SICOM6424SM Industrial Ethernet Switch

User Manual

Beijing Kyland Technology Co., Ltd.

SICOM6424SM Industrial Ethernet Switch

User Manual

Disclaimer: Kyland Technology Co., Ltd. tries to keep the content of this manual as accurate and as updated as possible. This document is not guaranteed to be error-free, and we reserve the right to amend it without notice to users.

Preface

SICOM6424SM is a high-performance network-managed industrial Ethernet switch specially designed by Kyland Technology Co., Ltd. for industrial applications. Its high-performance switch engine, solid and closed case design, high-efficient single-rib shape case heat dispersion surface without fans, overcurrent, overvoltage and EMC protection at power input side, and excellent EMC protection of RJ45 port allows SICOM6424SM applicable in harsh and dangerous industrial environments. The redundant optical fiber network, redundant power input and powerful entire network real-time management system provides multiplex guarantee for reliable operation of the system.

The user manual for SICOM6424SM Industrial Ethernet Switch mainly introduces the information on technical principles, specifications, hardware structures, installations etc. to provide the user with references in startup, expansion and routine maintenance. It is a practical teaching material that can be used for knowledge and understanding of SICOM6424SM industrial Ethernet Switch.

This manual mainly includes the following contents:

Chapter 1 Overview and system features;

Chapter 2 Specifications and service functions;

Chapter 3 Hardware structure;

Chapter 4 Installation;

Chapter 5 Test method;

Chapter 6 Networking and configurations;

Appendix A twisted pair and pin distribution rules;

Appendix B cable types and specifications;

Appendix C abbreviations used in this manual.

All product specifications are subject to change without notice. Please visit our website or contact our sales representative directly to have the update details.

Safety Notice

This product offers reliable performances as long as it is used within the designed scope. Artificial damage or destruction of the equipment should be avoided.

- Carefully read this manual and well preserve this manual for future reference;
- Do not place the equipments near water sources or damp places;
- Do not place anything on power cable which should be placed in unreachable places;
- Do not tie or wrap the cable to prevent fire.
- Power connectors and connectors for other equipments should be firmly interconnected and frequently checked.

In the following cases, please immediately disconnect the power supply and contact with our company:

1. Water gets into the equipments;
2. Equipment damage or shell breakage;
3. Abnormal operation conditions of equipment or the demonstrated performances have changed;
4. The equipment emits odor, smoke or noise.

- Please keep optical fiber plugs and sockets clean. During operation of equipments, do not stare directly into the cross section of optical fiber;
- Please keep the equipment clean; if necessary, wipe the equipment with soft cotton cloth;
- Do not repair the equipment by yourself, unless it is clearly specified in the manual.

Warning Marks:

This Manual uses following two kinds of conspicuous warning marks to remind users in operating:

Warning: please give enough attention to the remarks following the mark. Inappropriate operations may cause severe damages to the switch and operators.

Attention: pay attention to the remarks following the mark.

Table of Contents

1. Product Overview

1.1 Product Overview

SICOM6424SM is a high-performance network-managed industrial Ethernet switch specially designed by KYLAND for industrial applications. Its high-performance switch engine, solid and closed case design, high-efficient single-rib shape case heat dispersion surface without fans, over-current, over-voltage and EMC protection at power input side, and excellent EMC protection of RJ45 port allows it applicable in harsh and dangerous industrial environments. The redundant function of optical fiber network,, redundant power input function, and powerful entire network real-time management system provides multiplex guarantee for reliable operation of the system. SICOM6424SM series gigabit industrial Ethernet switch offers strong web-management which support CLI, Telnet, WEB, SNMP and OPC-based network management.

SICOM6424SM supports 19 inch stable rack mounting for installation. In rear panel there are total 4 redundant 1000M SFP ports or 10/100/1000Base-TX RJ45 ports and 24 fast-ethernet ports in 3 slots(8 port in each slot) , which support for fiber or TP cable(10/100Base-TX 的 RJ45 or 100Base-FX). The redundant SFP ports can be connected into redundant 1000Mbps fiber or TP cable ring network with recovery time less than 50ms. Each RJ45 port is adaptive and can be configured to 10Base-T or 100Base-TX and half/full duplex. It also supports for auto MDI/MDI-X connection.

1.2 **Features**

1. **High performance Gigabit industrial Ethernet switch**

Support various management software such as WEB、CLI、TELNET、SNMP、OPC.

10/100Base-TX adaptive Ethernet ports, half or full duplex, auto MDI/MDI-X connection.

100Base-FX port, single mode or multimode, full-duplex, redundant.

With redundant ring technology, the recovery time of the network is less than 50ms.

Support for static routing, dynamic routing protocols like RIP v1/v2、OSPFv2，BGPv4, and multicasting routing protocols like PIM-SM、PIM-DM、DVMRP、IGMP.

Powerful ACL, hardware supports for L2-L7 data filter.

Auto-detection and broadcasting storm control, support for IGMP message detection.

Support for Qos,Vlan,SNMP V1/V2, IGMP Snooping, port mirroring, port trunking.

Support for DT-Ring，MSTP etc.

FTP-based online upgrade make it easy to manage and update the devices.

2. **Industrial Power Supply**

The power supply can be: 24DC(18-36VDC),48DC(36-72VDC),220AC/DC(85-264VAC/120-300 VDC), 220AC/DCW(85-264VAC/77-300VDC), single and redundant power supply.

Overcurrent, overvoltage, and EMC protection for power input.

3. Rugged design

Ribbed heat-removal design (fanless); operation at -40℃~+85℃

Solid and closed case design, IP40, can be used in harsh environment.

1.3 Package Checklist

1. Packing list

See packing list.

2. Unpacking check

Before opening the carton, place it stably, pay attention to the direction of the packing carton, and ensure its right side is facing upward, so as to prevent the swtich from falling apart after opening the case. If a hard object is used to unclench the case, do not overly extend the hard object into the carton to avoid damage of the equipments inside. After opening the carton, check the quantity of switch according to the packing list, and check the appearance quality of switch.

⚠ **Warning:**

For the built-in precise parts of equipments, please handle with care and avoid strenuous vibration to avoid affecting the performances of equipments.

2.   Specifications & Service Functions

2.1 **System Specifications**

SICOM6424SM's system specifications are shown in Table 2-1.

