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USER'S REFERENCE

ADAPTEC FIBRE CARD 9110G

1 GIGABIT FIBRE CHANNEL HOST BUS ADAPTER

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Adaptec Fibre Card 9110G

User's Reference

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Overview

The Adaptec Fibre Card 9110G is a reliable, high-performance serial I/O storage interface for servers. The serial nature of Fibre Channel brings the flexibility and ease of Local Area Network (LAN) connectivity to storage attachment, introducing the idea of Storage Area Networks (SAN). Fibre Channel simplifies the physical configuration issues related to the I/O channel. Peripherals may be positioned at considerable distances from the server (depending on cabling media) for convenience or for data security. More reliable in data transfer than conventional LAN, Fibre Channel offers Gigabit performance and greater device connectivity than parallel SCSI. The Adaptec Fibre Card 9110G provides the I/O channel scalability required for continuous growth in storage capacity and availability needs.

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The Adaptec Fibre Card 9110G is a PCI to Fibre Channel controller card that provides a one Gigabit serial interface between a server and a Fibre Channel storage system. The cabling between the storage system and the interface card can be either fiber optic or copper.

Features

The Adaptec Fibre Card 9110G features an internal and external connector interface. The external interface requires the installation of a Gigabit Interface Converter (GBIC) module before connecting the Fibre Channel cables. The GBIC is connected to a GBIC receptacle on the adapter. See *GBIC Overview* on page 6.

The internal connector interface uses the High Speed Serial Data Connector (HSSDC). For a list of these cable assemblies, see *Fibre Channel Cable Assemblies and GBIC* on page 22.

The internal HSSDC interface can be used to attach Fibre Channel storage devices inside the server. The external and internal connector interfaces can be used simultaneously or individually. When both interfaces are used, the two segments are part of one Fibre Channel Arbitrated Loop.

The Adaptec Fibre Card 9110G supports Point to Point, Arbitrated Loop, and Fabric topologies, Class 3 services, and hardware assists for the SCSI FCP protocol. The SCSI FCP protocol allows the use of the standard Windows NT SCSI miniport interface. If configured as an Arbitrated Loop, you can use both internal and external connectors simultaneously. With a Point to Point connection, only one of the two connectors can be used. For more information on Point to Point and N_port connections to Fabric, see *N_port support:* on page 16.

The Adaptec Fibre Card 9110G installs into a standard PCI (Peripheral Component Interconnect) slot. This adapter supports a high-performance 64-bit and 66 MHz PCI bus (backward compatible to 32-bit and 33 MHz). The PCI bus provides a high-speed (up to 528 MBps) path between the system board and the Fibre Channel Adapter. The Adaptec Fibre Card 9110G is a PCI Bus Master device and requires a PCI Bus Mastering slot that conforms to the PCI Local Bus Specifications, version 2.1.

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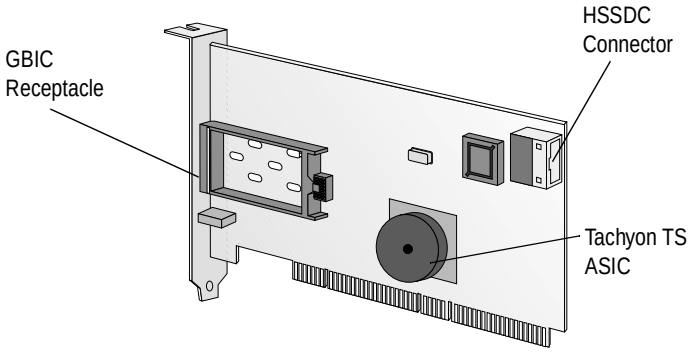


Figure 1. Adaptec Fibre Card 9110G

Contents of Kit

The contents in this kit are:

- One Gigabit Adaptec Fibre Card (AFC-9110G)
- Floppy disk containing the adapter driver(s)
- Cables
  - 10 m optical cable (Optical Kit)
  - 3 m copper cable HSSDC to DB9 (Copper Kit)
  - No cable included in Single Kit
- GBIC
  - Multimode GBIC (Optical Kit)
  - HSSDC (Copper Kit)
  - No GBIC included in Single Kit
- Printed Installation guide

