-9054-08
- IBM 4769 PCIe Cryptographic Coprocessor Statement of Limited Warranty - Warranty Information flyer, SC23-6884-01
- Notice to Users of the IBM 4769-001 PCIe Cryptographic Coprocessor, PN01EL550.

If any item is missing or damaged, contact your local IBM representative.

Special consideration for handling and storage

Each coprocessor is shipped from the factory with a certified device key. This electronic key, which is stored in the card's battery-backed protected memory, digitally signs test messages to confirm that the coprocessor is genuine and that no tampering has occurred.

Note: If any of the secure module’s tamper sensors is triggered by tampering or accident, the coprocessor erases (zeroizes) all data in the protected memory, destroying the device key. This renders the coprocessor permanently inoperable, and there is no recovery from this situation.

The coprocessor cannot operate without the device key. To protect the key, follow these temperature and battery guidelines:

Storage

It is recommended that an uninstalled coprocessor be kept in its original protective packaging material. Save this packaging material for future use, especially if the coprocessor must be transported to another location.

Temperature
Do not expose the coprocessor to temperatures outside the limits in “Environmental specifications” on page 12.

Batteries
Do not remove battery power from the coprocessor. Data in the protected memory is lost (zeroized) when battery power is removed, rendering the coprocessor permanently inoperable. For information about replacing the batteries without erasing the protected memory, see “Replacing coprocessor batteries” on page 7.

Requirements and specifications
The requirements and specification for the coprocessor consist of the necessary hardware and software, environmental requirements, and physical characteristics.

Hardware requirement
The coprocessor must be installed in an x86 server from the list of x86 servers. See notes below. No additional hardware or cabling is required.

Note: The full speed USB 2.0 Micro connector is for development use only. It is not intended for customer use.

Software requirement
The coprocessor requires support software, for example, the IBM 4769 CCA Support Program, for both the host machine and for its internal firmware. Operating system support is determined by the support software. This publication does not discuss the installation of support software. For information about the latest software features available, visit the IBM product website.

Power requirements
The power requirements for the IBM 4769-001 PCIe Cryptographic Coprocessor are:

- +12-volt PCIe domain: 20.13 watts maximum
- +3.3-volt PCIe domain: 3.31 watts maximum (including USB external load)
- On-board batteries: batteries dead less than 2.0 volts; low-battery warning less than 2.75 volts

Environmental specifications
The environmental specifications for the IBM 4769-001 PCIe Cryptographic Coprocessor are shown in Table 1.

Table 1 Operating, storage, and shipping environmental specifications

	Operating environment	**Storage environment**	**Shipping environment**
Temperature	+5°C to +40°C (+41°F to +104°F)	+1°C to +60°C (+33.8°F to +140°F)	-34°C to +60°C (-29.2°F to +140°F)
Relative humidity	8 to 85%	5 to 80%	5 to 100%
Wet bulb	< +24.0°C (+75°F)	< +29.0°C (+84.2°F)	< +29.0°C (+84.2°F)
Pressure (minimum)	550 mbar (maximum altitude 16 400 ft)	550 mbar (maximum altitude 16 400 ft)	550 mbar (maximum altitude 16 400 ft)

Airflow (minimum)	300 LFM (air velocity over the secure module)	N/A	N/A

Physical dimensions

- The coprocessor is a half-height, half-length PCIe adapter card
- 2.535 inches by 6.6 inches (64.4 mm by 167.65 mm).

Installing the coprocessor

This section describes installing the IBM 4769-001 PCIe Cryptographic Coprocessor.

About this task

Note that on a Microsoft Windows operating system, it is necessary to install the CCA support software before installing a coprocessor. Other supported operating systems do not require this, but it is recommended.

To install the coprocessor into the host computer, follow these steps:

Procedure

1. Locate your computer's instructions for installing expansion cards.
   Throughout this procedure, follow the safety instructions in that manual.
2. Turn OFF the computer and all attached devices.
3. Disconnect all cables, including the power cable. Refer to "Danger Notice D005" on page 8.
4. Choose a PCIe expansion slot able to accommodate a standard short-type adapter card.
5. If the expansion slot has an individual cover, remove any bracket-holding screw and the cover.
   Attention: Electrostatic discharge (ESD) can damage the card and its components. Wear an ESD wrist-strap while handling and installing the card, or take the following precautions:
   - Limit your movements; this helps prevent static electricity from building up around you.
   - Prevent others from touching the card or other components.
   - Before removing the card from the electrostatic discharge (ESD) barrier bag, touch the bag to an unpainted metal surface on your computer and hold it there for at least two seconds.
   - Handle the card by its edges only. Do not touch exposed circuitry and components.
6. Remove the cryptographic coprocessor from its ESD barrier bag. Do not discard the bag. It can be used again whenever the coprocessor is removed from the server.
7. Insert the coprocessor into the slot; be sure that the card is fully seated.
8. If possible, install a bracket-holding screw. Some server models have a row of screws available inside the machine for this purpose.
9. Replace the host computer's cover.
10. Reconnect the power cable and any other cables that you disconnected.
11. Turn the computer ON. The cryptographic coprocessor runs it power-on self-test (POST).

What to do next

You have completed the procedure for the physical installation of the PCIe cryptographic coprocessor. Refer to the support software documentation for information about initializing and using the coprocessor.

Replacing coprocessor batteries

This section describes the way to replace the batteries on the IBM 4769-001 coprocessor.

Two lithium coin cell batteries (Renata CR2477N) mounted on the IBM 4769-001 PCIe Cryptographic Coprocessor supply power to the card's components, including protected memory. Your support software or application software can query the coprocessor to determine whether the batteries need to be replaced.

When shipped from the factory, the protected memory contains a certified device key. If your coprocessor has been initialized by support software, the protected memory contains secret data, including a master cryptographic key, user profiles, and user passwords.

The useful life of the batteries mounted in an IBM 4769 that is continuously powered on is nearly the same as the useful shelf life of the batteries. The actual life of the batteries is anticipated to be in excess of seven years. IBM recommends changing the coprocessor batteries as a planned maintenance activity every three years. However, if the coprocessor is left unpowered for long periods of time, battery refresh should be done sooner than three years. Before changing batteries, ensure that the replacement batteries measure 3.0V or higher and have not been in inventory for a long period of time.

Attention: If you remove either of the batteries without first backing up the power with a fresh battery, the data in protected memory can be lost. You must provide backup power using a USB cable connected to the cards USB micro connector. No kit is available from IBM to perform the battery replacement.

CAUTION: The battery used in this device contains Lithium, which might present a risk of fire or chemical burn if mistreated. Do not disassemble, heat above 100 degrees Celsius, burn, incinerate, or crush. Dispose or recycle promptly and properly as instructed by= local regulations. Replace battery with an equivalent type or module recommended by the manufacturer only. Use of another battery might present a risk of fire or explosion. (C049)

Exchange only with Renata CR2477N Coin cell batteries, other brands will not work with the battery connector. Recycle or discard the battery as instructed by local regulations.

For more country specific battery disposal and recycling information link to:

https://www.ibm.com/ibm/recycle/ww/

Before you begin

To perform the battery replacement, you should have in hand the following:

- Two Renata CR2477N Coin cell batteries
- One USB to USB Micro cable and device adequate to provide USB power to this cable.

Procedure

To replace the on-board batteries, follow these steps:

1. Locate and remove the Crypto feature adaptor from the PCIe bus slot following your

systems product removal procedures.

Wear an ESD wrist-strap while handling and installing the card, or take the following precautions:

- Limit your movements; this helps prevent static electricity building up around you.
- Prevent others from touching the card or other components.
- Handle the card by its edges only. Do not touch exposed circuitry and components.

DANGER: Refer to “Danger Notice D005” on page 8 for warnings related to handling of the system.

2. Connect the USB to USB Micro cable to the cards USB Micro connector, make sure the system providing USB power is on. A green LED will turn on the card indicating proper USB power has been applied to the card.

Attention: Any loss of power erases data stored in the card’s protected memory. To prevent loss, ensure that the USB connection is secure while performing the battery replacement operation.