Table 2-1 System Specifications

System Specifications	SICOM6424SM
Fast Ethernet RJ45 port	Max 24 x 10/100Base-TX
1000Mbps port	4 x 100/1000Base-SFP or /10/100/1000Base-T(X) RJ45
Fast Ethernet fiber port	Max 24 x 100Base-FX-SM/MM
TP port	Physical port: shielded RJ-45 RJ-45 port: 10/100Base-TX, auto-negotiation Port standard: compliant with IEEE802.3 standard Transmission distance: <100m
Fiber port	Optical power: >-13dbm(SM) >-20dbm(MM) Receiving sensitivity: <-28dbm(SM) <-35dbm(MM) Wave length: 1310nm(SM) 1550nm(SM) 1310 nm(MM) Transmission distance: 40～80km(SM) <2km(MM)（1000M） <5km(MM)（100M） Connector type: LC，SC/FC/ST Transmission rate: 1.25Gbps（1000M）、 125Mbps（100M）
Power supply	Input voltage: 24DC(18-36VDC),48DC(36-72VDC),220AC/DC(85-264VAC/120-300VDC), 220AC/DCW(85-264VAC/77-300VDC)

	Input power consumption: 35W(MAX)
	Overcurrent protection: built-in
Mechanical parameters	Physical dimensions (width×height×depth)：482.6㎜×44㎜×420㎜
	Installation: 19' 1U rack mounting
	Heat dissipation: Ribbed aluminum case without fan
	Outlet: rear
	Protection class: IP40
	Weight: 5㎏
Ambient conditions	Operating temperature: -40℃～+85℃
	Storage temperature: -40℃～+85℃
	Humidity: 5%～95%（non-condensing）

2.2 Port Specifications

1. 24 ports of 100Mbps for TP or fiber cable. 0～24 ports of 100Base-FX, single mode or multimode, full-duplex. 0～24 ports of 10/100Base-TX is adaptive to 10/100M and half/full duplex and supports for auto MDI/MDI-X connection, the transmission distance is less than 100m. Redundancy technology is supported with recovery time less than 50ms.

2. 4 redundant ports of 1000Base-LX (single mode or multimode) or 10/100/1000Base-TX RJ45. The fiber port is 1000Mbps. Redundancy technology is supported with recovery time less than 50ms.

3. Comply with IEEE802.3、802.3U、802.3X 、802.3Z、IEEE802.3ab、IEEE 802.1w、IEEE 802.1d、IEEE 802.1p、IEEE 802.1q.

4. Meanings of RJ45 port LED:Yellow lamp – port rate LED; on: 100M; off: 10M Green lamp – link state LED, on: link established, blinking: active network, off: no link.

3. Hardware Structure

3.1 System Structure

The hardware structure of SICOM6424SM is shown in Figure 3-1:
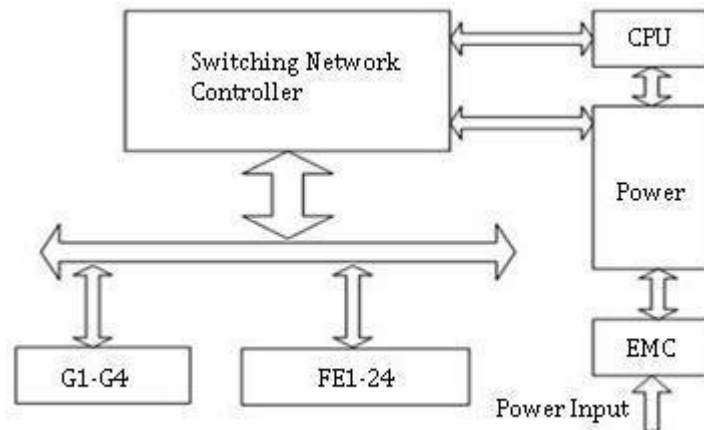

Figure 3-1 Hardware structure

The system hardware mainly consists of:

1． The switching network controller employs the high-performance ASIC chip technique and provides second-layer wire rate forward of data packages.

2． Fiber ports adopt integrated fiber optic transceiving modules and have stable performance

3． The power supply adopts the industrial power and offers overcurrent, overvoltage and EMC protections.

4． All Ethernet ports and console interfaces have EMC protections.

3.2 Switch Structure

3.2.1 Front Panel
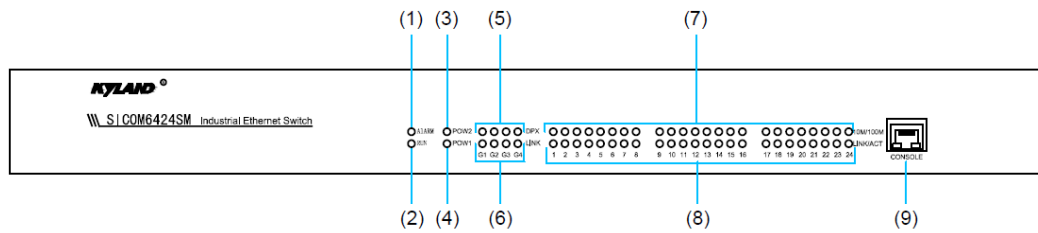
The following figure shows the front panel of SICOM6424SM.

Figure 3-2 Front Panel of SICOM6424SM

Table3-1 S Description of the Front Panel of SICOM6424SM

No.	Identifier	Description
(1)	ALARM	Alarm LED
(2)	RUN	Running LED
(3)	POW2	Power 2 LED
(4)	POW1	Power 1 LED
(5)	G1-G4, DPX	Speed LEDs for four gigabit ports
(6)	G1-G4, LINK	Connection status LEDs for four gigabit ports
(7)	1-24, 10M/100M	Speed LEDs for twenty-four 100M ports
(8)	1-24, LINK/ACT	Connection status LEDs for twenty-four 100M ports
(9)	CONSOLE	Console port

3. 2. 2 Rear Panel

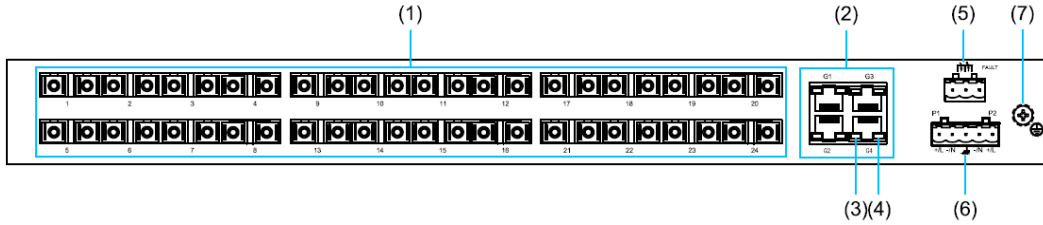The following figures show the rear panels of SICOM6424SM models.