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System Requirements

The minimum system requirements for the Adaptec Fibre Card 9110G are:

For Windows NT Systems

- A Pentium or higher system that is PCI 2.1 compliant
- Windows NT® 4.0 installed with at least service pack 4
- Minimum recommended system memory is 32 MB

For Windows 2000 Systems

- A Pentium or higher system that is PCI 2.1 compliant
- Windows 2000® installed
- Minimum recommended system memory is 64 MB

Cable and GBIC Requirements

A Fibre Channel cable is required. To use the external connector, the cable should match the GBIC module used. The Adaptec Fibre Card 9110G provides an additional internal connector. To use the internal connector, a Fibre Channel copper cable that has a HSSDC on one end and a connector interface for the internal Fibre Channel storage subsystem on the other end is required. For a list of cable assemblies, see *Fibre Channel Cable Assemblies and GBIC* on page 22.

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Installing the Hardware

Before installing the Adaptec Fibre Card 9110G into your server or workstation, make sure that the system is powered down. If your system supports hot plug PCI, see *PCI Hot Plug Support* on page 19.

Installing the Adapter in the PCI Slot

Install the Adaptec Fibre Card 9110G in any bus mastering PCI version 2.1 slot. The following generalized installation steps pertain to most PCI installations. Most system chassis are either vertical or horizontal orientated, therefore, you should install your card depending on the orientation of your system. See Figure 2 on page 6. Consult your server or workstation manual for PCI card installation.

1. Turn OFF power to your system.
2. Discharge any static electricity build-up before handling the Adaptec Fibre Card 9110G by touching a grounded metal object (such as the exposed metal parts on the back of your computer).
3. Remove the cover from your computer.
4. Locate an empty 64-bit PCI expansion slot in your system. If the computer does not have a 64-bit slot, you can install the card in a 32-bit PCI slot.
5. Remove the expansion slot cover. (Save the slot cover screw.)
6. Insert the Adaptec Fibre Card 9110G into the slot until it is firmly and evenly seated in the PCI connector.



WARNING: Be careful when inserting the Adaptec Fibre Card 9110G into a PCI slot. Some older 32-bit slots do not accomodate 64-bit cards, and the card or slot may break if you use force.

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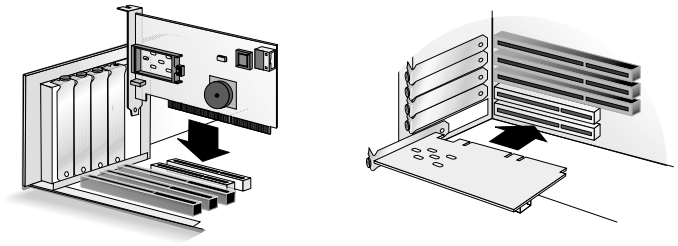


Figure 2. Installing the Adapter

7 Replace the slot cover screw.

GBIC Overview

A GBIC converts internal electrical signals to external electrical or optical signals for transmission across the Fibre Channel media. The Fibre Channel cable inserts into the connector of the GBIC module.

There are several types of GBIC modules currently available that can be used in the Adaptec Fibre Card 9110G. GBICs are *hot pluggable*, which means they can be plugged into, or pulled out of the adapter while the power is applied. GBICs are available from qualified third-party vendors.

WARNING: *Do not* remove or insert the adapter while power is applied. If you do switch GBICs while the system is powered up, make sure the adapter is secured in the PCI slot. If the adapter is not secured in the PCI slot, damage may occur to the adapter and possibly the system's logic board.

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Caution: Inserting a GBIC without a Fibre Channel device or hub attached will cause an open loop condition. This open loop condition will prevent devices attached to the internal HSSDC connector from functioning. To avoid this situation, avoid inserting the GBIC until external Fibre Channel devices are attached to the GBIC.

Installing the GBIC

- Select the type of GBIC module that is compatible with your cable's connector.
- Install the GBIC into the receptacle on the adapter.

Note: You can only install the GBIC one way, as the GBIC and guide rails inside the adapter receptacle are keyed.