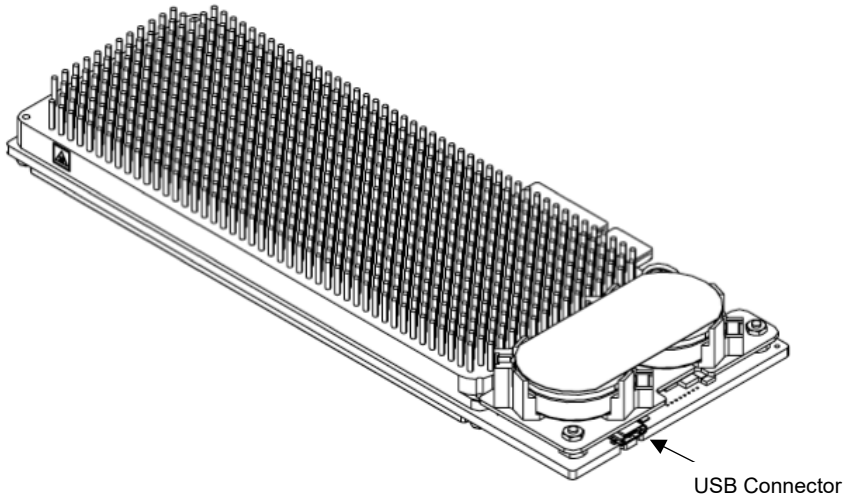

Figure 1 USB connector

3. Remove the battery attention labels from the battery holder on the card. This label should be removed carefully so it can be reapplied after the battery replacement has been performed.

4. Remove the batteries from the battery connectors on top of the card. The following diagram illustrates how the card batteries and label are placed.

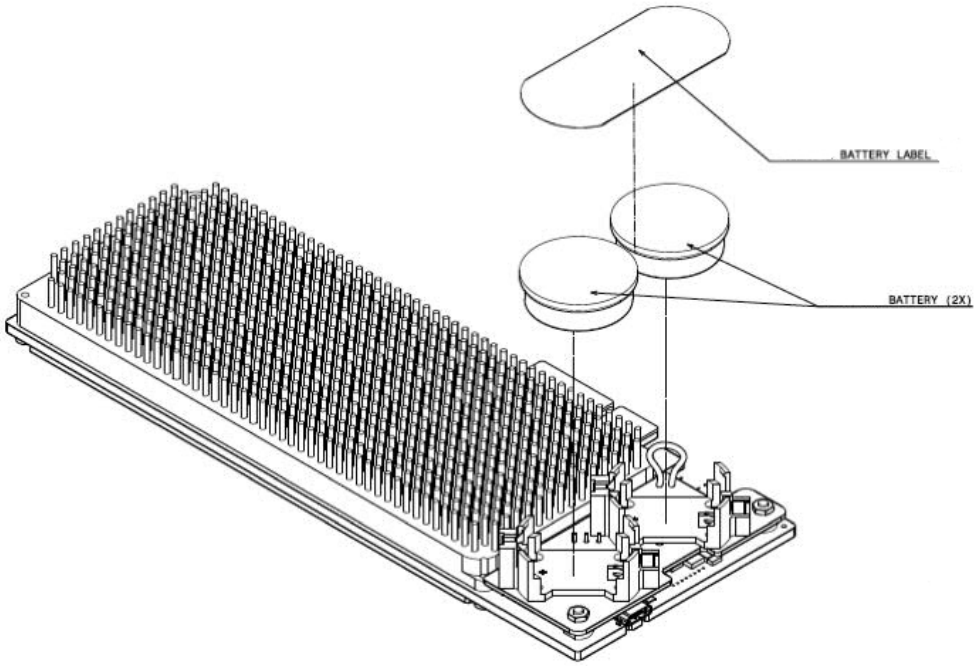

Figure 2 Battery and label placement

5. Replace both batteries with the new batteries inserting one battery at a time to the top socket, aligning the polarities as marked below.

   Attention: Make sure proper orientation of the batteries is performed or this will cause battery power to be lost.

