

SICOM3004/SICOM3006 Industrial Ethernet Switch

User's Manual

KYLAND Technology Co., Ltd.

**SICOM3004/SICOM3006 Industrial Ethernet Switch
User's Manual**

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Publisher: KYLAND Technology CO., LTD.

Address: Chongxin Creative Building, Shixing East Road 18#,
Shijingshan District, Beijing, China

Website: <http://www.kyland.cn>

Postcode: 100041

Tel: (+8610) 88796676

FAX: (+8610) 88796678

E-mail: sales@kyland.biz

Version: V1, Jan. 2007

V2, Jun. 2009

No.: 1.12.02.0080-0

Preface

SICOM3004/SICOM3006 embedded industrial Ethernet switch is specially designed according to the specifications of customer. Based on SICOM series products, the improved SICOM3004/SICOM3006 is able to be mounted on user's circuit motherboard.

The user's manual for SICOM3004/SICOM3006 Industrial Ethernet Switch mainly introduces the 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 SICOM3004/SICOM3006;

Chapter 2 Performance and service functions of SIOCM3004/SICOM3006;

Chapter 3 Hardware structure of SICOM3004/SICOM3006;

Chapter 4 Installation of SICOM3004/SICOM3006;

Chapter 5 Field test methods for SICOM3004/SICOM3006;

Chapter 6 Network topology and system configuration of SICOM3004/SICOM3006;

Appendix A Introduces twisted pair and pin distribution rules of SICOM3004/SICOM3006;

Appendix B Introduces cable types and specifications of SICOM3004/SICOM3006;

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 carefully and keep it 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 other equipment connectors 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

SICOM3004/SICOM3006 embedded industrial Ethernet switch is specially designed according to the specifications of customer. Based on SICOM series products, the improved SICOM3004/SICOM3006 is able to be mounted on user's circuit motherboard.

SICOM3004/SICOM3006 series industrial Ethernet switch has strong network management function which support CLI, Telnet, WEB, SNMP-based and OPC-based network management software.

SICOM3004/SICOM3006 industrial Ethernet switch support pin mounting.

SICOM3004 connects with user's motherboard by pins to get 2 standard 10/100Base-TX ports and 2 fiber or copper optional ports which support self-healing ring network. SICOM3006 is mounted on user's motherboard by pins to get 2 standard 10/100Base-TX ports and 4 fiber or copper optional ports which support self-healing ring network.

In fiber or copper optional ports of SICOM3004/SICOM3006, if customer chooses fiber ports, they will be compulsory to 100M full duplex, supporting DT-Ring and able to form fiber ring with the recovery time of less than 50ms. If customer chooses copper ports, they have self-adaptive function, supporting DT-Ring and able to form twisted-pair ring with the recovery time of less than 50ms.

1.2 Product Features

1. High performance industrial Ethernet switch

Support various management methods for user's easy management, such as WEB, CLI, TELNET, SNMP, OPC

10/100Base-TX, self-adaptive Ethernet ports, be automatically configured to 10Base-T or 100Base-TX state, full or half duplex operation mode, support auto MDI/MDI-X connection

100Base-FX full duplex multi mode/single mode redundant fiber ports

The fast ring network redundancy technology with recovery time of less than 50ms, raising the reliability of system communication

IEEE802.3i, IEEE802.3u, IEEE802.3x, IEEE 802.1p, IEEE 802.1Q, IEEE802.1s store and forward

switching mode

Support IGMP Snooping, port mirroring, port trunking, broadcast storm control

Support DT-Ring, DT-Ring+, RSTP for redundancy protection

Support VLAN

ACL function

Alarm function

Support SNMP protocol

Support 802.1P, IP TOS, DSCP priority setting

Transparent transmission of VLAN Tag packets

FTP-based online software update, easy for user's device management and renewal

2. Industrial Power Design

3.3V/3A power is supplied to SICOM3004/SICOM3006 by motherboard through pins. To guarantee stable and reliable power input, the effective value of input power ripple is less than 50mv and starting current is more than 3A.

1.3 Packing list and unpacking check

1. Packing list

The packing list includes the following items:

SICOM3004/SICOM3006 industrial Ethernet switch	1
User's Manual for SICOM3004/SICOM3006 Industrial Ethernet Switch	1
Customer Service Guideline	1
Network cable	1

2. 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 SICOM3004/SICOM3006 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 unpacking, please check the accessories and the appearance of the equipment. If anything

is missing or damaged, please contact us



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 SICOM3004/SICOM3006 industrial Ethernet switch are shown in Table 2-1.