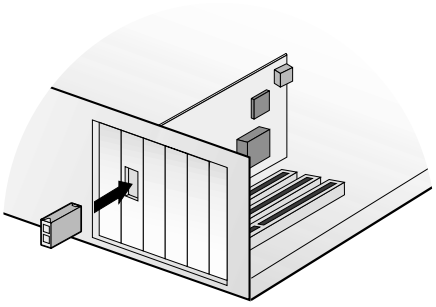


Figure 3. Installing GBIC Module

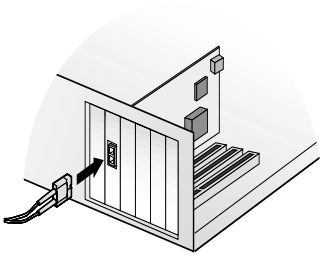
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Connecting Cables

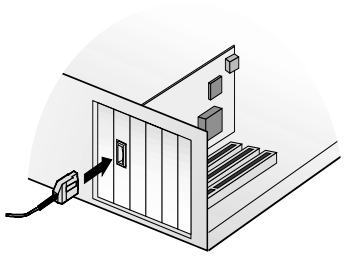
1. Select the correct cable that matches the GBIC you installed.
2. Install the end connectors into the GBIC. The GBIC and Fibre Channel cable are keyed, so they can only fit one way. See Figure 4 on page 9.

Caution: For optical Fibre Channel cables, support the cable so that you do not have a bend radius of less than three inches.

Caution: For optical and copper Fibre Channel cables, support and route the cable to prevent damage from sharp edges or from being crushed by nearby equipment.

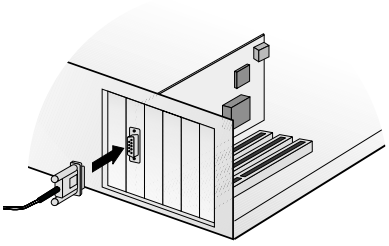


Optical (SC)



Copper (HSSDC)

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Copper (DB9)

Figure 4. Installing the Cable

Removing the GBIC

To remove the GBIC, follow these steps:

1. Remove the Fibre Channel cable.
   - **a** If you are using the IBM optical GBIC, flip the bar of the GBIC to the OPEN position and pull to remove. See Figure 5 on page 10.
   - **b** If you are using the HSSDC copper cable, squeeze the tab on the cable to remove. See Figure 6 on page 10.
   - **c** If you are using the HSSDC or the DB9 copper GBIC, squeeze the tabs on both sides of the GBIC. See Figure 6 on page 10 or Figure 7 on page 10.
   - **d** If you are using the DB9 copper cable, loosen the screws on either side of the cable connector and pull out to remove. See Figure 7 on page 10.
2. Pull the module out of the receptacle.

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3 For optical GBICs, reinsert the dust plug.

