SICOM6524

Industrial Ethernet Switch

User's Manual

KYLAND Technology Co., Ltd.

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Preface

SICOM6524, a new generation full Gigabit industrial Ethernet switch, is specially design for the core backbone network, based on the technical advantages of Kyland and numerous years of research and development of industrial Ethernet switch, Its high-performance switch engine, solid and closed chassis, single-ribbed design of chassis surface for high efficient heat-dissipation, over current, over voltage and EMC protection in power input side, excellent EMC protection of RJ45 port make SICOM6524 withstand harsh and dangerous industrial environments. Its redundant function of optical fiber network and redundant power supplies provide multi-support for reliable operation of the system.

The User's Manual for SICOM6524 Industrial Ethernet Switch mainly introduces its technical principles, performance indexes, installation and commissioning, etc. It is a reference for users in system startup, expansion and routine maintenance. It is also a practical teaching material for user training and technician study.

This manual mainly includes the following contents:

Chapter 1 Overview and system features of SICOM6524;

Chapter 2 Performance and service functions of SIOCM6524;

Chapter 3 Hardware structure of SICOM6524;

Chapter 4 Hardware Installation of SICOM6524;

Chapter 5 Field test methods for SICOM6524;

Chapter 6 Network topology and system configuration of SICOM6524;

Appendix A Introduces twisted pair and pin distribution rules of SICOM6524;

Appendix B Introduces cable types and specifications of SICOM6524;

Appendix C Introduces abbreviations used in this manual.

Statement: As product and technology upgrades and improves constantly, the contents of this document may not completely accord with the actual product. For product upgrading information, please visit our company's website or directly contact with our business representative.

Notice for Safety Operation

This product performs reliably as long as it is used according to the guidance. Artificial damage or destruction of the equipment should be avoided.

● Read this manual and put it away for future reference;

● Do not place the equipments near water sources or humid places;

● Do not place anything on power cable and put the cable 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 cut off the power supply and contact 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 makes noise.

● Please keep optical fiber plugs and sockets clean. During the operation of equipments, do not look directly at 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.

Explanation of Warning Marks:

This manual uses two kinds of noticeable warning signs to arouse special attention of users during operation. The implications of these signs are as follows:

Warning: pay special attention to the notes behind the mark, improper operation will lead to serious damage of the switch or injury of the operating personnel.

Caution, attention, danger: remind the operators places that need to pay attention to.

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Chapter 1: System Overview

1.1 Product Overview

SICOM6524, a new generation full Gigabit industrial Ethernet switch, is specially design for the core backbone network, based on the technical advantages of Kyland and numerous years of research and development of industrial Ethernet switch, Its high-performance switch engine, solid and closed chassis, single-ribbed design of chassis surface for high efficient heat-dissipation, over current, over voltage and EMC protection in power input side, excellent EMC protection of RJ45 port make SICOM6524 withstand harsh and dangerous industrial environments. Its redundant function of optical fiber network and redundant power supplies provide multi-support for reliable operation of the system.

SICOM6524 adopts rack mounting structure with the height of 1U. The case of switch is made of aluminum alloy with a good sealing performance and IP40 protection class. All connectors in the devices are industrial level products for reliable connection. SICOM6524 is designed with full consideration of thermal design, EMC design, completely compliant with EMC requirements regulated in IEC61000.

SICOM6524 series Gigabit industrial Ethernet switch has powerful network management function, supporting CLI, Telnet, WEB, SNMP-based network management software and OPC network management software.

1.2 Product Features

1. High performance core industrial Ethernet switch

- Supports three types of cards: 4GX/GE-20GX, 4GX/GE-20GE and 12GX-12GE with the total of 24 ports in the device

- Gigabit SFP slot, supporting hot-swappable LC fiber interface module and RJ45 copper interface module

- 10/100/1000Base-TX self-adaptive Ethernet ports (full duplex, half duplex), support MDI/MDI-X auto-connection

- Fast fiber ring network redundant technology with the recovery time of less than 50ms to enhance the system communication reliability

- Supports IEEE802.1Q-based VLAN with max 4094 VLANs

- Supports DT-Ring protocol suite, STP/RSTP/MSTP, VRRP, etc

- Supports static routing, equal cost multipath routing, policy routing and multiple dynamic routings, such as RIP v1/v2, OSPF v2, BGPv4, etc

- Supports IGMP, PIM-SM, PIM-DM, DVMRP, etc multicasting protocols

- 48Gbps backplane switching bandwidth, hardware routing, and wire speed switching layer 3 packets

- Routing table size is 512K

- Supports QoS policies and multi queues scheduling algorithm

- Supports SNMP, RMON (1, 2, 3, 9), Telnet, CLI, etc network management protocols

- Supports hardware ACL function, provide data filtering from L2 to L7

- Supports IGMP Snooping function

- Supports broadcast storm control

- Supports full-duplex and half-duplex mode flow control

- Support speed limit with $n \times 64K$ steps

- Power: 48VDC, 220VAC/DC

- Reliability: MTBF≥50000 hours

- Supports IP conflict alarm, MAC conflict alarm, port alarm, ring alarm, etc

- FTP/TFTP-based online software upgrade, easy for user's device management and renewal

- SICOM6524 supports graphical network configuration, management and maintenance functions, capable of remote monitoring network operation status, performance, and provides network troubleshooting, diagnosis, location and alarm functions

2. Industrial Power Design

Support industrial power input: 48VDC (36 ～ 72VDC), 220VAC/DC (165~265VAC/200~400VDC)

Power input with over-current, over-voltage and EMC protection.

3. **Rugged design**

Single ribbed surface design is adopts on both sides of aluminum case for high efficient heat dissipation; reliable operation at -40℃ to +65℃

Solid and sealed aluminum case with IP40 protection class, and is able to work in harsh and dangerous industrial environments

1.3 Packing list and unpacking check

1. **Packing list**

Refer to packing list

Unpacking check

Before opening the case, place it stably, pay attention to the direction of the packing case and ensure its right side is facing upward, so as to prevent SICOM6524 falling from the case after opening it. If using a hard object to open the case, do not over extend the hard object into the case to avoid damage of the equipments inside it.