Table 2-1 System Specifications

Specifications	SICOM3004/SICOM3006
Quantity of RJ45 port	2×10 /100Base-TX
Quantity of redundant 100M fiber or copper ports	2×100Base-FX-SM/MM or 2×10/100Base-TX (SICOM3004) 4×100Base-FX-SM/MM or 4×10/100Base-TX (SICOM3006)
System performance	Standards: IEEE802.3i, IEEE802.3u, IEEE802.3x, IEEE 802.1p, IEEE 802.1Q, IEEE802.1s Max store-and-Forward speed: 148810pps; Max. filtering speed: 1488100pps Switching mode: Store-and-Forward System switching bandwidth: 5.6G Electromagnetic compatibility interference: EN55022 Electromagnetic compatibility immunity: EN50082-2
TP port parameters	Physical port: 2.54mm-spacing two-row pin RJ45 port: 10/100Base-TX, supporting auto-negotiation Port standard: in line with IEEE802.3 standard Transmission distance: <100m
Fiber port parameters	Physical port: 2.54mm-spacing two-row pin Optical power: >-13dbm (SM) >-20dbm (MM) Receiving sensitivity: <-28dbm (SM) <-35dbm (MM) Wave length: 1310nm (SM) 1550nm (SM) 1310 nm (MM) Transmission distance: 20-80km (SM) <5km (MM) Connector type: SC/FC/ST Transmission speed: 125Mbps (100M)
Power supply	Input voltage: DC3.3V Input power consumption: <10W
Mechanical parameters	Physical dimensions (height×width): 80mm×80mm (SICOM3004); 95mm×80mm (SICOM3006)

	<p>Mounting mode: pin mounting</p> <p>Weight: 0.1kg</p>
Ambient conditions	<p>Operating temperature: -40°C ~ 85°C</p> <p>Storage temperature: -40°C ~ 85°C</p> <p>Humidity: 5~95% (non-condensing)</p>

2.2 Service Interface

1. 2 10/100Base-TX RJ45 ports. Each RJ45 port has self-adaptive function, capable of automatically configuring between 10Base-T and 100Base-TX, between full duplex and half duplex mode, supporting MDI/MDI-X auto-connection. The transmission distance is less than 100m.
2. 2 (SICOM3004) or 4 (SICOM3006) fiber or cooper optional ports supporting self-healing ring network. 2 or 4 redundant 100Base-FX SM/MM fiber ports and the maximum throughput of each port is 100Mbps with compulsory 100M full duplex working mode. 2 or 4 standard 10/100Base-TX Ethernet ports. Each port has self-adaptive function, capable of automatically configuring between 10Base-T and 100Base-TX, between full duplex and half duplex mode, supporting MDI/MDI-X auto-connection. Support ring redundancy technology with recovery time of less than 50ms.
3. Comply with IEEE802.3i, IEEE802.3u, IEEE802.3x, IEEE 802.1p, IEEE 802.1Q, IEEE802.1s, etc.
4. LED indicators are also provided to motherboard by pins, including system operation LED (CPURUN1), master or slave LED (RUN2), 2 alarm LEDs, 4 (SICOM3004) or 6 (SICOM3006) LINK LEDs and SPEED LEDs for ports.

2.3 Service Functions

The service functions of SICOM3004/SICOM3006 mainly include:

LED Indicator

LED indicators are provided to motherboard by pins. The LEDs indicate the port status including transmitting speed, link status and system status.

Layer-2 Switching

The two commonly used switching technologies: Cut-Through and Store-and-Forward. In

Cut-Through, as soon as the switch receive a frame header, it is immediately forwarded without any error checking and processing; in Store-and-Forward, after receiving and storing the complete frame, error checking is conducted before forwarding. Store-and-forward is most widely used switching technology and it is also adopted by SICOM3004/SICOM3006.

VLAN

VLAN will divide a network into multiple logical networks. Data packets cannot be transmitted between different VLANs so as to control the broadcast domain and segment flow and improve the network performance, security and manageability. SICOM3004/SICOM3006 series supports IEEE802.1q VLAN tag. It can be divided into up to 4094 VLANs based on ports. The VLAN division can be realized via WEB, CLI. VLAN Tag packet is transmitted transparently.

QoS function

IEEE 802.1p is the most widely used priority solution in LAN environment. SICOM3004/SICOM3006 series supports 802.1p standard, as well as IP TOS and DSCP priority configurations. When the terminal connected to SICOM3004/SICOM3006 doesn't support these three priorities and user wants to set different priorities to services in different ports, QoS function can be used to do port-based priority configuration. This configuration only affects the data packets without priorities in the ports. Each port of SICOM3004/SICOM3006 support 4-level priority configuration (highest, high, low, lowest).

Port Trunking

SICOM3004/SICOM3006 series industrial Ethernet switch can aggregate several physical ports into a logical port, then these ports have same rate, duplex mode and VLAN ID. Port Trunking can be configured in a single switch with max 4 Port Trunking groups. This function can reduce the network traffic congestion and enhance fault-tolerance performance.