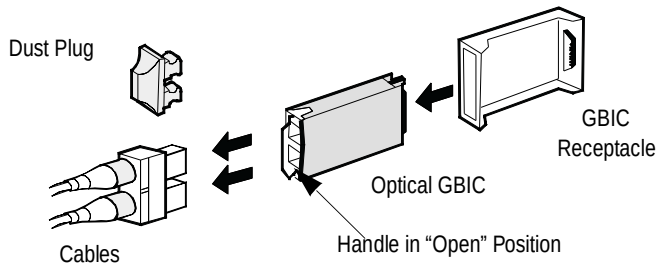


Figure 5. Removing the Optical GBIC Module

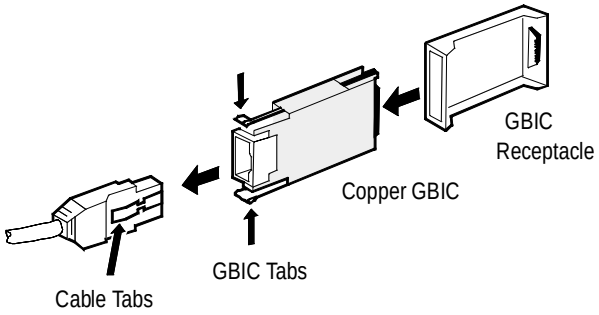


Figure 6. Removing the HSSDC GBIC Module

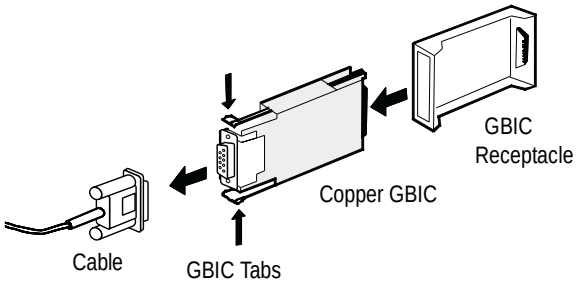


Figure 7. Removing the DB9 GBIC Module

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Verifying the Adapter

You can verify the adapter and cable installation by powering up the system and looking at the two LEDs on the bulkhead of the adapter. See Figure 8 on page 11. Under normal operation, the LEDs operate as follows:

Upon Power-up

- PWR / ACT LED is on
- LNK LED is off

During Card Initialization by the Host OS

- PWR / ACT LED will flash as Fibre Channel devices are identified
- LNK LED is off

Once the Card has been Initialized by the Host OS

- PWR / ACT LED will flash at approximately one second intervals
- LNK LED is on if the adapter is operating properly

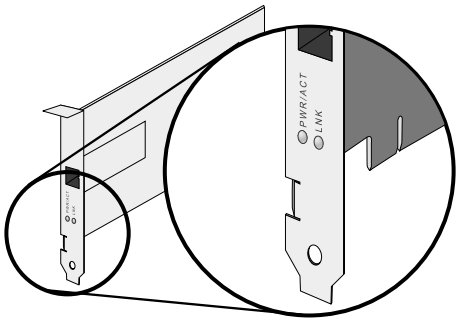


Figure 8. Front View of Bracket

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Installing the Device Driver for Windows NT 4.0

Before installing the Adaptec Fibre Card 9110G driver, Windows NT 4 should be installed.



Note: You *cannot* install the operating system to a drive attached to the Adaptec Fibre Card 9110G.

Installing the Driver

To install the Windows NT driver, perform these steps:

1. Start Windows NT and log into an account with administrative privileges.
2. Insert the Adaptec Fibre Channel Drivers disk into the floppy drive.
3. From the **Start** button, select **Settings**.
4. From the Settings menu, select **Control Panel**.
5. From the Control Panel window, select **SCSI Adapters** icon.
6. From the SCSI Adapters window, select **Drivers** tab.
7. From the Drivers window, select **Add**.
8. Select **Have Disk**.
9. Click the **Browse** button.
10. Double-click the **Winnt4** folder.
11. Click the **Open** button.
12. Click **OK**.
13. Select **Adaptec AFC-9110G PCI 64-bit/66MHz Fibre Channel 1Gbit Controller**.
14. Click **OK**.

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15 Click **Yes** to reboot the system.

16 When the installation is complete, remove the disk, shut down Windows NT, and reboot the system to start the driver.

Removing the driver

In certain situations you may need to remove the device driver. Follow these steps to remove the driver:

1 Start Windows NT and log into an account with administrative privileges.

2 From the **Start** button, select **Settings**.

3 From the Settings menu, select **Control Panel**.

4 From the Control Panel screen, select **SCSI Adapters** icon.

5 From the SCSI Adapters window, select **Drivers** tab.

6 Select **Adaptec AFC-9110G PCI 64-bit/66MHz Fibre Channel 1Gbit Controller.**

7 From the Drivers window, select **Remove.**

8 Click on **Yes** to remove the driver.

9 When you are finished, shut down Windows NT, and reboot the system to remove the driver.

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Installing the Device Driver for Windows 2000

Before installing the Adaptec Fibre Card 9110G driver, Windows 2000 should be installed.



Note: You *cannot* install the operating system to a drive attached to the Adaptec Fibre Card 9110G.

Installing the Driver

To install the Adaptec Fibre Card 9110G driver:

1. Turn ON the system after installing the Adaptec Fibre Card 9110G.
2. Log into an account with administrative privileges.

   Windows 2000 will automatically discover the new hardware and start a Found New Hardware Wizard to guide you through the device driver installation.
3. At the Welcome to the Found New Hardware Wizard window, select **Next**.
4. The window should say:

   This Wizard will complete the installation for this device:
   Fibre Channel Controller

   It will ask,

   What do you want the wizard to do?

