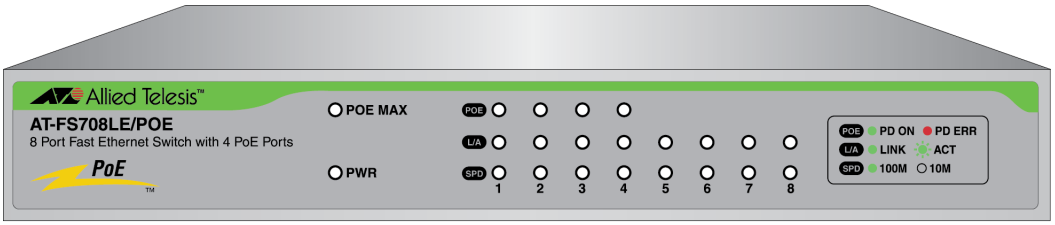
AT-FS708LE/PoE

Fast Ethernet Unmanaged Switch



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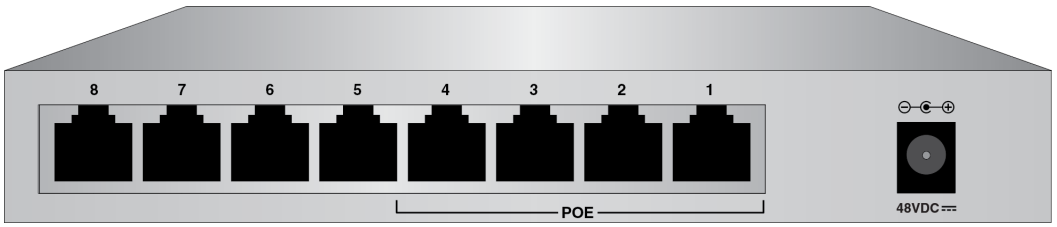

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Installation Guide

the solution : the network

613-002087 Rev. B

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Electrical Safety and Emissions Standards

This section contains the following:

- ❒ “US Federal Communications Commission”
- ❒ “Industry Canada”
- ❒ “Emissions, Immunity and Electrical Safety Standards” on page 4
- ❒ “Translated Safety Statements” on page 4

US Federal Communications Commission

Radiated Energy

Note
This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of 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 this 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.

Note
Modifications or changes not expressly approved of by the manufacturer or the FCC, can void your right to operate this equipment.

Industry Canada

Radiated Energy

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Emissions, Immunity and Electrical Safety Standards

RFI Emissions FCC Part 15 Class A, CISPR 22 Class A, EN55022:2006/A1:2007 Class A

Warning
In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures. E84

EMC (Immunity) EN55024

Electrical Safety EN60950-1 (TUV), UL 60950-1 ($_{C}UL_{US}$), RCM, CE Mark

Translated Safety Statements

Important: The indicates that translations of the safety statement are available in the PDF document “Translated Safety Statements” posted on the Allied Telesis website at **alliedtelesis.com/support**.

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Preface

This manual is the installation and user's guide for the AT-FS708LE/PoE switch. This Preface contains the following sections:

- "Safety Symbols Used in this Document" on page 8
- "Contacting Allied Telesis" on page 9

Safety Symbols Used in this Document

This document uses the following conventions:

Note
Notes provide additional information.

Caution
Cautions inform you that performing or omitting a specific action may result in equipment damage or loss of data.

Warning
Warnings inform you that performing or omitting a specific action may result in bodily injury.

Contacting Allied Telesis

If you need assistance with this product, you may contact Allied Telesis technical support by going to the Support & Services section of the Allied Telesis web site at **alliedtelesis.com/support**. You can find links for the following services on this page:

- 24/7 Online Support - Enter our interactive support center to search for answers to your questions in our knowledge database, check support tickets, learn about Return Merchandise Authorization (RMA), and contact Allied Telesis technical experts.
- USA and EMEA phone support - Select the phone number that best fits your location and customer type.
- Hardware warranty information - Learn about Allied Telesis warranties and register your product online.
- Replacement Services - Submit an RMA request via our interactive support center.
- Documentation - View the most recent installation guides, user guides, software release notes, white papers and data sheets for your product.
- Software Updates - Download the latest software releases for your product.

For sales or corporate contact information, go to **alliedtelesis.com/purchase** and select your region.