After opening the case, please check the amount of SICOM6524 equipments according to the packing list and check the appearance quality of SICOM6524.

Warning:

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

Chapter 2: Performance Specifications

2.1 System Specifications

The system performance specifications of SICOM6524 core industrial Ethernet switch are shown in Table 2-1.

Table 2-1 System Specifications

Specifications	SICOM6524
Gigabit fiber/copper ports	1) 4GX/GE-20GX: 20 Gigabit SFP slots and 4 combo SFP slots and 10/100/1000Base-TX ports 2) 4GX/GE-20GE: 20 10/100/1000Base-TX ports and 4 combo SFP slots and 10/100/1000Base-TX ports 3) 12GX-12GE: 12 10/100/1000Base-TX ports and 12 Gigabit SFP slots
System performance	Standards: IEEE802.3, IEEE 802.3x, IEEE 802.3u, IEEE 802.3z, IEEE 802.3ab, IEEE 802.1w, IEEE 802.1d, IEEE 802.1p, IEEE 802.1q, IEEE 802.3ad, wire speed switching and forwarding layer 3 packets Max. filtering speed: 148810pps (100M), 1488100pps (1000M) Switching mode: Store-and-Forward System backplane bandwidth: 48Gbps Routing address table: 512K EMC: EN61000
TP port parameters	Physical port: shielded RJ45 RJ45 Ports: 10/100/1000Base-TX, supporting auto-negotiation Port standard: in line with IEEE802.3ab standard Transmission distance: <100m
Fiber port parameters	Wave length: 1310nm (SM) 1550nm (SM) 1310 nm (MM) Transmission distance: 10~80km (SM), <2km (MM) Connector type: SFP-LC Transmission speed: 1.25Gbps (Gigabit)
Power supply	Input voltage: 48VDC (36~72VDC), 220VAC/DC

	(165~265VAC/200~400VDC) Input power consumption: <50W (full fiber ports: 150W) Over-current protection: built in
Mechanical parameters	Physical dimensions (height×width×depth): 44 ㎜×482.6 ㎜×375 ㎜ Installation: IU rack mounting Heat dissipation mode: aluminum alloy single ribbed case Outlet method: back outlet Shell protection class: IP40 Weight: 5.5kg
Ambient conditions	Operating temperature: -40℃~+65℃ Storage temperature: -40℃~+85℃ Humidity: 0～95% （non-condensing）

2.2 Service Interface

1. SICOM6524 industrial Ethernet switch supports three types of card:

   1) 4GX/4GE-20GX: 20 Gigabit SFP slots and 4 combo SFP slots and 10/100/1000Base-TX ports

   2) 4GX/GE-20GE: 20 10/100/1000Base-TX ports and 4 combo SFP slots and 10/100/1000Base-TX ports

   3) 12GX-12GE: 12 10/100/1000Base-TX ports and 12 Gigabit SFP slots

2. 10/100/1000Base-TX RJ45 ports. Each port has self-adaptive function, capable of being automatically configured between 10/100/1000M, full duplex or half duplex operation mode, supporting MDI/MDI-X auto-connection. The max transmission distance is 100m.

3. Gigabit SFP slots support hot-swappable Gigabit single mode or multi mode fiber interface module and RJ45 copper interface module with the max throughput of 1000Mbps for each port and are forced to work in 1000M full-duplex mode, support link redundant technology with the recovery time of less than 50ms.

4. Complies with IEEE802.3/802.3u/802.3x/802.3z/802.3ab, etc

Chapter 3: Hardware Structure

3.1 System Structure

In the part of hardware design, SICOM6524 is a 24 ports layer 3 Gigabit rack mounting switch with the standard height of 1U. The complete device contains a piece of motherboard and a piece of power board.

The motherboard uses Freescale's CPU and Broadcom's switching chip to achieve the design of 24 ports Gigabit wire speed switching.

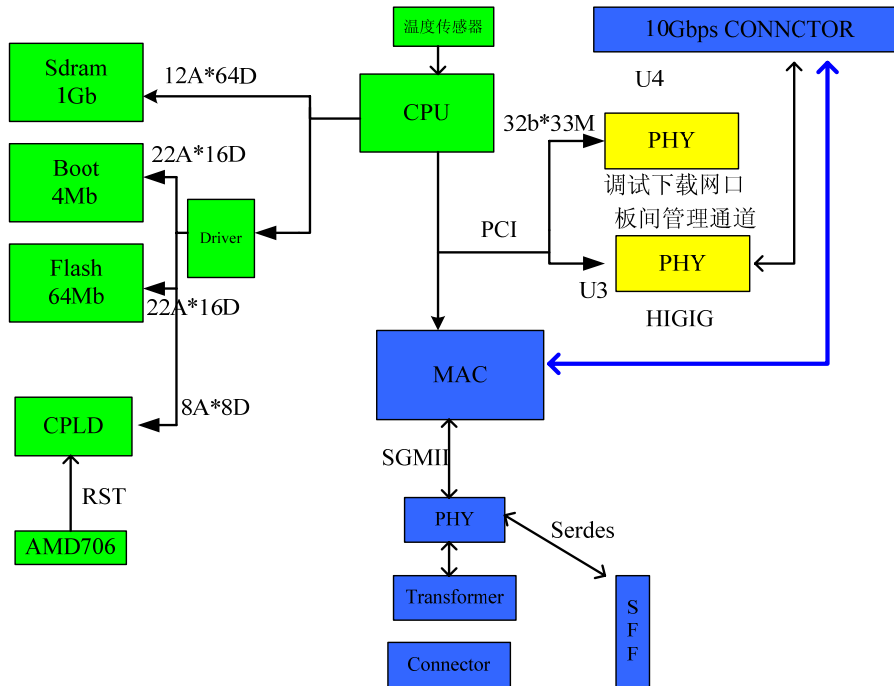The hardware structure of SICOM6524 is as Figure 3-1:

Figure 3-1 Hardware Structure

3.2 Device Structure

3.2.1   Chassis

SICOM6524 chassis is a 19 inch 1U rack mounting structure. The entire unit adopts six-side-enclosed structure with protection class up to IP40. The top, left and right panels of chassis are made of single-ribbed aluminums which are a part of the heat dissipation system of the device.