Fiture 3-3 Rear Panel of SICOM6424SM-4GE-24S/M

Table 3-2 Description of the Rear Panel of SICOM6424SM-4GE-24S/M

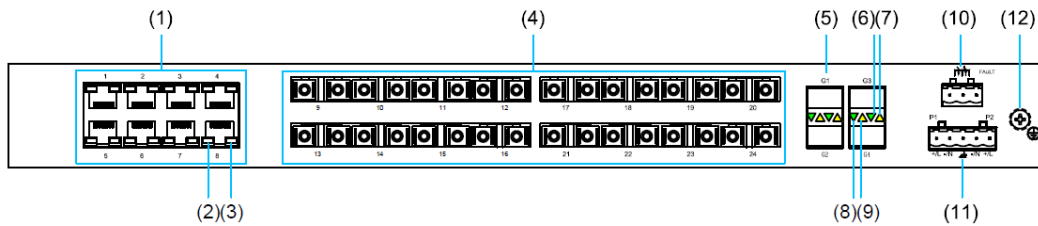| No.	Identifier	Description
(1)	1-24	Twenty-four 100Base-FX Ethernet ports
(2)	G1-G4	Four 10/100/1000Base-T(X) Ethernet ports
(3)	--	10/100/1000Base-T(X) Ethernet port speed LED (yellow)
(4)	--	10/100/1000Base-T(X) Ethernet port connection status LED (green)
(5)	⛏ FAULT	Alarm terminal block
(6)	P1 P2 +/L -/N ⏚ -/N +/L	Power terminal block
(7)	--	Grounding screw

Fiture3-4 Rear Panel of SICOM6424SM-4GX-16S/M-8T

Table3-3 Description of the Rear Panel of SICOM6424SM-4GX-16S/M-8T

No.	Identifier	Description
(1)	1-8	Eight 10/100Base-T(X) Ethernet ports
(2)	--	10/100Base-T(X) Ethernet port speed LED

|		
		(yellow)
(3)	--	10/100Base-T(X) Ethernet port connection status LED (green)
(4)	9-24	Sixteen 100Base-FX Ethernet ports
(5)	G1-G4	Four gigabit SFP ports
(6)	--	Upper gigabit SFP port connection status LED (green)
(7)	--	Upper gigabit SFP port speed LED (yellow)
(8)	--	Lower gigabit SFP port connection status LED (green)
(9)	--	Lower gigabit SFP port speed LED (yellow)
(10)	FAULT	Alarm terminal block
(11)	P1 P2 +/L -/N -/N +/L	Power terminal block
(12)	--	Grounding screw
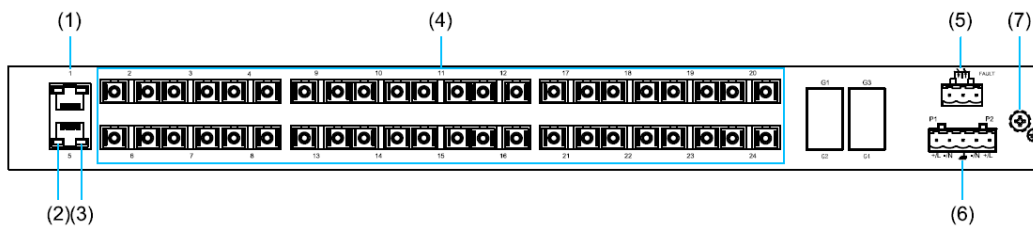
Fiture3-5 Rear Panel of SICOM6424SM-22S/M-2T

Table3-4 Description of the Rear Panel of SICOM6424SM-22S/M-2T

No.	Identifier	Description
(1)	1-2	Two 10/100Base-T(X) Ethernet ports
(2)	--	10/100Base-T(X) Ethernet port speed LED (yellow)
(3)	**--**	10/100Base-T(X) Ethernet port connection status LED (green)
(4)	**3-24**	Twenty-two 100Base-FX Ethernet ports
(5)	FAULT	Alarm terminal block
(6)	P1 P2 +/L -/N -/N +/L	Power terminal block

(7)	--	Grounding screw

1. Gigabit SFP optical/electrical module

SICOM6424SM provides four slots for gigabit SFP optical/electrical modules, as shown in the following figure. A gigabit SFP optical module is equipped with LC connector, while a gigabit SFP electrical module is equipped with an RJ45 port. Each SFP port consists of TX (transmit) port and RX (receive) port. To enable communication between Device 1 and Device 2, connect the TX port of Device 1 to the RX port of Device 2, and the RX port of Device 1 to the TX port of Device 2. Four pairs of gigabit optical/electrical ports can be connected to form a fiber or twisted pair redundant ring. If a fault occurs, the redundant ring helps the network to recover within 50ms, improving network reliability.

Fiture3-6　SFP

● When hot-plugging, insert SFP as below:

1. See and find one gap in RJ45 or two gaps in fiber ports.

2. Insert the SFP into case with the gap backward to the PCB board. The position is right when you hear a sound. Ready for use if the SFP handle horizontal with connector。

● When hot-plugging, pull SFP as below:

1. The fiber part could be separate from SFP case when angle 90 degree between handle of SFP unit and connector.
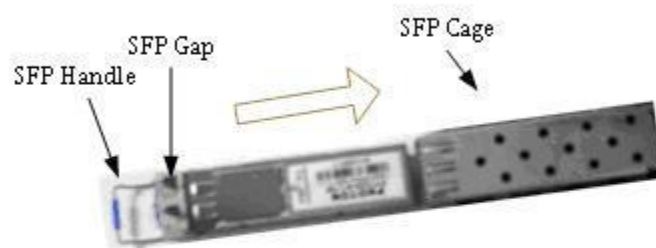
2. Pull out the fiber part from case.

Fiture3-7　The SFP hot-plugging precess

2. 10/100/1000Base-T(X) Ethernet Port

SICOM6424SM provides four 10/100/1000Base-T(X) Ethernet RJ45 ports. All these ports are self-adaptive and can automatically configure themselves to work in 10M or 100M state. With these ports, the switch can be connected to a terminal, server, hub, or another switch through a straight-through or cross-over cable. The ports support IEEE802.3x. They can automatically work in full-duplex or half-duplex, 10 Mbps, 100Mbps, or 1000Mbps. If the connected port of the peer device is not self-adaptive, the port will work at the supported speed. The default duplex mode is half duplex. 10/100/1000Base-T(X) Ethernet RJ45 ports can be connected to form a twisted-pair redundant ring. If a fault occurs, the redundant ring helps the network to recover within 50ms, improving network reliability.