Chapter 1

Product Description

This chapter contains the follows sections:

- “Overview” on page 12
- “Key Features” on page 15
- “Power over Ethernet” on page 16
- “Ethernet Switching Basics” on page 17

Overview

The AT-FS708LE/PoE switch is an unmanaged eight-port Fast Ethernet switch including four ports with Power over Ethernet (PoE) capability.

This switch provides a simple solution for Ethernet switching between devices operating at either 10 Mbps or 100 Mbps. With PoE available, you can connect up to four Powered Devices (PDs), such as, IP telephones, surveillance cameras, and wireless access points to the switch.

Figure 1 illustrates the front panel of the switch.

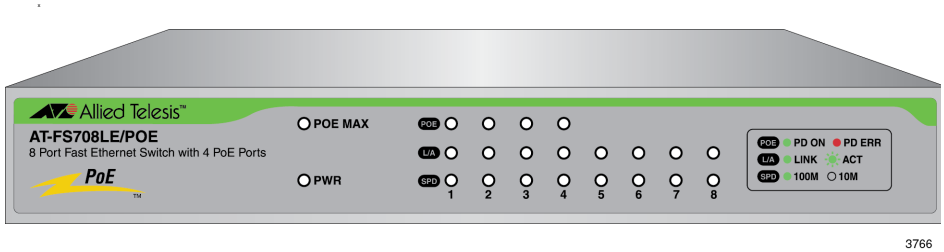

Figure 1. AT-FS708LE/PoE Front Panel

The AT-FS708LE/PoE switch is designed to be used on a desktop. The switch does not require software configuration or management.

10/100Base-TX Twisted Pair Ports

The AT-FS708LE/PoE switch features eight twisted pair ports.

Figure 2 illustrates the back panel of the switch.

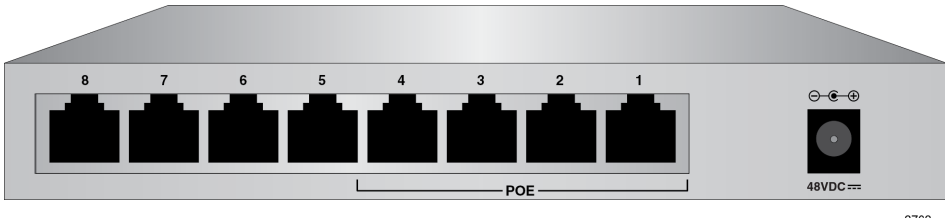

Figure 2. AT-FS708LE/PoE Back Panel

Connector

All twisted pair ports feature 8-pin RJ-45 connectors. For the port pinouts, see “RJ-45 Twisted Pair Port Connectors” on page 33.

Speed

The ports are 10Base-T, and 100Base-T compliant and are capable of 10 Mbps and 100 Mbps speeds. The ports are IEEE 802.3u Auto-Negotiation

compliant. With Auto-Negotiation, the switch automatically matches the highest possible common speed between each switch port and each end-node. For example, if an end-node is capable of only 10 Mbps, the switch sets the port connected to the end-node to 10 Mbps.

Duplex Mode

Each twisted pair port on the switch can operate in either half- or full-duplex mode. The twisted pair ports are IEEE 802.3u-compliant and automatically negotiate the duplex mode setting.

> **Note**
> In order for the switch to set the duplex mode for each port correctly, the end-nodes that you connect to the switch ports also need to be configured for Auto-Negotiation. Otherwise, a duplex mode mismatch can occur, affecting network performance. For further information, refer to “Duplex Mode” on page 17.

Cabling

For 10 Mbps operation, Category 3 or better unshielded twisted pair cabling is required. For 100 Mbps operation, Category 5 unshielded twisted pair cabling is required.

Auto MDI/MDI-X

All of the twisted pair ports on the switch feature auto-MDI to automatically configure themselves as MDI or MDI-X when connected to an end-node. Consequently, you can use a straight-through twisted pair cable to connect any network device to a port.

PoE Capability

Power over Ethernet (PoE) is a system that supports power along with data using a single Ethernet cable.

The four ports of the AT-FS708LE/PoE switch are capable for providing power to connected devices. The switch can support four class 2 Powered Devices (PDs) or two class 3 PDs at a time. See “Power over Ethernet” on page 16.

LEDs

The LEDs on the front panel of the AT-FS708LE/PoE switch display status information. Table 1 on page 14 describes the LEDs on the AT-FS708LE/PoE switch.