Port mirroring (Port sniffing)

Be capable of mirroring the data packets in a port to another port for real time monitoring the communication data.

Configure Port Working Modes

SICOM3004/SICOM3006 series is able to configure the working mode of all ports through network management: self adaptive, 10M/half-duplex, 100M/half-duplex, 10M/full-duplex, 100M/full-duplex, etc

Configure Port Traffic Flow

SICOM3004/SICOM3006 series can configure the TX and RX rate of all ports via the management software. For port of 100Mbps, it can be set as 128K, 256K, 512K, 1M, 2M, 10M, 50M, 100M.

Static Multicast Communication

Adding multicast users by the way of manually adding static multicast table, compared to dynamic multicast, is more simple, reliable and faster without the need of protocols. The multicast data can be forwarded by configuring static multicast forwarding tables. Users can manually configure the multicast communication according to their own requirements. Static multicast communication cannot be used with IGMP simultaneously.

IGMP

IGMP is Internet Group Multicast Protocol. SICOM3004/SICOM3006 series offers IGMP monitoring and query functions. Data packets can be transmitted to multi necessary host computers and prevent overloading. It solves the problems of bandwidth occupation when broadcasting.

Broadcast Storm Control

When too much broadcast packets are transmitted in the network, they will take up so much bandwidth that cause a network timeout. It is called network storm. SICOM3004/SICOM3006 support broadcast data packets, multicast data packets and broadcast storm control and discard the broadcast data packets that exceed user's time limit setting.

DT-Ring

DT-Ring is Kyland's proprietary communication protocol. It determines the state of ring & port by inspecting the ring port state, so as to ensure the redundant network won't form a ring and achieve a fast and reliable Ethernet redundant ring to meet the high requirements of industrial communications.

DT-Ring+

DT-Ring+, based on DT-Ring, is also Kyland's proprietary communication protocol which is to make a backup between two rings and determine ring & port state by the ID of backup device so as to ensure the redundant network won't form a ring. This function guarantees a fast and reliable redundant ring to meet high requirements in the field of industrial communication.

RSTP

SICOM3004/SICOM3006 has RSTP and STP functions which offer network redundancy protection for the switch's network. RSTP can achieve all functions of STP with an extra function of reducing

the delay time from blocking to forwarding in the port in order to resume the network communication ASAP.

ACL

ACL (Access Control List) use protocols to define the access rules by the source or target MAC addresses. It can limit the network traffic, enhance network performance and control the communication flow. ACL is the basic security method to network access.

Alarm Output

This function is significant for the real time transmission of device alarms. Alarm function includes port alarm and ring alarm which can be enabled by management software. The alarm information is displayed on the network management interface.

SNMP

SNMP (Simple Network Management Protocol) offers a frame structure for low level network management. SNMP protocol is used widely. Many kinds of networking devices, software and system adopt it because it is easy to be realized, free, and can be used to control various devices.

RMON

RMON is a standard monitoring regulation, used to switch the network monitoring data between network monitors and console system. It offers more selections for network operators to choose the suitable console and network monitor for special requirements. It is a supplementation to SNMP function and is especially useful for monitoring and managing LAN. The purpose of developing RMON is to provide statistic result of information flow and analyze network parameters so as to work out a comprehensive network diagnoses, plan and regulation.

By RMON, users can do operation among SNMP management stations and monitoring agents. Furthermore, it can offer a standard for a group of MIB to collect the network statistics which is not available via SNMP. RMON realizes early network diagnoses by using powerful Alarm Group, which allows to set thresholds for key network parameters so as to automatically send alarm signal to central management console.

Chapter 3: Hardware Structure

3.1 System Structure

The hardware structure of SICOM3004 is as Figure 3-1:

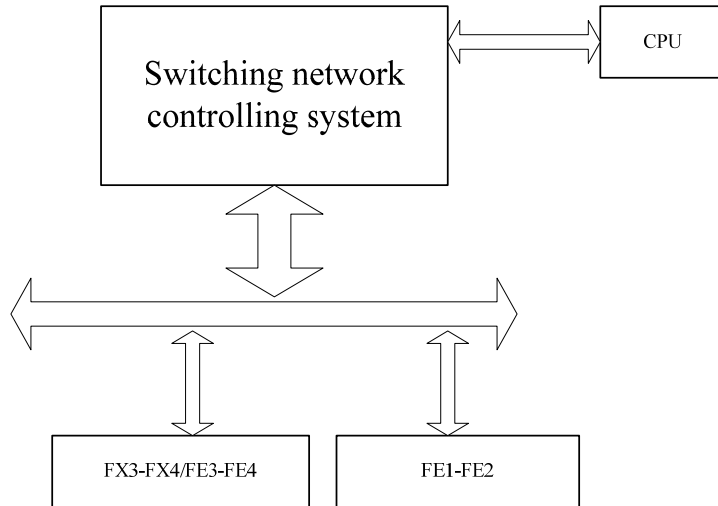


Figure 3-1 Hardware Structure of SICOM3004

FE1-FE2: 2 10/100Base-TX ports

FX3-FX4/FE3-FE4: 2 100Base-FX ports or 2 10/100Base-TX ports (optional)