The single-ribbed structure increases heat dissipation area. The heat generated when the unit is working is effectively dissipated into the environment via the single-ribbed surface in the form of radiation and convection, greatly increasing its high temperature resistance performance and improving system stability. The drawing of SICOM6524 chassis is shown in Figure 3-2.

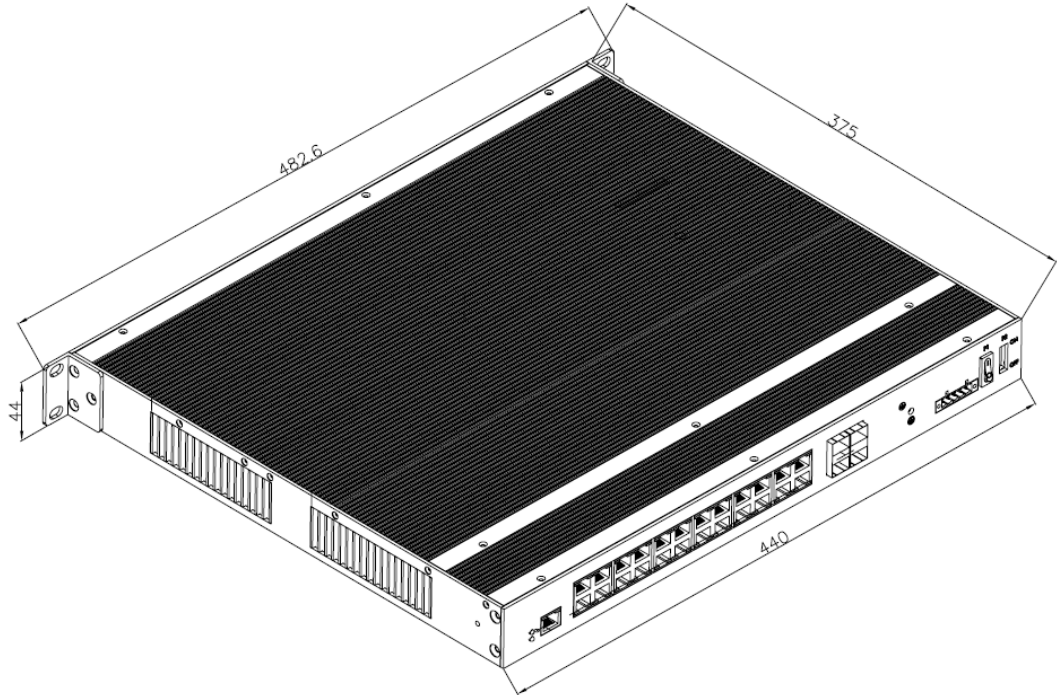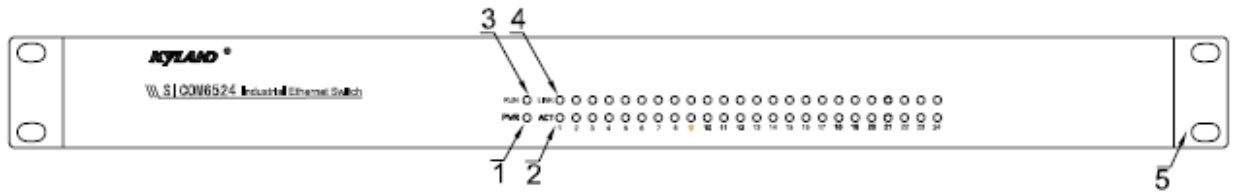Its dimension: 44 ㎜× 482.6 ㎜×375 ㎜,（height × width ×depth）

Figure 3-2 Chassis dimensions of SICOM6524

Warning: The shell is a part of the heat-dissipation system, getting hot during working, so never touch the case when the equipment is working to avoid burning.

3.2.2   Front Panel

The front panel structure of SICOM6524 industrial Ethernet switch is shown as Figure 3-3:

Note: 1. PWR, power indicator; 2: ACT, indicator to show Gigabit port operation state 3: RUN, operation indicator; 4: LINK, indicator to show Gigabit port link state; 5 flange for chassis installation

LED indicators

The indicators on the front panel of SICOM6524 can show system operation and port status, helping detect and eliminate faults. Table 3-1 describes the meanings of all LED indicators on the front panel.

Table 3-1 LED indicators

LED	State	Description
System state LED		
RUN	Blinking 1Hz	Switch operates normally
	Off	Switch does not start up
Power indicator		
PWR	ON	Normal operation
	OFF	Abnormal operation
Gigabit copper port/SFP slot state LED (2 LEDs for each port)		
LINK	On	Effective network connection in the port
	Off	No effective network connection in the port
ACT	Blinking	Network activities in the port
	Off	No network activities in the port

3.2.3 Rear Panel

The rear panel of SICOM6524 industrial Ethernet switch integrates Gigabit SFP slots, Gigabit Ethernet RJ45 ports, one 5-pin DC/AC power terminal, one power switch, one Console port, one

grounding hole, one operation indicator, one power indicator. Three types of rear panels are shown in the following figure 3-4.