Table 1. System and Port LEDs

LED	State	Description
POE MAX	Green	The power that the switch is providing to the connected PDs reaches the maximum.
	Off	The power that the switch is providing is under the maximum.
PWR	Green	The switch is powered ON and operating normally.
	Off	The switch is not receiving power.
POE	Green	The connected PD is receiving power.
	Red	The connected PD has an error.
L/A	Green	A valid link is established on the port.
	Blinking Green	Frames are being transmitted/received on the port.
SPD	Green	The port is operating in 100Mbps.
	Off	The port is operating in 10 Mbps.

DC Power Connector

The AT-FS708LE/PoE switch has a single DC power supply socket on the back panel. Use the AC power adapter that came with the switch to supply AC power.

To power ON or OFF the switch, connect or disconnect the power cord.

Note
Allied Telesis recommends attaching the power cord to the switch before plugging the power cord into a wall outlet.

Key Features

The AT-FS708LE/PoE switch has the following key features:

- Eight 10/100 Mbps (10Base-T / 100Base-TX) twisted pair ports with RJ-45 connectors
- Four ports with PoE capability
- Auto-Negotiation (IEEE 802.3u-compliant) on all eight ports
- Auto MDI/MDI-X on all eight ports
- Half- or full-duplex mode on all eight ports
- Flow control (IEEE 802.3x-compliant)
- Storage of up to 1K MAC addresses
- Wire speed reception and transmission
- Store-and-forward switching method
- 96Kb on the chip packet buffer
- Back pressure flow control for half-duplex
- Non-blocking architecture
- Switch power-scaling
- Port speed-scaling
- Diagnostic LEDs
- Eu-RoHS Compliant
- China RoHS Compliant

Power over Ethernet

The four twisted-pair ports on the AT-FS708LE/PoE switch feature Power over Ethernet (PoE). PoE is a mechanism for supplying power to network devices over the same twisted-pair cables used to carry network traffic. This feature can simplify network installation and maintenance by allowing you to use the switch as a central power source for other network devices.

Powered Device (PD)

A device that receives its power over an Ethernet cable is called a powered device (PD). Examples of such devices can be wireless access points, IP telephones, web cams, and even other Ethernet switches. A PD connected to a port on the switch receives both network traffic and power over the same twisted-pair cable.

The switch automatically determines whether or not a device connected to a port is a PD. A PD has a resistor or capacitor that the switch can detect over the Ethernet cabling. If the resistor or capacitor is present, the switch assumes that the device is a PD.

Power Budgeting

The AT-FS708LE/PoE switch provides a maximum power of 15.4 W per port on four ports for a total power consumption of 30 W, while furnishing standard 10/100 Mbps Ethernet functionality. The switch supports four class 2 PDs on four PoE ports or two class 3 PDs on two PoE ports. The IEEE 802.3af Class power level table is shown in Table 2.

Table 2. IEEE 802.3af Class vs. Power Levels

Class	Usage	Maximum Power Levels Output at the PoE Port	Range of Power Levels Available at the PD Input
0	Default	15.4W	0.44W to 12.95W
1	Optional	4.0W	0.44W to 3.84W
2	Optional	7.0W	3.84W to 6.49W
3	Optional	15.4W	6.49W to 12.95W

The PoE port that is connected to a non-PD, a device receiving its power from another power source, functions as a regular Ethernet port. The PoE feature remains enabled on the port but no power is delivered to the device.

Ethernet Switching Basics

An Ethernet switch interconnects network devices, such as workstations, printers, routers, and other Ethernet switches, so that they can communicate with each other by sending and receiving Ethernet frames.

Duplex Mode

Duplex mode refers to how an end node receives and transmits data. If an end node can receive or transmit data, but not both simultaneously, it is operating in what is referred to as half-duplex mode. If an end node can both receive and transmit data simultaneously, the end node is operating in full-duplex mode. Naturally, an end node capable of operating in full-duplex can handle data much faster than an end node that can only operate in half-duplex mode.

The twisted pair ports on the AT-FS708LE/PoE switch can operate in half- or full-duplex mode for 10/100 Mbps. They are IEEE 802.3u-compliant and use Auto-Negotiation to set the duplex mode setting for you automatically.