   Choose **Search for a suitable driver for my device (recommended)**, and select **Next**.
5. For optional search locations, deselect **Floppy disk drives** and **CD-ROM drives**. Select **Specify a location**, and then select **Next**.
6. Insert the Adaptec Fibre Channel Driver disk into the floppy drive.

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7 Below the window requesting Copy manufacturer's files from:, type: `A:\WIN2000`

Select **OK**.

8 At the Driver Files Search Results window, select **Next**.

9 The next window may ask,

Do you want to continue the installation?

Select **Yes**.

10 At the Completing the Found New Hardware Wizard window, select **Finish**.

The device driver has been installed and loaded. The system does *not* require rebooting.

Removing the Driver

To uninstall the Adaptec Fibre Card 9110G:

1 Turn OFF your system and remove the Adaptec Fibre Card 9110G from your computer.

2 Once you reboot the system, Windows 2000 will recognize that the Adaptec Fibre Card 9110G has been removed.

Additional Notes



WARNING: The following registry files will change your systems registry information. Improper changes can cause the system to become unbootable. Use the options that pertain to your configuration. All the following changes require you to log into Windows NT 4.0 or Windows 2000 with administrative privileges.

1 RAID Storage Arrays:

If you are using RAID Storage arrays that are continually timing out on complex operations, you should increase the disk operation timeouts from a default of 10 to 60 seconds. The following registry file will change the TimeOutValue to 60

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seconds to avoid NT timeouts (Event ID 9s on Windows NT's System EventLog).

To increase the timeout value:

a Goto the **Start** button and select **Run...**

b For Windows NT 4, type:

```
a:\winnt4\timeout.reg
```

For Windows 2000, type:

```
a:\win2000\timeout.reg
```

c Select **OK** for the pop up window.

d You need to reboot in order for the registry setting to take place.

2 N_port support:

If the switch is configured as an F_port, the adapter should be configured as an N_port. When the adapter is configured as an N_port, only one of the two connectors can be used (internal HSSDC connector or the GBIC module).

To enable or disable N_Port:

a Goto the **Start** button and select **Run...**

b For Windows NT 4, type:

```
a:\winnt4\nport_on.reg
```

For Windows 2000, type:

```
a:\win2000\nport_on.reg
```

Replace `nport_on.reg` with `nport_off.reg` if you would like to disable N_port support.

c Select **OK** for the pop up window.

d You need to reboot in order for the registry setting to take place.

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3 Large I/O request performance enhancement:

Performance enhancement for a large size I/O request could be done by increasing the maximum number of scatter-gather lists or NumberOfPhysicalBreaks used by the SCSIPORT driver. This is only needed if you are running a special application that takes advantage of large I/O.

The default when not specified in the Registry is 17 elements or a maximum transfer size of 64K. The Registry file provided will change the value to 65 elements or a maximum transfer size of 256K.

To enable Large I/O support:

a Goto the **Start** tab and select **Run...**

b For Windows NT 4, type:

```
a:\winnt4\largesg.reg
```

For Windows 2000, type:

```
a:\win2000\largesg.reg
```

c Select **OK** for the pop up window.

d You need to reboot in order for the registry setting to take place.

4 EMC Symmetrix Storage array (Windows NT 4.0 only):

For Windows NT 4.0, there are some registry adjustments needed for supporting the EMC Symmetrix Storage array. Adaptec has provided a registry file to adjust some parameters to EMC recommendations.

To enable EMC Symmetrix support:

a Goto the **Start** button and select **Run...**

b Type `a:\winnt4\emc.reg`.

c Select **OK** for the pop up window.

d You need to reboot in order for the registry setting to take place.

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5 Windows NT 4.0 conflict of Agilent and Adaptec drivers:

Windows NT 4.0 cannot distinguish the difference between Agilent 5121x Fibre Channel controllers and the Adaptec AFC-9110G controller when installed in the same system. If both controllers are installed in the same system, either Adaptec's or Agilent's driver will load for all the controllers in the system. To avoid this conflict, install either the Adaptec or Agilent driver, or avoid using both controllers in the same system.