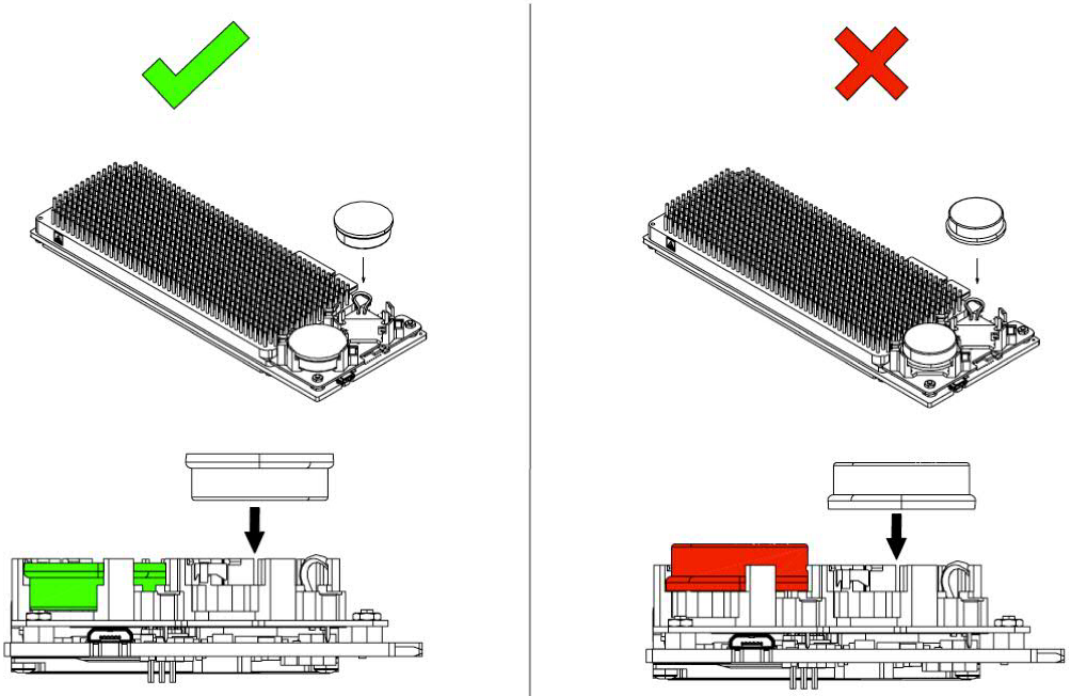

Figure 3 Battery orientation

6. Reapply the battery attention label on top of the coin cell batteries for protection from contact with the battery.
7. Remove the USB to USB Micro cable from the card, the LED at this time should turn off but power would remain active from the new fresh coin cell batteries.
8. Re-insert the coprocessor into the PCIe bus slot following your systems feature installation procedures; be sure the card is fully seated.
9. Turn your system ON. The PCIe Cryptographic coprocessor runs its power-on self-test (POST).
10. The batteries are lithium coin cell batteries. Recycle or dispose of the old batteries as required by local law.

You have completed the procedure for replacing the PCIe cryptographic coprocessor batteries.

Transporting a coprocessor

This section provides guidelines to follow when it becomes necessary to travel with or ship an IBM 4769-001 PCIe Cryptographic Coprocessor. This chapter addresses protecting the coprocessor from physical damage. It also touches on some export and import considerations. This chapter does not attempt to address issues with data security.

About this task

The guidelines provided below are meant to assist you in properly transporting your coprocessor. Following these guidelines does not guarantee that your coprocessor or the data that it contains will arrive unharmed. You are ultimately responsible for taking whatever measures are necessary to adequately protect your coprocessor and its data. At a minimum, the coprocessor must be maintained within the environmental specifications shown in Table 1 on page 12.

Note: There is no X-ray tamper sensor on the coprocessor.

Handling the coprocessor

Electrostatic discharge (ESD) can damage the coprocessor and its components. Wear an ESD wrist-strap while handling the coprocessor, or take the following precautions:

Procedure

- Limit your movements; this helps prevent static electricity from building up around you.
- Prevent others from touching the card or other components.
- Before removing the coprocessor from the ESD barrier bag, touch the bag to an unpainted metal surface on your computer and hold it there for at least two seconds.
- Handle the coprocessor by its edges only. Do not touch exposed circuitry and components.

Traveling with a coprocessor

Whenever traveling with a coprocessor, keep it in the ESD barrier bag that the coprocessor was shipped in, or a bag with similar properties. Ensure that the bag has not been damaged and is in good condition.

Procedure

- Use enough cushioning and packing materials as deemed necessary to protect the coprocessor. Consider these forces, expected or otherwise:
  - Vibration
  - A hard knock or blow
  - A crushing load
  - Bending or flexing
  - A piercing object
- If the coprocessor could be subject to extreme hot or cold temperatures, such as when it is in the cargo hold of an airplane or left in a parked vehicle, it is recommended that it be packed as if you were shipping a coprocessor. See “Shipping a coprocessor” on page 20.

Traveling internationally with a coprocessor

International transport of a cryptographic coprocessor requires special consideration of applicable export laws, regulations, and controls. For example, the export of a cryptographic coprocessor to certain countries might be restricted. When hand carrying a coprocessor, consider taking with you proof-of-purchase documents to protect against duty assessment. When shipping a coprocessor, there might be a Customs declaration form that must be completed. Any existing company policies should be considered as well.