3. 100Base-FX Ethernet Port

SICOM6424SM offers max 24 pairs of redundant 100Base-FX full duplex single mode or multi-mode optical fiber ports, with connector of SC, FC or ST. Fiber ports should be used in pairs (TX and RX are a pair), TX interface is the transmitting end connected to the receiving end RX of the optical fiber interface of another remote switch; RX is the receiving end connected to the transmitting end TX of the same optical fiber interface of the same remote switch. Two

pairs of redundant 100Base-FX optical fiber interface can be used to form an optical fiber redundant ring network. In the event of the system fault, the recovery time of the redundant ring network is less than 50ms, effectively increasing the reliability of network operation.

4. 10/100Base-T(X) Ethernet Port

SICOM6424SM provides up to twenty-four 10/100Base-T(X) Ethernet RJ45 ports. Each RJ45 port has self-adaptation function, support MDI/MDI-X connection and can be connected to end equipments, servers, hubs or other switches in straight-through or cross-over way. Each port supports IEEE802.3x self-adaptation, so the most suitable transmission mode (half duplex or full duplex) and data rate (10 Mbps or 100Mbps) will be automatically selected (the connected equipment should also support this characteristic). If the equipment connected to these port does not support self-adaptation, the ports will be able to send at proper speed but transmission mode is default as half duplex. The RJ45 ports can be connected into redundant TP cable ring network. In the event of the system fault, the recovery time of the redundant ring network is less than 50ms, effectively increasing the reliability of network operation.
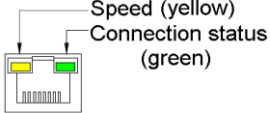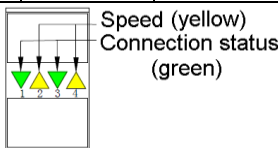
5. LEDs

The indicators on the front panel of SICOM6424SM can indicate system operation and port state to find and correct faults. The Table 3-5/3-6 shows the functions of these LED indicators on the front panel.

Table3-5 Front Panel LEDs

LED	State	Description
Power 1 LED	On	Power 1 is connected and operates properly.
	Off	Power 1 is not connected or

			operates abnormally.
Power 2 LED		On	Power 2 is connected and operates properly.
		Off	Power 2 is not connected or operates abnormally.
Running LED		Blinking	The CPU operates properly.
		Off	The CPU operates abnormally or does not start up.
100M port speed LED	10/100Base-T(X) Ethernet port speed LED	On	100M working state (100Base-TX)
		Off	10M working state (10Base-T) or no connection
	100Base-FX Ethernet port speed LED	On	100M working state (100Base-FX)
		Off	No connection
100M port connection status LED		On	Effective port connection
		Blinking	Ongoing network activities
		Off	No effective port connection
Gigabit port speed LED	10/100/1000Base-T(X) Ethernet port speed LED	On	1000M working state (1000Base-TX)
		Off	10/100M working state (10/100Base-T(X)) or no connection
	Gigabit SFP optical module	On	1000M working state (1000Base-X)
		Off	100M working state (100Base-FX) or no connection
	Gigabit SFP electrical module	On	1000M working state (1000Base-TX)
		Off	10/100M working state (10/100Base-T(X)) or no connection
Gigabit port connection status LED		On	Effective port connection
		Blinking	Ongoing network activities
		Off	No effective port connection

Table3-6 Rear Panel LEDs

LED	State	Description
Speed (yellow) Connection status (green)		
10/100/1000Base-T(X) Ethernet port speed LED (yellow)	On	1000M working state (1000Base-TX)
	Off	10/100M working state (10/100Base-T(X)) or no connection
10/100/1000Base-T(X) Ethernet port connection status LED (green)	On	Effective port connection
	Blinking	Ongoing network activities
	Off	No effective port connection
10/100Base-T(X) Ethernet port speed LED (yellow)	On	100M working state (100Base-TX)
	Off	10M working state (10Base-T) or no connection
10/100Base-T(X) Ethernet port connection status LED (green)	On	Effective port connection
	Blinking	Ongoing network activities
	Off	No effective port connection
Speed (yellow) Connection status (green)		
Gigabit SFP port speed LED (yellow)	Gigabit SFP optical module	On	1000M working state (1000Base-X)
		Off	100M working state (100Base-FX) or no connection
	Gigabit SFP electrical module	On	1000M working state (1000Base-TX)
		Off	10/100M working state (10/100Base-T(X)) or no connection
Gigabit SFP port connection status LED	On	Effective port connection
	Blinking	Ongoing network activities

(green)	Off	No effective port connection

6. Power Terminal Block

Connect the device to AC or DC power input according to power requirements. Use multiple power wires (cross-sectional area of the power wire>0.75mm^2) to connect the power terminal block. Figure 3-8 shows the wiring sequence. The connection and mounting steps are as follows:

Step 1: Ground the device properly.

Step 2: Remove the power terminal block from the device.

Step 3: Insert the power wires into the power terminal block according to the following figure and secure the wires.

Step 4: Insert the terminal block with the connected wires into the terminal block socket on the device.

Step 5: Connect the other end of the power wires to the external power supply system according to the power supply requirements of the device. View the status of the power LEDs on the front panel. If the LEDs are on, the power is connected properly.
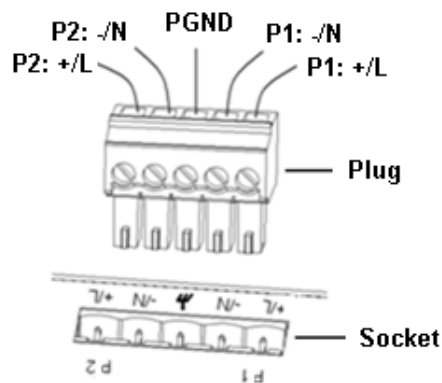

Fiture3-8 Connection of 5-Pin 5.08mm-Spacing Plug-in Terminal Block

7. Alarm Terminal Block

The device provides an alarm terminal block on the rear panel for alarm output. When the switch works properly, the normally-open contacts of the alarm relay are closed and the normally-closed contacts are open; when an alarm occurs, the normally-open contacts are open and the normally-closed contacts are closed. The alarm is outputted through a 3-pin 5.08mm-spacing plug-in terminal block.
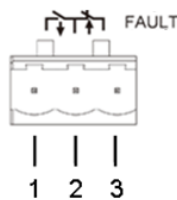

Fiture3-9 Alarm Terminal Block

Note: Pin 1 and pin 2 are normally-open contacts; pin 2 and pin 3 are normally-closed contacts. When the switch works properly, pin 1 and pin 2 are closed, pin 2 and pin 3 are open; when an alarm occurs, pin 1 and pin 2 are open; pin 2 and pin 3 are closed.