Note
In order for a switch port to successfully Auto-Negotiate its duplex mode with a 10 or 100 Mbps end-node, the end-node should also be configured for Auto-Negotiation. Otherwise, a duplex mode mismatch can occur. A switch port using Auto-Negotiation defaults to half-duplex if it detects that the end-node is not using Auto-Negotiation. This results in a mismatch if the end-node is operating at a fixed duplex mode of full-duplex.

Store and Forward

The AT-FS708LE/PoE switch uses store and forward as the method for receiving and transmitting frames. When a Ethernet frame is received on a switch port, the switch does not retransmit the frame out the destination port until it has received the entire frame and stored the frame in a port buffer. It then examines the frame to determine if it is a valid frame. Invalid frames, such as fragments or runts, are discarded by the switch. This insures that only valid frames are transmitted out the switch ports and that damaged frames are not propagated on your network.

Backpressure and Flow Control

To maintain the orderly movement of data between the end-nodes, an Ethernet switch may periodically need to signal an end-node to stop sending data. This can occur under several circumstances. For example, if two end-nodes are operating at different speeds, the switch, while transferring data between the end-nodes, might need to instruct the faster end-node to stop transmitting data to allow the slower end-node to catch up. An example of this would be when a server operating at 100 Mbps is sending data to a workstation operating at only 10 Mbps.

How a switch signals an end-node to stop transmitting data differs depending on the duplex mode of the end-node and switch port. A twisted

pair port operating in half-duplex mode stops an end-node from transmitting data by forcing a collision. A collision on an Ethernet network occurs when two end-nodes attempt to transmit data using the same data link at the same time. A collision causes an end-node to stop sending data, wait for a brief period of time, and then retransmit the same data. Once the switch is ready to receive data again, the switch stops forcing collisions. This is referred to as backpressure.

A port operating in full-duplex mode uses PAUSE frames, as specified in the IEEE 802.3x standard, to stop the transmission of data from an end-node. Whenever the switch wants an end-node to stop transmitting data, it issues this frame. The frame instructs the end-node to cease transmission for a period of time specified within the frame. The switch continues to issue PAUSE frames until it is ready again to receive data from the end-node. This is referred to as flow control.

Chapter 2

Installation

This chapter contains the following sections:

- “Reviewing Safety Precautions” on page 20
- “Selecting a Site for the Switch” on page 22
- “Planning the Installation” on page 23
- “Unpacking the Switch” on page 24
- “Installing the Switch on a Table or Desktop” on page 25
- “Cabling the Switch” on page 26
- “Powering On the Switch” on page 27

Reviewing Safety Precautions

Please review the following safety precautions before you begin to install the switch.

Note
Important: The ✍ indicates that translations of the safety statement are available in the PDF document “Translated Safety Statements” posted on the Allied Telesis website at **alliedtelesis.com/support**.

Warning
To prevent electric shock, do not remove the cover. No user-serviceable parts inside. This unit contains hazardous voltages and should only be opened by a trained and qualified technician. To avoid the possibility of electric shock, disconnect electric power to the product before connecting or disconnecting the cables. ✍ E1

Warning
Do not work on equipment or cables during periods of lightning activity. ✍ E2

Warning
Power cord is used as a disconnection device. To de-energize equipment, disconnect the power cord. ✍ E3

Warning
Class I Equipment. This equipment must be earthed. The power plug must be connected to a properly wired earth ground socket outlet. An improperly wired socket outlet could place hazardous voltages on accessible metal parts. ✍ E4

Note
Pluggable Equipment. The socket outlet shall be installed near the equipment and shall be easily accessible. ✍ E5

Caution
Air vents must not be blocked and must have free access to the room ambient air for cooling. ✍ E6

Warning
Operating Temperature. This product is designed for a maximum ambient temperature of 40 degrees C. E7

Note
All Countries: Install product in accordance with local and National Electrical Codes. E8

Note
The power input must be provided from SELV source only, per IEC 60950. Do not connect to a centralized DC battery bank. E31

Caution
Power to the hub must be sourced only from the adapter. E34

Warning
In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures. E84

Caution
Only use the AC adapter that is supplied with the unit. E85

Selecting a Site for the Switch

Observe the following requirements when choosing a site for the AT-FS708LE/PoE switch:

- ❒ Make sure that the table is level and secure.
- ❒ The site should provide for easy access to the ports on the back of the switch and the LEDs on the front of the switch should be easily viewed.
- ❒ To allow proper cooling of the switch, air flow around the unit and through its vents on the side should not be restricted.
- ❒ Do not place objects on top of the switch.
- ❒ Do not expose the switch to moisture or water.
- ❒ Ensure that the site is a dust-free environment.
- ❒ Use dedicated power circuits or power conditioners to supply reliable electrical power to the network devices.