SICOM6524-4GX/GE-20GX

SICOM6524-4GX/GE-20GE

SICOM6524-12GX-12GE
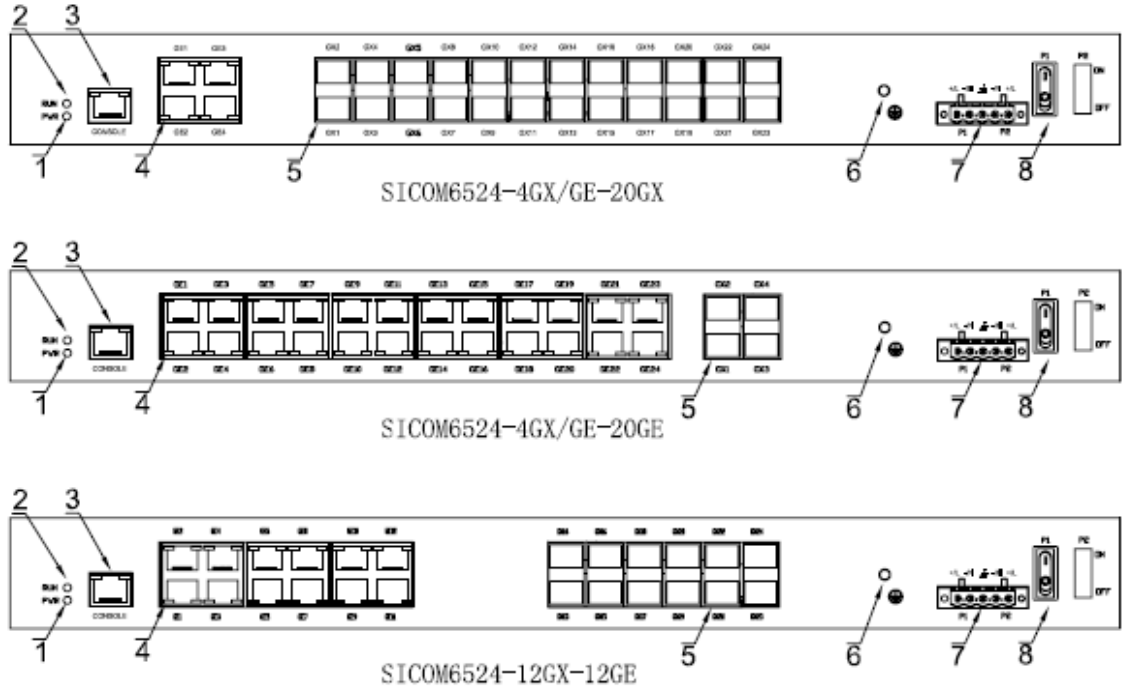
Note: 1: PWR, power indicator; 2: RUN, operation indicator; 3. Console port;

    4: GE, 10/100/1000Base-TX port

    5: GX, Gigabit SFP slot for 1000Base-SX/LX/LH/ZX-LC fiber interface module or 10/100/1000Base-TX RJ45 interface module

    6: Grounding hole; 7: Power terminal block; 8: Power switch

Gigabit fiber/copper port

SICOM6524 has Gigabit SFP slot and 10/100/1000Base-TX Ethernet RJ45 port. The designs of three types of motherboard are as follows:

1) 4GX/4GE-20GX: 20 Gigabit SFP slots and 4 combo SFP slots and 10/100/1000Base-TX ports

2) 4GX/GE-20GE: 20 10/100/1000Base-TX ports and 4 combo SFP slots and 10/100/1000Base-TX ports

3) 12GX-12GE: 12 10/100/1000Base-TX ports and 12 Gigabit SFP slots

In the mother board of 4GX/GE-20GX and 4GX/GE-20GE, the ports with number 1, 2, 3, 4 are

combo ports. If choose 4 SFP slots, the 4 copper ports can't be used; and if link 4 copper ports, the 4 SFP slots can't be used.

SFP slot supports hot-swappable Gigabit single mode or multimode fiber interface module and RJ45 copper interface module to make 1000Base-LX full-duplex single mode or multi mode port or 10/100/1000Base-TX RJ45 port. In SFP modules: LC connector for fiber port, RJ45 connector for TP port. Fiber ports should be used in pairs (TX and RX are a pair). TX port is for transmission, connected to receiving port RX in a remote switch; RX port is for receiving, connected to the transmitting port TX in the same pair of the same remote switch. Using 1000Base-LX fiber ports can form redundant fiber ring network with the recovery time of less than 50ms, which effectively increase the reliability of network operation. The SFP modules are shown in the below Figure 3-5

Copper port	Fiber port
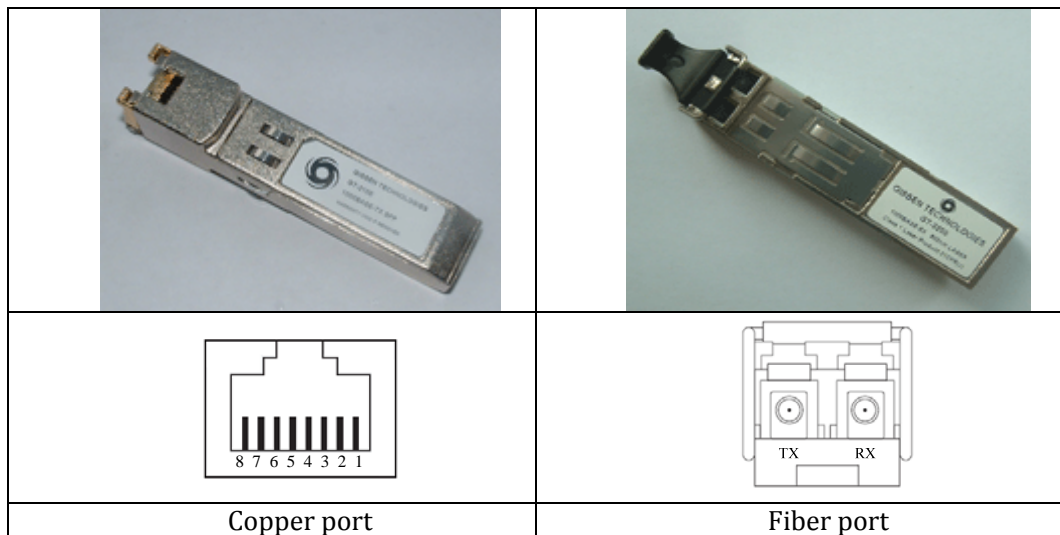
Gigabit SFP modules hot plug and play steps:

● Take a close look at SFP module. There are two breaks on the fiber port SFP module with LC connector and one break on the copper port SFP module with RJ45 connector

● Inserting: Inserting the end of module without breaks into the SFP slot in the switch until you hear a sound.

● Pulling out: Put down the handle in the SFP module, forming a 90 degree angle with the port, then use the handle to pull out the SFP module from the SFP slot.
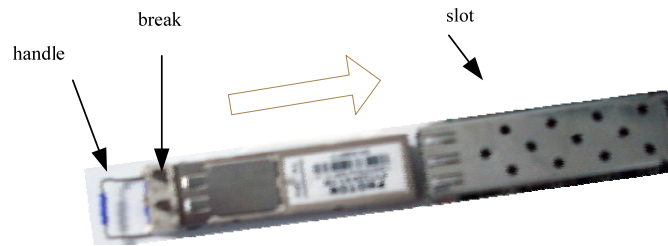
Gigabit Ethernet RJ45 port

SICOM6524 supports 10/100/1000Base-TX Ethernet RJ45 ports. Each RJ45 port has self-adaptive function and support MDI/MDI-X auto-connection. They can be connected to terminal devices, server, hub or other devices with straight-through cable or cross-over cable.