Electrical parameters of the relay:

Max Switch Voltage: 250VAC/220VDC

Max Switch Current: 2A

Max Switching Power: 60W

8. RS232 Console Interface

The network management interface of SICOM6424SM is shielded RJ45 connector and its interface communication standard is 3-wire RS232. Users can use a network management cable with end bearing RJ45 plug and another end DB9F plug to connect the network management interface of SICOM6424SM with the 9-pin serial port of the control computer. Operating the local management

software to set up SICOM6424SM by CLI. The wiring sequence for network management interface of SICOM6424SM and the 9-pin serial port of PC computer is shown in Figure 3-10.

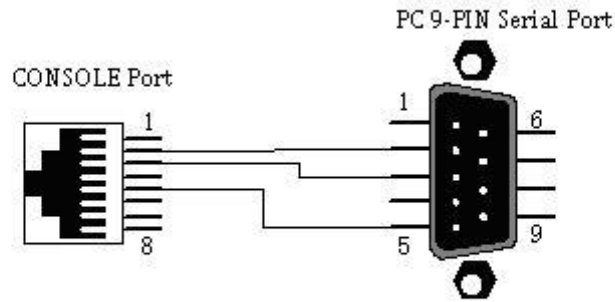Bits per second: 9600, Data bits: 8, Parity: None, Stop bits: 1, and Flow control: None

Fiture3-10　CONSOLE wiring

9. Ground

There is a grounding screw hole at the rear panel of the switch as shown in Fig3-3/3-4/3-5. The grounding wire is connected to cold pressed terminal, both of them are fixed in the hole with grounding screw. The other end of grounding wire can be to the earth. The grounding wire is no less than 2.5mm.

4.   Installation
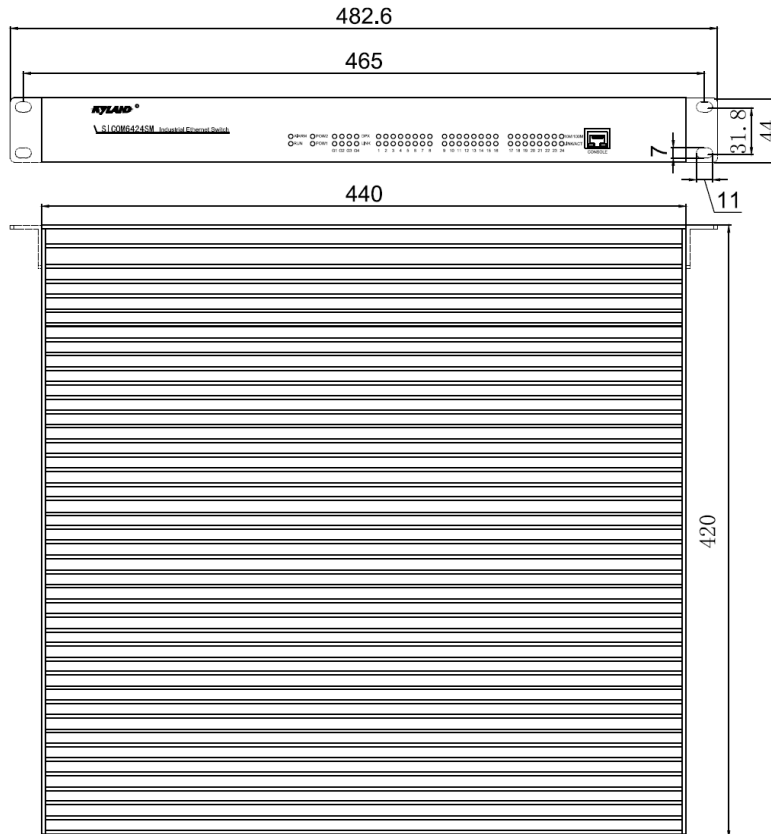
4.1 Dimension Drawing

Fiture4-1 Dimensions (unit: mm)

⚠️   **Caution:**

As part of the heat dissipation system, the switch housing becomes hot during operation. Please use caution when coming in contact and avoid covering the switch housing when the switch is running.

The figures in this manual are only for reference.

4.2 Mounting

The series switches support rack mounting by front/rear panel. Before installation, make sure that the following requirements are met.

1) Environment: temperature (-40℃ to 85℃), ambient relative humidity (5% to 95%, non-condensing)

2) Power requirement: The power input is within the voltage range of the switch.

3) Grounding resistance: <5Ω

4) No direct sunlight, distant from heat source and areas with strong electromagnetic interference.

● Mounting Steps

Step 1: Select the mounting position for the switch and guarantee adequate space and heat dissipation (dimensions: 440mm×44mm×420mm).

Step 2: Move the switch in direction 1 and align the holes in the mounting brackets with the corresponding holes in the rack posts. Use four screws and supporting captive nuts to secure the switch.
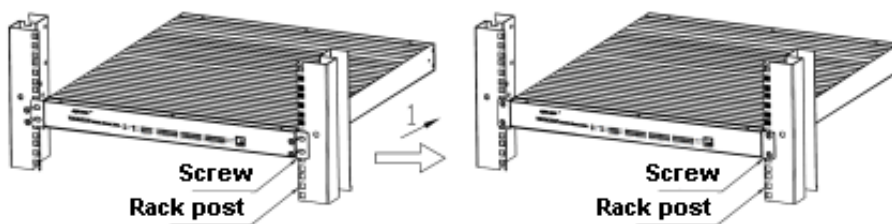

Fiture4-4　Front Panel Mounting

● Dismounting Steps

Step 1: Remove the four screws and supporting captive nuts fastening the switch.

Step 2: Remove the switch from the rack posts. Then remove the mounting brackets from the switch.

4.3 Copper Cable Connection

After having installed the switch, the cable can be connected:

1. Service port

The RJ45 port of 10/100Base-TX is connected to the terminal device by straight-through cable and to networking devices by cross-over cable.

2. Power input

Use the right power supply as instruction on the switch. After other cables are connected, power cable can be connected.

4.4 Optical Fiber Cable Connection

SICOM6424SM offers 0-24 pairs of redundant ports of 100Base-FX, full-duplex, single mode or multimode. These fiber ports can be connected into redundant fiber ring network. In case of failure, the network will be able to re-configure within less than 50ms. The connector can be SC/FC/ST.

⚠ **Warning:**

The switch use laser to transmit signal in optical fibers. The laser is in accordance with requirements for the Class 1 laser products. In normal operation, it is harmless to eyes. But when units are connected with powers, do not directly watch optical transmitting ports and the end surface of optical fiber terminal.