Shipping a coprocessor

When shipping a coprocessor, it is recommended that it be packed and shipped using the original package materials. These materials include a cardboard box, pieces of foam, bags of isothermal gel, a bag containing a desiccant, and an electrostatic discharge barrier bag. Before using the bags of isothermal gel, keep them at room temperature for a reasonable amount of time.

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

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

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Tel: +49 (0) 800 225 5426
email: HalloIBM@de.ibm.com

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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

Electromagnetic Compatibility (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 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: +49 800 225 5426
e-mail: 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

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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

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 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, NY 10504
Contact for FCC compliance information only: fccinfo@us.ibm.com

Glossary

This glossary includes some terms and definitions from the *IBM Dictionary of Computing*, New York: McGraw Hill, 1994. This glossary also includes some terms and definitions from:

- The *American National Standard Dictionary for Information Systems*, ANSIX3.172-1990, copyright 1990 by the American National Standards Institute (ANSI). Copies may be purchased from the American National Standards Institute, 11 West 42 Street, New York, New York 10036. Definitions are identified by the symbol (A) following the definition.
- The *Information Technology Vocabulary*, developed by Subcommittee 1, Joint Technical Committee 1, of the International Organization for Standardization and the International Electrotechnical Commission (ISO/IEC JTC1/SC1). Definitions of published parts of this vocabulary are identified by the symbol(I) following the definition; definitions taken from draft international standards, committee drafts, and working papers being developed by ISO/IEC JTC1/SC1 are identified by the symbol (T) after the definition, indicating that final agreement has not yet been reached among the participating National Bodies of SC1.

A

American National Standards Institute (ANSI)

An organization consisting of producers, consumers, and general interest groups that establishes the procedures by which accredited organizations create and maintain voluntary industry standards in the United States. (A)

B

bus In a processor, a physical facility along which data is transferred.

C

card

An electronic circuit board that is plugged into a slot in a system unit. A plug-in circuit assembly.

coprocessor

A supplementary processor that performs operations in conjunction with another processor. A microprocessor on an expansion card that extends the address range of the processor in the host system or adds specialized instructions to handle a particular category of operations; for example, an I/O coprocessor, math coprocessor, or networking coprocessor.

cryptography

The transformation of data to conceal its meaning. In computer security, the principles, means and methods used to so transform data.

E

EEPROM

See electrically erasable programmable read-only memory.

electrostatic discharge (ESD)

An undesirable discharge of static electricity that can damage equipment and degrade electrical circuitry.

electrically erasable programmable read-only memory (EEPROM)

A type of memory chip that can retain its contents without consistent electrical power. Unlike the PROM, which can be programmed only once, the EEPROM can be erased electrically. Because it can only be reprogrammed a limited number of times before it wears out, it is appropriate for storing small amounts of data that are changed infrequently.

expansion card

A circuit board that a user can install in an expansion slot to add memory or special features to a computer. Synonym for card.

expansion slot

One of several receptacles available inside a computer, into which a user can install an expansion card.

F

feature

Part of an IBM product able to be ordered separately.

Federal Communications Commission (FCC)

A board of commissioners, appointed by the President under the Communications Act of 1934, having the power to regulate all interstate and foreign communications in the United States that are transmitted by wire or radio.

Federal Information Processing Standard (FIPS)

A standard published by the US National Institute of Science and Technology.

FIPS See Federal Information Processing Standard.

I

interface

A shared boundary between two functional units, defined by functional characteristics, signal characteristics, or other characteristics, as appropriate. The concept includes the specification of the connection of two devices having different functions. (T) Hardware, software, or both, that links systems, programs, and devices.

International Organization for Standardization (ISO)

An organization of national standards bodies established to promote the development of standards to facilitate the international exchange of goods and services, and to develop cooperation in intellectual, scientific, technological, and economic activity.

J

jumper

A wire that joins two unconnected circuits.

K

key

In computer security, a sequence of symbols used with an algorithm to encipher or decipher data.

P

power-on self-test (POST)

A series of diagnostic tests that are run automatically by a device when the power is turned on.

S

security

For computers, the protection of data, system operations, and devices from accidental or intentional ruin, damage, or exposure.

Numerics

4769

IBM 4769-001 PCIe Cryptographic Coprocessor.