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PCI Hot Plug Support

PCI Hot Plug involves the insertion and removal of PCI adapters from a system without interrupting the normal operation or powering down the whole system. PCI Hot Plug functions by disabling power to PCI slots where PCI Hot Plug capable adapters will be inserted or removed. To provide PCI Hot Plug functionality, the installed operating system, the motherboard, and the device driver for the PCI adapter must all support the PCI Hot Plug capability.

The Adaptec Fibre Card 9110G device driver for Windows NT 4.0 supports the PCI hot swap / replacement capability on system platforms that support PCI Hot Plug. Check your system documentation to determine if PCI Hot Plug is supported.



Caution: *Do not* insert or remove the Adaptec Fibre Card 9110G into or out of PCI slots with power enabled to the PCI slot. If PCI Hot Plug support is provided by your system hardware and software, then follow the procedures for insertion and removal of Hot Plug capable PCI adapters as defined by your system documentation.

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Troubleshooting

The following tips are general troubleshooting procedures:

- Check that the card is seated evenly all the way into the PCI slot.
- Check motherboard system documentation to ensure that bus mastering support is provided and enabled for the PCI 2.1 compliant slot containing the Adaptec Fibre Card 9110G.
- Check that the GBIC is seated correctly into the adapter.
- Check that the cable is inserted all the way into the GBIC.
- Check that all peripherals are connected correctly throughout the loop. Peripherals with intermittent connections can cause long OS initialization during power on. Remove suspect peripheral from loop.
- Check the LED lights. The PWR / ACT LED turns on at power up, and flashes after the card is initialized. The LNK LED indicates that the link is up. For more information on verifying the adapter card, see *Verifying the Adapter* on page 11.
- If not using a hub or switch, make sure that the cables are connected correctly throughout the loop. The loop must be in series, from one device to another.
- Verify that at least one device in the loop is powered up if you are not using a hub or switch. Hubs or switches detect devices that are not powered up and automatically do a port bypass.

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- If a problem occurs while loading the Windows NT or Windows 2000 driver or when you try to access a storage device, check the Event Log. The Event Log lists events that have been logged by various software components. As an example, if the driver failed to initialize, the log should have an event listed as Driver failed to initialize.

  To get to the Event Log on Windows NT, click the **Start** button, select **Programs—Administrative Tools**, and click **Event Viewer**.

  To get to the Event Log on Windows 2000, click the **Start** button, select **Programs—Administrative Tools**, and click **Event Viewer**. Select the **System Log** at the left side of the Event Window.



Note: A possible cause of driver or device failure could be that the loop is not complete, or in other words, devices are not connected in series to form a loop. This does not apply if you are using a hub or switch.

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Fibre Channel Cable Assemblies and GBIC

Cable assemblies and GBICs are available from Adaptec, Inc. You can order from the online store at http://www.adaptecstore.com, or within the US, you can call: 1-800-442-7274. See the following tables for the type of cable assemblies and GBICS that are offered.

HSSDC to HSSDC Cable Assembly (1 Gigabit Operations)

Description	Length (Meters)
30 AWG	1.0
30 AWG	3.0
30 AWG	10.0
24 AWG	20.0
22 AWG	30.0

HSSDC to DB9 Cable Assembly (1 Gigabit Operations)

Description	Length (Meters)
30 AWG	1.0
30 AWG	3.0
30 AWG	10.0
24 AWG	20.0
22 AWG	30.0

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Multimode Optical Cable F/C SC Duplex 50/125 (1 Gigabit Operations)

Description	Length (Meters)
F/C SC Duplex 50/125	5.0
F/C SC Duplex 50/125	10.0
F/C SC Duplex 50/125	25.0
F/C SC Duplex 50/125	100.0
F/C SC Duplex 50/125	250.0
F/C SC Duplex 50/125	500.0

Fibre Channel Gigabit Interface Converters (GBICS)

Description	Connector
Multimode Short Wave Optical	Optical SC
Copper	HSSDC

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Changes

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Adaptec Customer Support

If you have questions about installing or using your Adaptec product, check this user's guide first—you will find answers to most of your questions here. If you need further assistance, use the support options listed below.