To connect the pluggable fiber module as follows:

1. Remove the rubber capsof the connector and keep them to for use to protect the fiber terminators when unused.

2. Check cleanness of optical fiber terminators. Wet clean paper towel or tampon slightly and clean plugs of optical fibers softly. Dirty optical fiber terminators will reduce optical transmission quality and affect port performance.

3. Connect one side of the optical fiber with an optical port of the switch and connect the other side with an optical port of another unit.

4. Upon finishing connection, check the LIK/ACT indicator for the optical port on the front panel of the switch. It means effective connection to have the LED on.

4.5 Cable Wiring

Cable wiring should meet the following requirements:

1. Before cable wiring, check whether the specifications, models and quantities of all cables and make sure all comply with project requirements.

2. Befoere laying, check whether cables and wires are damaged and ensure they have ex-works records and quality guarantee, and other certificates that prove their quality.

3. The specification, quantity, route, and position of cables and wires shall accord with design requirements under construction drawings. The laying length of each cable and wire shall be determined according to real position.

4. No intermediate break or joint is allowed for the cables to be laid.

5．User's cables and power cable should be laid separately.

6．Inside walkways, the cables should be properly arranged in good order, with uniform, smooth and flat turnings.

7. Cables should be straightly laid in cable channels. Extruding of cable from cable channels to block other outlet or inlet holes is not allowed. The cables at the outlet part of cable channel or at turnings should be bundled and fixed.

8．If cables, power line and grounding conductor are laid in the same channel, cables, power line and grounding conductor should be not folded or blended together. If a cable line is overly long, coil and place it in the middle of the cabling rack, do not let it cover on other cables.

9. For optical fiber cable, avoid knotting it and try not to turn it. Tie it property and lay it separately.

10．There must be the relevant marks at both ends of cable and the information on the marks should be explicit to facilitate maintenance.

$\triangle$ **Attention:**

When laying pigtails, prevent optical fiber cable from knotting, minimize the amount of turnings and avoid turnings with too small radius, because turning with too small radius will result in serious consumption of optical signal of links, affecting communication quality.

5. Test Method

5.1 **Self-test**

After the switch is powered, the service ports LED are blinking one time and 30s later, the RUN LED is always on, which prove the switch is normal.

5.2 **Test TP Ports**

Power the switch as shown in Fig. 5-1, make any two TP ports connect with the network port of the two testing PCs by straight-through cable, transmit Ping command mutually, both sides can correctly Ping to each other and no data package is lost. Meanwhile, the yellow lamp on the corresponding port shall be always on (computer network interface operates at100Mbps), or off (computer network operates at 10Mbps), and the green lamp on the corresponding port shall be blinking. All indicates the hardware of the tested TP ports operates normally. The same test method will be used to test all the rest TP ports (For detailed operation of the Ping command, please refer to the following examples).
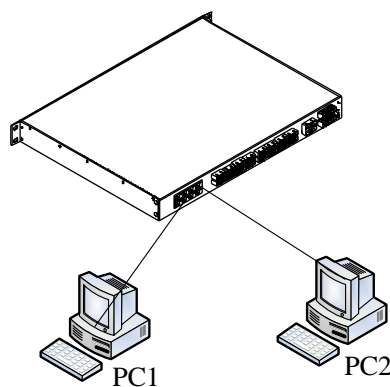

Fiture5-1   Test TP ports

5.3 Test Fiber Ports

Connect the two switches of SICOM6424SM into chain optical network. Any one TP port of each switch is connected to PC by straight through cable and transmit PING command mutually, both sides can correctly Ping to each other and no data package is lost. Meanwhile, the corresponding LINK/ACT lamp is always on. All indicates that the tested fiber port hardware is no problem. The same method is used to test the other pair of fiber ports (For detailed operation of the Ping command, please refer to the following examples).
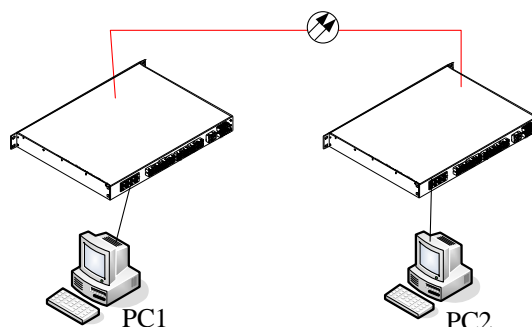

Fiture5-2   Test Fiber Ports

PING commands:

The IP address of testing PC 1 is 192.168.100.10, and PC 2 is 192.168.100.11，operate "cmd" or command (cmd in WIN2000 system, command in WIN98/95) in PC 1 and transmit "ping is 192.168.100.11 –l 1000 –t "(–l means the number of byte, -t means continuously transmitting data), operate "cmd" or command (cmd in WIN2000 system, command in WIN98/95) in PC 1 and transmit "ping is 192.168.100.10 –l 1000 –t". "Reply from 192.168.100.11：bytes=1000 time<10ms TTL=128" is replied by PC1 and "Reply from 192.168.100.10：bytes=1000 time<10ms TTL=128" by PC2. In more than 10 minutes, use "CTL+C" to count packet loss rate. If the packet loss rate is zero, the switch operates normally.

6. Networking & Configurations

6.1 Networking Mode

SICOM6424SM offers 1-24 RJ45 ports of 10/100Base-T/TX, each of which can be direct connection to the terminal devices or the device before terminals as shared link. SICOM6424 has 4 redundant ports of 1000Base-LX or 10/100/1000Base-TX. The gigabit fiber ports can be connected into redundant gigabit fiber ring network with reocovery time less than 50ms. Meanwhile, the 24 fast Ethernet ports can also be connected into redundant 100Mpbs ring network with recovery time less than 50ms.
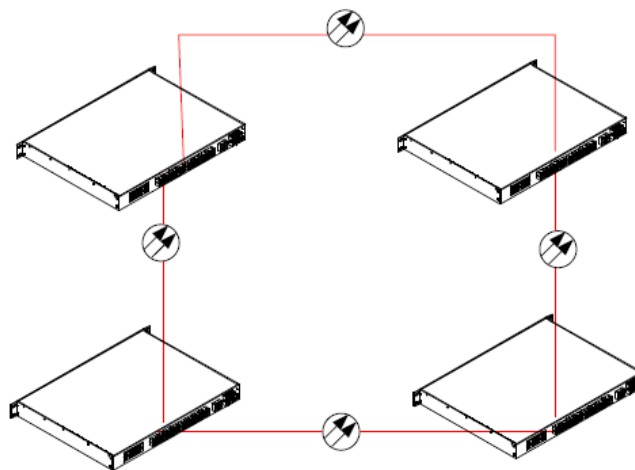
Fiture6-1 Redundant fiber ring network