RS232 CONSOLE interface

The Console interface of SICOM6524 is a shielded RJ45 connector and its communication standard is 3-wire RS232. Users can use a network management cable with one end bearing RJ45 plug and the other end bearing DB9F plug to connect the Console interface with the 9-pin serial port in the control computer. Operate the hyper terminal in the control computer to configure SICOM6524 by CLI command. The cable wiring is shown in Figure 3-7.

The configuration parameters for hyper terminal port: baud rate: 9600; data bit: 8; parity check: none; stop bit: 1; flow control: none

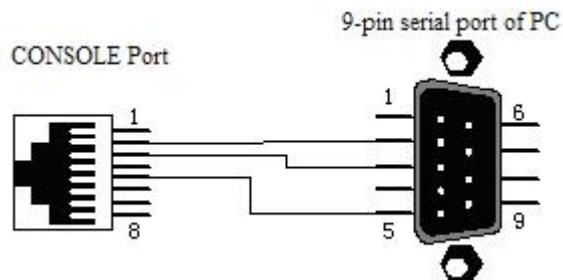Figure 3-7: the wiring diagram for Console management

5.08mm-spacing terminal block for power input

SICOM6524 supports 220VAC or 48VDC power input voltage. Input proper power with the instruction on the device label and use this terminal block to connect power cables. Using multi-strands power lines with each section more than 0.7mm^2 (the biggest section is 2.5mm^2), The wiring diagram is as below figure.
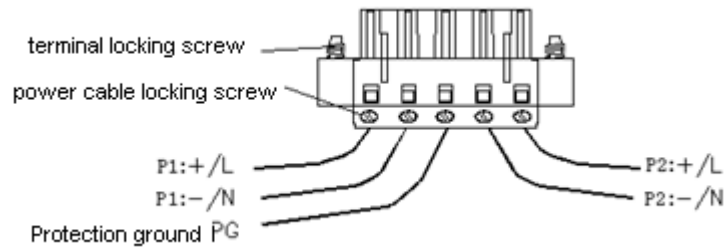
Figure 3-8: 5.08mm-spacing power terminal block

Grounding

The rear panel of SICOM6524 has a grounding screw hole (M4). After crimping one terminal of grounding cable with the cold-pressing terminal, fix it to the grounding hole with grounding screws. The other terminal of grounding cable reliably connects to the ground. The section area of grounding cable should not be less than 2.5mm^2.

3.3 Device Usage

1. Check up before power connection

   Before powered on, please check if all power input and output cables are connected correctly and ensure whether hardware devices meet the hardware environmental requirements of SICOM6524

2. Start up device

   After power input, turn on the power switch and check if switch work normally.

3. Port commission

Copper port connection status can be check from the LED indicators in the front panel of SICOM6524. If port is linked successfully, its corresponding LED will keep ON; when data is transmitted and received in the port, the corresponding LED of the port will keep blinking; and RUN indicator is blinking after the switch is powered on which means that switch is running normally. Power LED indicator keeps ON which means that the power supply is normal. In the mother board of 4GX/GE-20GX and 4GX/GE-20GE, the ports with number 1, 2, 3, 4 are combo ports. If choose 4 SFP slots, the 4 copper ports can't be used; and if link 4 copper ports, the 4 SFP slots can't be used.

4. Serial port commission function (CONSOLE)

SICOM6524 industrial Ethernet switch has a CONSOLE port for commission. Use a DB9 to RJ45 serial cable to connect the Console port with PC serial port and set the PC serial port commission program to the following mode:

Figure 3-9: serial port property setting

Then operate the switch by PC to achieve network configuration and information query. Please refer to SICOM6524 Industrial Ethernet Switch Software Operation Manual for detail information.

5. Attentions on device shutdown

Shut down the device with a correct method. Don't cut the power directly.

6. Restart

The switch support software restart and hardware restart. Please make a choice based on the actual needs.

Chapter 4 Hardware Installation

4.1 Installation requirement

SICOM6524 series industrial Ethernet switch is a single unit and adopts rack mounting structure for easy installation and maintenance. The height of the complete device is 1U.

Before installation, make sure all conditions match the installation requirements below.

1．Power supply: 48VDC (36~72VDC), 220VAC/DC (165~265VAC/200~400VDC), please pay attention to the power voltage.

2．Environment: operating temperature: -40℃~65℃; Relative humidity (non-condensing) 0％ ~95%

3．Earthing resistance: <5Ω

4．Make sure all fiber units are ready for use

5．Avoid direct sunshine, heating device and strong EMC area

6．Check whether there are cables and connectors needed.

4.2 Mainframe installation

The mounting dimensions of SICOM6524 industrial Ethernet switch is shown in the Figure 4-1. If SICOM6524 is required to install on a rack, please check the rack first before mounting with following steps:

1．Ensure if there is enough space for the switch

2．Ensure a proper power voltage for the switch
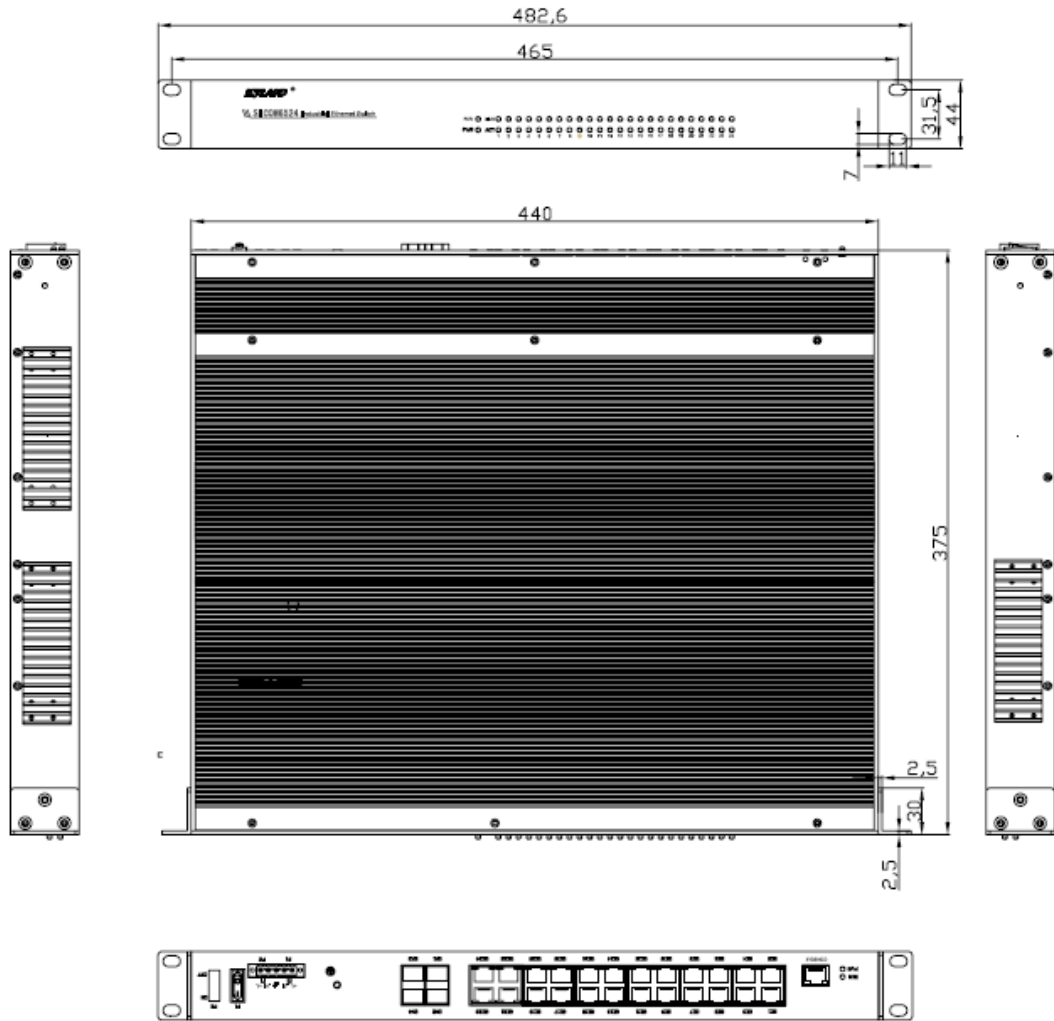
Figure 4-1: SICOM6524 mounting dimension

4.3 Cable connection

After the installation of SICOM6524, the next step is to connect the cables.

1 . Connecting service interface

SICOM6524 offers 10/100/1000Base-TX RJ45 ports to connect with terminal equipments by straight-through cables, and to connect with network devices by cross-over cables.

2 . Connecting power

Use the proper power supply voltage listed on the product label. After finishing other cables connection, connect the power.

4.4 Optical Fiber Connection

SICOM6524 provides Gigabit SFP slot which support hot-swappable Gigabit single mode or multi mode fiber interface module and RJ45 copper interface module. Fiber ports are able to form fiber redundant ring network with the recovery time of less than 50ms and the type of connector for fiber port is LC.

⚠ CAUTION ：

Laser is used to transmit signals in fiber cables. Routine operations do not harm to eyes, but do not directly look at the fiber port when the switch is powered on.

The steps of fiber cable connection are as follows

1. Remove the rubber caps of the fiber ports and keep them for protecting the ports when they are not used.

2. Check whether the ports are clean. Dirty ports might affect the transmitting quality. Use wet handkerchiefs or cotton balls to sweep the cable connectors.

3. Connect the fiber cables to fiber ports.

4. After connection, check the corresponding LINK/ACT indicator in the front panel of switch. If the indicator goes on, it means an effective connection.

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 comply with the construction drawing design and contract requirements.

2. Before cable wiring, it is necessary to check whether there are damaged cables and whether the cables are accompanied by ex-factory records and vouchers attesting their quality such as quality assurance certificate etc.

3. The specifications, quantities, route directions and laying position of the cables to be laid should meet the design requirements of construction drawings. The laying length of each

cable should be determined according to its actual 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. When laying the pigtail, avoid knotting of optical fiber cable, minimize the amount of turnings and avoid turnings with overly small radius. Bundle pigtails in proper tightness and avoid too tightly bundling. If laid on a cabling rack, it should be placed separately from other cables.

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

⚠ 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.

4.6 Hardware Maintenance

1. Ensure the device operation environments meet requirements

2. Monitoring device working status. When the device operate normally,

● PWR indicator in the front panel is ON

- Power indicator (PWR) and system operation indicator (RUN) in main board is ON

- The indicators of ports which are used in the main board are ON or blink

4.7 Troubleshooting

In the use of SICOM6524, users might meet the following problems:

1. After power connection, switch don't work

Solution:

- Check if the power plug is connected securely.

2. Power indicator in main board is OFF

Solutions:

- Check if the power connectors become loosened

- Use SICOM6524 serial port cable to read switch information and check if the switch operates normally; if the switch operates abnormally, the device need to be replaced

3. Indicators of ports which are used are OFF

Solutions:

- Please check if the cables are connected securely at two ends. It is capable of using unused physical ports to check.

- Check if the ports at two ends are set at SHUTDOWN mode. If they are, please delete this configuration

- Use serial cable to read port status. If the port works normally, please change the indicator.

4. Switch copper ports works under 100M mode

Solution:

- Check the port configuration at two ends. If they are forced to work at 100M, please restore its default settings

- Please check if the ports are connected securely. If no, please reconnect it.

5. Fiber port couldn't LINK

Solutions:

Please check if the fiber connectors are fastened well. If no, please reconnect and check if the fiber connectors are clean. It can be confirmed by unused ports.

6．No communication in Serial port of PC

Solutions:

● Please check if the connection between switch CONSOLE port and PC serial port is reliable

● Please check if serial cable is in good condition. Connect serial cable with PC, use golden wires to short circuit pin 2, 3 in the plug of serial cable; send data in PC serial port program at will and check if they are received by PC. If they are received, it proved that PC and serial cable are in good condition. If not, it means something wrong with serial cable or PC, so you need to check them one by one.