Planning the Installation

Table 3 contains the cabling specifications for the twisted pair ports.

Table 3. Twisted Pair Cabling and Distances

Speed	Type of Cable	Maximum Operating Distance
10 Mbps	Category 3 or better unshielded twisted pair cable	100 m (328 ft)
100 Mbps	Category 5 or unshielded twisted pair cable	100 m (328 ft)

Note
The twisted pair ports on the switch feature Auto-MDI when operating at either 10 or 100 Mbps. Each port is individually configured as MDI or MDI-X when connected to an end-node. Consequently, you can use a straight-through twisted pair cable when connecting any network device to a twisted pair port on the switch. A port operating at 10 or 100 Mbps uses four of the eight strands in twisted pair wiring.

Unpacking the Switch

To unpack the AT-FS708LE/PoE switch, perform the following procedure:

1. Remove all components from the shipping package.

   Note
   Store the packaging material in a safe location. You must use the original shipping material if you need to return the unit to Allied Telesis.

2. Place the switch on a level, secure surface.

3. Verify that the following hardware components are included in your switch package:

   - One AT-FS708LE/PoE switch
   - Rubber Feet for desktop installation
   - AC adapter

   If any item is missing or damaged, contact your Allied Telesis sales representative for assistance.

Installing the Switch on a Table or Desktop

To install the switch on a table or desktop, perform the following procedure:

1. Remove all the items from the packaging.
2. Store the packaging material in a safe place.

   In the event a problem occurs and you need to return the unit, use as much of the original shipping material as possible.
3. Attach the four self-adhesive rubber feet to the bottom of the switch, as shown in Figure 3.

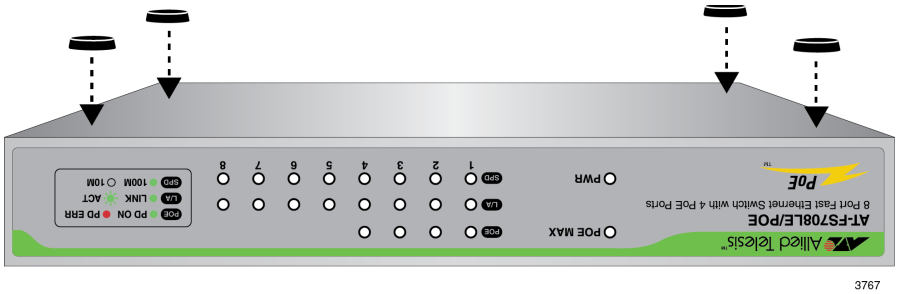

Figure 3. Attaching the Rubber Feet

4. Place the switch on a flat and secure surface, leaving ample space around the switch for ventilation.
5. Proceed to “Cabling the Switch” on page 26 for the cable installation.

Cabling the Switch

After setting up the switch on the desktop, connect twisted pair cables to the ports on the AT-FS708LE/PoE switch.

When connecting a twisted pair cable to a port, observe the following guidelines:

- An RJ-45 connector should fit snugly into the port on the switch. The tab on the connector should lock the connector into place.
- The ports on the switch are auto-MDI/MDI-X. You can use a straight-through twisted pair cable to connect any type of network device to a port on the switch.
- The network should not contain data loops, which can adversely affect network performance. A data loop exists when two or more network devices can communicate with each other over more than one data path.

Powering On the Switch

The AT-FS708LE/PoE is operating with DC power input. Use the AC power adapter that came with the switch to supply AC power.

To power on the switch, perform the following procedure:

1. Attach the power cord to the power connector on the back of the switch as shown in Figure 4.

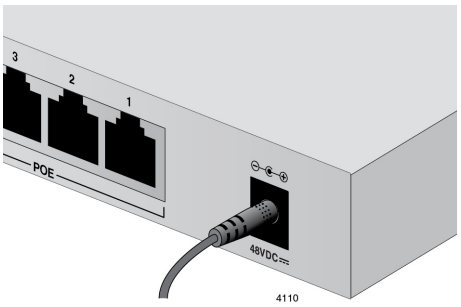

Figure 4. Attach the Power Cord into the Connector

2. Plug the other end of the power cord into a wall outlet. See Figure 5.

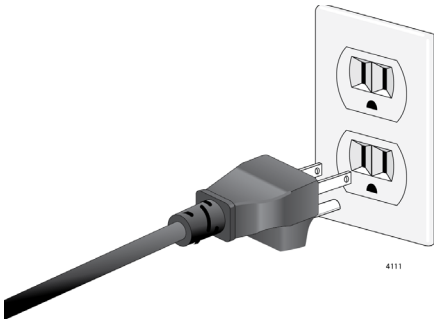

Figure 5. Plug the Power Cord into a Wall Outlet

3. Verify the PWR LED is green. If the LED id off, see Chapter 3, “Troubleshooting” on page 29.

   The switch is now powered on and ready for network operations.

Note
Allied Telesis recommends attaching the power cord to the switch before plugging the power cord into a wall outlet.

Warning
Power cord is used as a disconnection device: To de-energize equipment, disconnect the power cord. E3

Caution
Only use the AC adapter that is supplied with the unit. E85

Chapter 3
Troubleshooting

This chapter contains information on how to troubleshoot the switch in the event a problem occurs.

> **Note**
> If you are still unable to resolve the problem after following the instructions in this chapter, contact Allied Telesis Technical Support for assistance. Refer to “Contacting Allied Telesis” on page 9.

Check the PWR LED on the front of the switch. If the LED is OFF, indicating that the unit is not receiving power, do the following:

- Verify that the power cord is securely connected to the power source and to the connector on the back panel of the switch.
- Verify that the power outlet or power supply has power by connecting another device to it.
- Try connecting the unit to another power source.
- Try using a different power cord.
- Verify that the voltage from the power source is within the required levels for your region.

Verify that the L/A LED for each port is green. If an L/A LED is OFF, do the following:

- Verify that the end-node connected to the port is powered ON and is operating properly.
- Verify that the twisted pair cable is securely connected to the port on the switch and to the port on the end-node.
- Ensure that the twisted pair cable does not exceed 100 meters (328 feet).
- Verify that you are using the appropriate category of twisted pair cable: Category 3 or better for 10 Mbps operation and Category 5 for 100 Mbps operation.

Appendix A

Technical Specifications

This appendix contains the following sections:

- ❒ “Physical Specifications,” next
- ❒ “Environmental Specifications,” next
- ❒ “Safety and Electromagnetic Emissions Certifications,” next
- ❒ “RJ-45 Twisted Pair Port Connectors” on page 33

Physical Specifications

Dimensions:	(W x D x H) 171 mm x 98 mm x 29 mm (6.7 in x 3.9 in x 1.1 in)
Weight:	0.43 kg (0.95 lbs)

Environmental Specifications

Operating Temperature:	0° C to 40° C (32° F to 104° F)
Storage Temperature:	-10° C to 70° C (-14° F to 158° F)
Operating Humidity:	10% to 90% non-condensing
Storage Humidity:	10% to 95% non-condensing

Power Specifications

Rated Voltage:	48V DC
Rated Current:	0.8A

Safety and Electromagnetic Emissions Certifications

EMI	FCC Part 15 Class A, CISPR 22 Class A, EN55022: 2006/A1: 2007 Class A
Immunity	EN55024
Electrical Safety	UL 60950-1 (cULus), EN 60950-1 (TUV), CE Mark

RJ-45 Twisted Pair Port Connectors

This section lists the connectors and connector pinouts for the AT-FS708 Fast Ethernet switch and its components.

Figure 6 illustrates the pin layout to an RJ-45 connector and port.

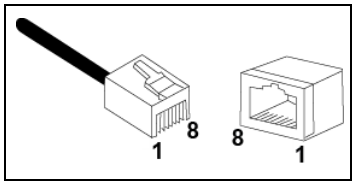

Figure 6. RJ-45 Connector and Port Pin Layout

Table 4 lists the RJ-45 pin signals when a twisted pair port is operating in the MDI configuration.

Table 4. MDI Pin Signals (10Base-T or 100Base-TX)

Pin	Signal
1	TX+
2	TX-
3	RX+
6	RX-

Table 5 lists the RJ-45 port pin signals when a twisted pair port is operating in the MDI-X configuration.

Table 5. MDI-X Pin Signals (10Base-T or 100Base-TX)

Pin	Signal
1	RX+
2	RX-
3	TX+
6	TX-