6.2 Configurations

SICOM6424SM is an integrative industrial Ethernet switch, has max 24 fast Ethernet ports for fiber or copper and 4 SFP ports of 100m/1000M or RJ45 ports of 10/100/1000Base-TX. The details are as follows:

Table6-1   SICOM6424SM Configurations

Model	Port	Power
SICOM6424SM-4GX(E)-24S/M	Four gigabit SFP (or 10/100/1000Base-T(X), RJ45) ports, twenty-four SM/MM 100Base-FX ports (FC/SC/ST)	24DC 48DC 220AC/DC 220AC/DCW (redundant or single power supply)
SICOM6424SM-4GX(E)-22S/M-2T	Four gigabit SFP (or 10/100/1000Base-T(X), RJ45) ports, twenty-two SM/MM 100Base-FX ports (FC/SC/ST), and two 10/100Base-TX ports	
SICOM6424SM-4GX(E)-20S/M-4T	Four gigabit SFP (or 10/100/1000Base-T(X), RJ45) ports, twenty SM/MM 100Base-FX ports (FC/SC/ST), and four 10/100Base-TX ports	
SICOM6424SM-4GX(E)-18S/M-6T	Four gigabit SFP (or 10/100/1000Base-T(X), RJ45) ports, eighteen SM/MM 100Base-FX ports (FC/SC/ST), and six 10/100Base-TX ports	
SICOM6424SM-4GX(E)-16S/M-8T	Four gigabit SFP (or 10/100/1000Base-T(X), RJ45) ports, sixteen SM/MM 100Base-FX ports (FC/SC/ST), and eight 10/100Base-TX ports	
SICOM6424SM-4GX(E)-14S/M-10T	Four gigabit SFP (or 10/100/1000Base-T(X), RJ45) ports, fourteen SM/MM 100Base-FX ports (FC/SC/ST), and ten	

	10/100Base-TX ports
SICOM6424SM-4GX(E)-12S/M-12T	Four gigabit SFP (or 10/100/1000Base-T(X), RJ45) ports, twelve SM/MM 100Base-FX ports (FC/SC/ST), and twelve 10/100Base-TX ports
SICOM6424SM-4GX(E)-10S/M-14T	Four gigabit SFP (or 10/100/1000Base-T(X), RJ45) ports, ten SM/MM 100Base-FX ports (FC/SC/ST), and fourteen 10/100Base-TX ports
SICOM6424SM-4GX(E)-8S/M-16T	Four gigabit SFP (or 10/100/1000Base-T(X), RJ45) ports, eight SM/MM 100Base-FX ports (FC/SC/ST), and sixteen 10/100Base-TX ports
SICOM6424SM-4GX(E)-6S/M-18T	Four gigabit SFP (or 10/100/1000Base-T(X), RJ45) ports, six SM/MM 100Base-FX ports (FC/SC/ST), and eighteen 10/100Base-TX ports
SICOM6424SM-4GX(E)-4S/M-20T	Four gigabit SFP (or 10/100/1000Base-T(X), RJ45) ports, four SM/MM 100Base-FX ports (FC/SC/ST), and twenty 10/100Base-TX ports
SICOM6424SM-4GX(E)-2S/M-22T	Four gigabit SFP (or 10/100/1000Base-T(X), RJ45) ports, two SM/MM 100Base-FX ports (FC/SC/ST), and twenty-two

	10/100Base-TX ports
SICOM6424SM-4GX(E)-24T	Four gigabit SFP (or 10/100/1000Base-T(X), RJ45) ports and twenty-four 10/100Base-TX ports
SICOM6424SM-24S/M	Twenty-four SM/MM 100Base-FX ports (FC/SC/ST)
SICOM6424SM-22S/M-2T	Twenty-two SM/MM 100Base-FX ports (FC/SC/ST) and two 10/100Base-TX ports
SICOM6424SM-20S/M-4T	Twenty SM/MM 100Base-FX ports (FC/SC/ST) and four 10/100Base-TX ports
SICOM6424SM-18S/M-6T	Eighteen SM/MM 100Base-FX ports (FC/SC/ST) and six 10/100Base-TX ports
SICOM6424SM-16S/M-8T	Sixteen SM/MM 100Base-FX ports (FC/SC/ST) and eight 10/100Base-TX ports
SICOM6424SM-14S/M-10T	Fourteen SM/MM 100Base-FX ports (FC/SC/ST) and ten 10/100Base-TX ports
SICOM6424SM-12S/M-12T	Twelve SM/MM 100Base-FX ports (FC/SC/ST) and twelve 10/100Base-TX ports
SICOM6424SM-10S/M-14T	Ten SM/MM 100Base-FX ports (FC/SC/ST) and fourteen 10/100Base-TX ports
SICOM6424SM-8S/M-16T	Eight SM/MM 100Base-FX ports (FC/SC/ST), and sixteen 10/100Base-TX ports
SICOM6424SM-6S/M-18T	Six SM/MM 100Base-FX ports (FC/SC/ST), and eighteen 10/100Base-TX ports

SICOM6424SM-4S/M-20T	Four SM/MM 100Base-FX ports (FC/SC/ST), and twenty 10/100Base-TX ports
SICOM6424SM-2S/M-22T	Two SM/MM 100Base-FX ports (FC/SC/ST) and twenty-two 10/100Base-TX ports
SICOM6424SM-24T	Twenty-four 10/100Base-TX ports

⚠ **Caution:**

To use single power supply, connect P1. For details, see Fig 3-3, 3-4, or 3-5.

Appendix A Twisted-pair and Pin Distribution

For the connection of 10Base-T/100Base-TX, the twisted-pair must have two pair cable. Each pair is distinguished with two different colors. For example, one strand is green, and the other is the alternate of green and white stripes. RJ-45 connector should be equipped at both ends of the cable.

⚠️⚡ **Warning:**

Don't insert a telephone plug into any RJ-45 port. Only use twisted-pair with RJ45 connectors at both ends conforming to FCC standard.

Fig. A-1 Shows how the connector of RJ-45 is numbered please make sure that the inserting direction is correct.
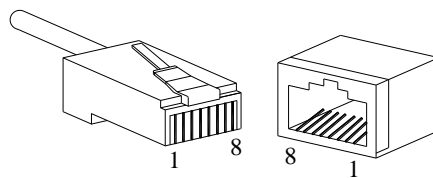

FitureA-1   Connector of RJ-45

Pin distribution of 10Base-T/100Base-TX

Unshielded twisted- pair (UTP) or shielded twisted-pair (STP) will be used for the connection of RJ-45: for the connection of 10Mbps, category 3, 4 and 5 of 100 ohm will be used, and cat.5 of 100 ohm will be used for 100Mbps. Additionally, do make sure that the connecting length of any twisted-pair shall not exceed 100 meter.