7．Packet loss in copper ports

Solutions:

● The switches have been strictly tested before they are dispatched from the factory, so the probability of packet loss is little. But if packet loss happens, please check if the connections for copper ports are reliable. If it is reliable and packet loss still exist, please plug the cable to other ports for comparison to ensure what went wrong. Don't start up the switch hastily.

8．Packet loss in fiber ports

Solutions:

● The switches have been strictly tested before they are dispatched from the factory, so the probability of packet loss is little. But if packet loss happens, please check if the connections for fiber ports are reliable. Check the optical power and receiving sensitivity. Optical power decays as 0.2dB/km.

● Check if fiber cables are qualified. Optical power decays as 0.2dB/km.

4.8 Important Points

1．Heat dissipation and ventilation
If the heat is dissipated improperly and the ventilation is poor during the use of switch, it might cause high temperature of the switch, and decrease CPU efficiency, even dead of the machine.

2．Fiber port

The SFP fiber ports in the front panel have caps for protection. Don't take off the cap when the port is unused to avoid dirt in fiber port and effect communication

3．Spare parts

Spare parts must be stored in a dry place at moderate temperature to avoid going moldy because of moisture

Chapter 5: Test Methods

5.1 Self inspection

When the equipment is powered on, PWR indicator will keep on. After 1 minute, device startup normally and RUN indicator keep blinking.

5.2 TP Port Test

As shown in Figure 5-1, after SICOM6524 is powered on, respectively connect two TP ports in the switch to two test computers by straight-through cables, and send the "ping" command to each other. If both of them receive complete command without packet loss and the corresponding yellow light of the port keep on (PC work on 100M) or keep off (PC work on 10M) and the corresponding green light blink, they mean that these two TP ports are in good conditions. Test other TP ports as the same way. The PING command example is as follows.
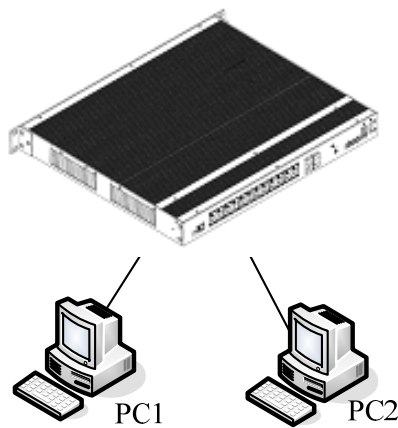

Figure 5-1 TP port test

5. 3 Fiber Port Test

As shown in Figure 5-2, firstly two units of SICOM6524 are connected to a fiber chain network. Then connect any RJ45 port in each device with test computers by straight-through cables and

send Ping command to each other. They can both get command without packet loss and the corresponding LINK/ACT indicators of the fiber ports go on, showing the testing fiber ports work well. In the same way, test other pairs of fiber ports. The PING command example is as follows.
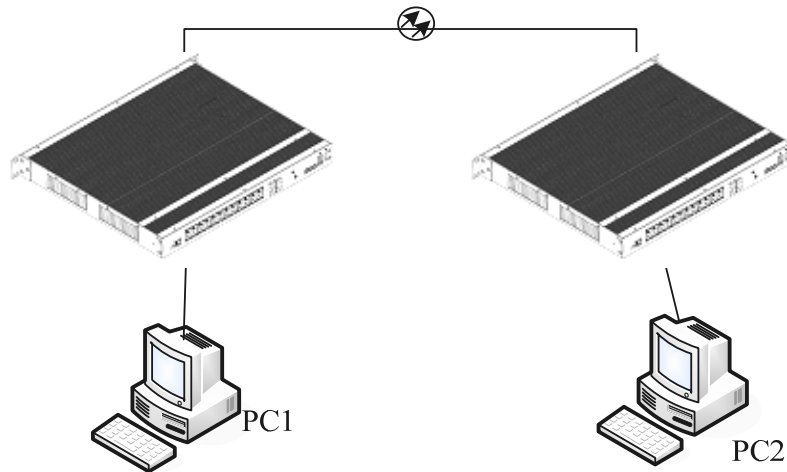

Figure 5-2 Fiber port test

PING command example：

Suppose the IP address of test computer 1 is 192.168.100.10 and the test computer 2 is 192.168.100.11. Click the "Begin" menu on the test computer 1, select the "Operation" item, input "cmd" (WIN2000) or "command" (WIN98/95), and send ping 192.168.100.11 –l 1000 –t; (-l means the number of bytes of sending packets, -t means keep sending the data);

Operate the "Begin" menu on the test computer 2, select the "Operation" item. input "cmd" (WIN2000) or "command" (WIN98/95), and send ping 192.168.100.10 –l 1000 –t.

Test computer 1 returns "Reply from 192.168.100.11：bytes=1000 time<10ms", Test computer 2 returns "Reply from 192.168.100.10：bytes=1000 time<10ms". Ten minutes later, use CTL+C command to get the packet loss rate. If the rate is "0", it shows that the equipment is running well.

Chapter 6: Networking and Configurations

6.1 Networking

The most typical networking topology of SICOM6524 is redundant ring network. SICOM6524 can form the redundant fiber ring network as shown in Figure 6-1, in which one device is set as master and the rest are slaves. The recovery time of re-communication is less than 50ms.
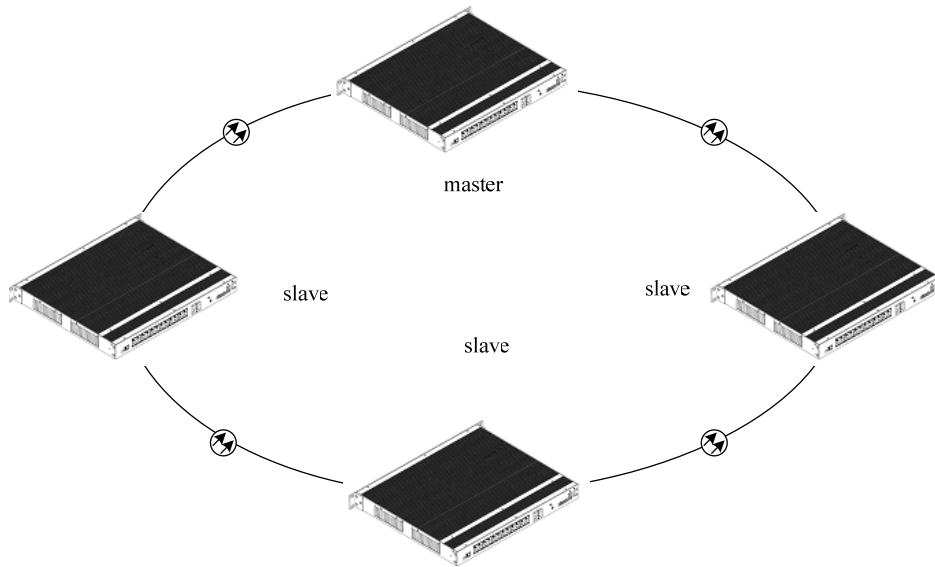