Technical Support Identification (TSID) Number

- The 12-digit TSID can be found on the white barcode-type label included inside the box with your product. The TSID helps us provide more efficient service by accurately identifying your product and support status. The TSID is required when contacting Technical Support.
- Affix your TSID label here:

Support Options

- Search the Adaptec Support Knowledgebase (ASK) at http://ask.adaptec.com for articles, troubleshooting tips, and frequently asked questions for your product.
- For support via Email, submit your question to Adaptec's Technical Support Specialists at http://ask.adaptec.com.

North America

- Visit our Web site at http://www.adaptec.com.
- For information about Adaptec's support options, call +1 408-945-2550, 24 hours per day, 7 days per week.
- To speak with a Technical Support Specialist, call +1 321-207-2000, Monday–Friday, 3:00 A.M. to 5:00 P.M., Pacific Time. To expedite your service, have your computer in front of you.
- To order Adaptec products, including software and SCSI cables, call +1 800-442-7274 or +1 408-957-7274.

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Europe

- Visit our Web site at http://www.adaptec-europe.com.
- **English and French:** To speak with a Technical Support Specialist, call one of the following numbers, Monday–Thursday, 10:00 to 12:30 and 13:30 to 17:30; Friday, 10:00 to 12:30 and 13:30 to 16:30, Central European Time:
  - **English**: +32 2 352 3470
  - **French**: +32 2 352 3460

  To expedite your service, have your computer in front of you.
- **German:** To speak with a Technical Support Specialist, call +49 89 456 40660, Monday–Thursday, 09:30 to 12:30 and 13:30 to 16:30; Friday, 09:30 to 12:30 and 13:30 to 15:00, Central European Time. To expedite your service, have your computer in front of you.
- To order Adaptec products, including accessories and SCSI cables:
  - **UK**: +0800 96 65 26 or fax +0800 731 02 95
  - **Other European countries**: +32 11 300 379 or fax +32 11 300 375

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- Visit our Web site at http://www.adaptec.com.au.
- To speak with a Technical Support Specialist, call +612 9416 0698, Monday–Friday, 10:00 A.M. to 4:30 P.M., Eastern Australia Time. To expedite your service, have your computer in front of you.

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- Visit our Web site at http://www.adaptec.com.
- To speak with a Technical Support Specialist, call +852 2869 7200, Monday–Friday, 10:00 to 17:00.
- Fax Technical Support at +852 2869 7100.

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- Visit our Web site at http://www.adaptec.com.
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Regulatory Compliance Statements

Federal Communications Commission Radio Frequency Interference Statement

WARNING: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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 instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. However, if this equipment does cause interference to radio or television equipment 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 equipment and receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/television technician for help.
- Use a shielded and properly grounded I/O cable and power cable to ensure compliance of this unit to the specified limits of the rules.

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.

Adaptec, Inc. AFC-9110G

Tested to Comply
With FCC Standards

FOR HOME OR OFFICE USE

European Union Compliance Statement

This Information Technology Equipment has been tested and found to comply with the following European directives:

EMC Directive 89/336/EEC, as amended by 92/31/EEC and 93/68/EEC

EN 50081-1 (1992)
EN55022 (1994) Class B
EN 50082-1 (1992)
EN61000-4-2 (1998)
EN61000-4-3 (1998)
EN61000-4-4 (1995)
EN61000-4-5 (1995) Surges
EN61000-4-6 (1996) Conducted immunity
EN61000-4-11 (1994) Supply dips of variation

Australian/New Zealand Compliance Statement

This device has been tested and found to comply with the limits for a Class B digital device, pursuant to the Australian/New Zealand standard AS/NZS 3548 set out by the Spectrum Management Agency.

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Canadian Compliance Statement

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matérial brouilleur du Canada.



Japanese Compliance (Voluntary Control Council Initiative)

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Legal Department
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3. Warranty service is available to the purchaser by delivering the product during the warranty period to an authorized Adaptec service facility or to Adaptec and providing proof of purchase price and date. The purchaser shall bear all shipping, packing and insurance costs and all other costs, excluding labor and parts, necessary to effectuate repair, replacement or refund under this warranty.
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