Port of RJ-45 supports automatic MDI/MDI-X operation, PC or server may be connected with straight-through cable, or connect with other switch or hub. In straight-through cable, pin 1, 2, 3 and 6 at one end of the cable are connected to pin 1, 2, 3 and 6 at the other end of the straight-through

cable respectively. Cross-over cable must be used for switch or hub with MDI-X port. The pin distribution of 10Base-T/100Base-TX is listed in the table A-1.

Table A-1 Pin distribution of 10Base-T/100Base-TX

Pin	MDI-X signal name	MDI signal name
1	Receiving data ＋（RD+）	Output data ＋（TD+）
2	Receiving data －（RD-）	Output data －（TD-）
3	Output data ＋（TD+）	Receiving data ＋（RD+）
6	Output data －（TD-）	Receiving data －（RD-）
4，5，7，8	Unused	Unused

**Note:** "+""-"denoting cable polarity.

Definition of straight-through cable from RJ45 (8-pin) to RJ45 (8-pin)

| Pin	MDI-X	MDI
1	Transmit/Receive Data (TRD1+)	Transmit/Receive Data (TRD0+)
2	Transmit/Receive Data (TRD1-)	Transmit/Receive Data (TRD0-)
3	Transmit/Receive Data (TRD0+)	Transmit/Receive Data (TRD1+)
4	Transmit/Receive Data (TRD3+)	Transmit/Receive Data (TRD2+)
5	Transmit/Receive Data (TRD3-)	Transmit/Receive Data (TRD2-)
6	Transmit/Receive Data (TRD0-)	Transmit/Receive Data (TRD1-)
7	Transmit/Receive Data (TRD2+)	Transmit/Receive Data (TRD3+)
8	Transmit/Receive Data (TRD2-)	Transmit/Receive Data (TRD3-)

Note: "+""-"denoting cable polarity.

Definition of straight-through cable from RJ45 (8-pin) to RJ45 (8-pin)
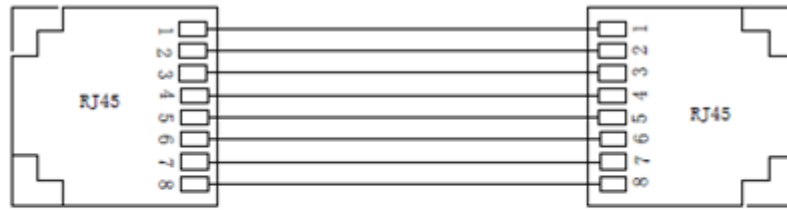
The connection sequence is in turn:

Orange-white, Orange, Green-white, Blue, Blue-white, Green, Brown-white and Brown

FitureA-2 Cable sequence of straight-through cable

Definition of Cross-over cable from RJ45 (8-pin) **to** RJ45 (8-pin)
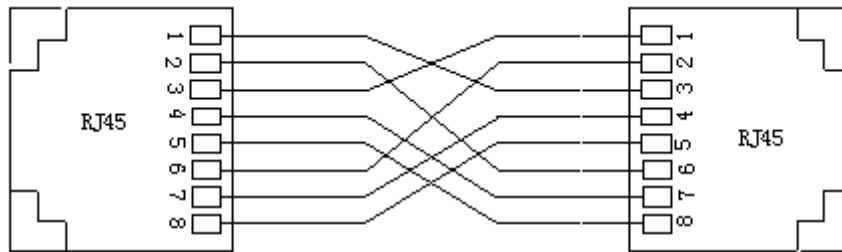
The connection sequence is in turn:

Orange-white, Orange, Green-white, Blue, Blue-white, Green, Brown-white and Brown
Green-white, Green, Orange-white,   Blue, Blue-white, Orange, Brown-white and Brown

FitureA-3 Cable sequence of cross-over cable

Appendix B Cable Type and Specifications

The cable type and specifications are shown as table B-1:

Table B-1 Cable type and specifications

Cable	Type	Max. length	Connector
10Base-T	Cat 3,4 and 5 100 ohmUTP	100m	RJ45
100Base-TX	Cat 5 -100ohmUTP	100m	RJ45
100Base-FX	50/125 or 62.5/125µm core multi-mode fiber（MMF）	5km(1310 nm(MM))	SC/FC/ST
100Base-FX	9/125µm single-mode fiber（SMF）	40km(1310nm(SM)) 80km(1550nm(SM))	SC/FC/ST
1000Base-T	Cat 5-100 ohm UTP	100m	RJ45
1000Base-LX	9µm or 10µm core sigle-mode fiber(1310nm)	5km	LC
1000Base-LX	50/125 or 62.5/125µm core multi-mode fiber（MMF）(850nm)	550m	LC

Appendix C Glossary

Terminology	Explanation
10Base-T	Twisted-pair standard of Cat3, Cat4 and Cat5 in IEEE specification for 10Mbps Ethernet
100Base-TX	Twisted-pair standard of Cat5 or above in IEEE specification for 100Mbps Fast Ethernet
100Base-ＦX	Fast Ethernet which uses one pair of multi-mode or single mode optical fiber to transmit.
Adaptive	A characteristic that is automatically configured to adaptive mode for the speed, duplex and traffic control port.
Bandwidth	The information capacity that the channel can transmit. For instance, the bandwidth of the Fast Ethernet is 100Mbps（bit per second）.
Baud Rate	It expresses the signaling rate which is defined as the change times of the status for the electric or optical transmission medium within 1 second.
Bridge	One of network equipments which run on the layer2 in the OSI layer7 model, and it can be connected to the LAN or network segment which uses the same protocol. It presents the automatic network address learning and network configuration function.
Traffic Control	It is a congestion control mechanism. The network equipment sends the data to the equipment which has overloaded and causes the port to congest. The traffic control can prevent the data packet from loss and avoid the congestion for the port.
Broadcast	One data packet is sent to all equipments on the network.
Broadcast storm	Restless forward broadcast frame or multicast frame on bridge caused by the bridge ring.
Full Duplex	Use switches to set up the point to point connection among nodes in the LAN and allow them to receive and send data packet at the same time.
Half Duplex	The communication for two nodes can only move toward one direction at the same time, but can not move toward both directions.

MDI	It is the Medium Dependent Interface, in which, one Ethernet port is taken as the receiving terminal to connect to the port of other equipment.
MDI-X	Medium Dependent Interface Cross-over