Figure 6-1 the redundant fiber ring network of SICOM6524

6.2 System configuration

SICOM6524 industrial Ethernet switch is an integrative structure. Detailed configuration and models are shown in Table 6-1

Table 6-1 Configuration table of SICOM6524

Models	Description	Power supply
SICOM6524-4GX/GE-20GE	4 combo SFP slots and 10/100/1000Base-TX RJ45 ports, 20 10/100/1000Base-TX RJ45 ports	48VDC

SICOM6524-20GX-4GX/GE	20 Gigabit SFP slots and 4 combo SFP slots and 10/100/1000Base-TX RJ45 ports	220VAC/DC
SICOM6524-12GX-12GE	12 Gigabit SFP slots and 12 10/100/1000Base-TX RJ45 ports	

Appendix A: Twisted-pair and Pin Distribution

For the connection of 10/100Base-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.
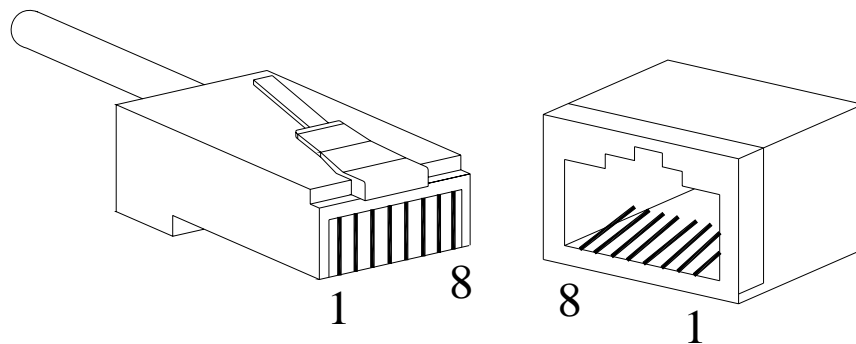
Figure A-1 Connector of RJ-45

Pin distribution of 10/100/1000Base-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 by 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.

Table A-2 Pin distribution of 10/100/1000Base-TX

Pin	MDI/MDI-X signal name
1	TD0+
2	TD0-
3	TD1+
4	TD2+
5	TD2-
6	TD1-
7	TD3+
8	TD3-

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

Definition of straight-through cable from RJ45 (8-pin) to RJ45 (8-pin)
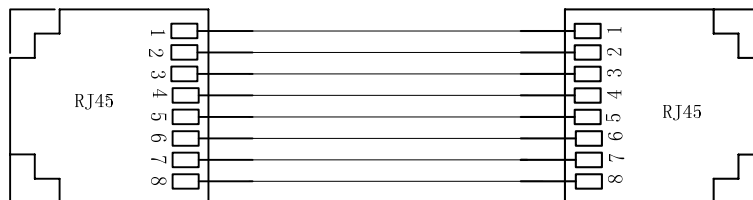
The connection sequence is in turn: Orange-white, Orange, Green-white, Blue, Blue-white, Green, Brown-white and Brown

Figure A-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

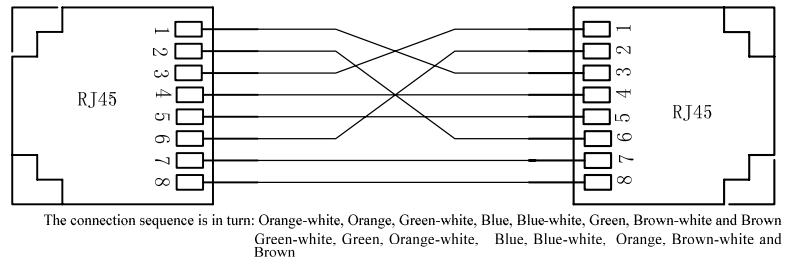Green-white, Green, Orange-white, Blue, Blue-white, Orange, Brown-white and Brown

Figure A-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 specification

Cable	Type	Max. length	Connector
10Base-T	Cat 3,4 and 5 100ohm UTP	100m	RJ-45
100Base-TX	Cat 5 -100ohmUTP	100m	RJ-45
100Base-FX	50/125 or 62.5/125μm core multi-mode fiber（MMF）	5km（1310nm MM）	SC/FC/ST
100Base-FX	9/125μm core single-mode fiber（SMF）	40km（1310nm SM）80km (1550nm SM)	SC/FC/ST
1000Base-TX	Cat 5-100 ohm UTP	100m	RJ-45
1000Base-SX	50/125μm multi mode fiber (850nm)	500m	LC
1000Base-SX	62.5/125μm multi mode fiber (850nm)	275m	LC
1000Base-LX	50/125μm multi mode fiber (1310nm)	1100m	LC
1000Base-LX	62.5/125μm multi-mode fiber (1310nm)	550m	LC
1000Base-LX	9/125μm single-mode fiber (1310nm)	10km	LC
1000Base-LH	9/125μm single-mode fiber (1310nm)	40km	LC
1000Base-ZX	9/125μm single-mode fiber (1550nm)	60, 80km	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.
1000Base-T	Gigabit Ethernet which using Cat.5 UTP as transmission medium, max effective transmission distance is up to 100m. U
1000Base-LX	Gigabit 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.
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 cannot 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