The hardware structure of SICOM3006 is as Figure 3-2:

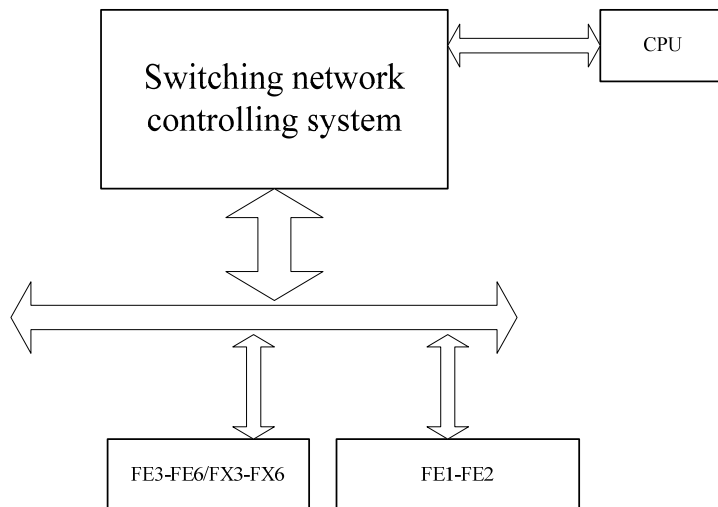


Figure 3-2 Hardware Structure of SICOM3006

FE1-FE2: 2 10/100Base-TX ports

FE3-FE6/FX3-FX6: 4 10/100Base-TX ports or 4 100Base-FX ports (optional)

3.2 System Explanation

1. Power

3.3V/3A power is supplied to SICOM3004/SICOM3006 by motherboard through pins. To guarantee stable and reliable power input, the effective value of input power ripple is less than 50mv and starting current is more than 3A.

2. LED

LEDs include system operation LED (CPURUN1), master and slave LED (RUN2), 2 alarm LEDs, 4 (SICOM3004) or 6 (SICOM3006) LINK LEDs and SPEED LEDs for ports

3. Network management

The network management CONSOLE port is a RS232 serial port. Switch provides TTL interface level to motherboard by pins. RS232 interface circuit is implemented on motherboard.

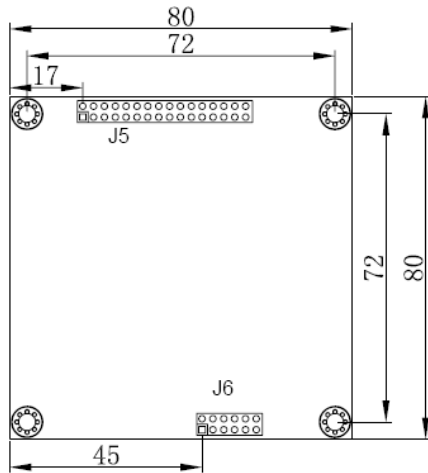
4. Alarm Output

OEM board has ring network fault self-inspection and alarm functions. When network breakdown, poor contact, communication problem and other failures happen in the ring network, OEM board is able to automatically locate the fault and send alarm by software and hardware contacts. In hardware, it is judged by the signal providing by pins. When the uplink port is under normal connection, the corresponding alarm signal "ALARM1" or "ALARM2" outputs high level; when the connection is abnormal, the corresponding alarm signal "ALARM1" or "ALARM2" outputs low level.

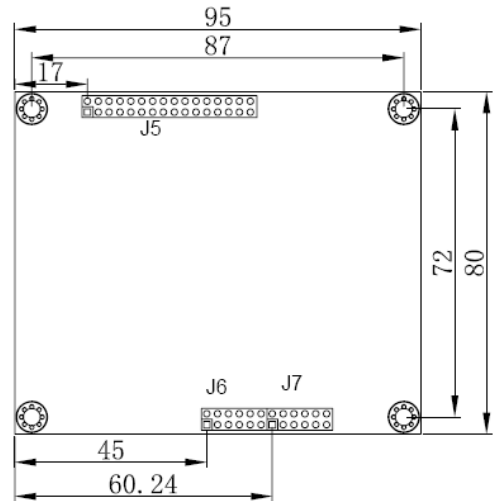
5. Pin definition

SICOM3004 adopts one 2 × 16, 2.54mm-spacing two-row pin (J5) and one 2 × 6, 2.54mm-spacing two-row pin (J6). SICOM3006 adopts one 2 × 16, 2.54mm-spacing two-row pin (J5) and two 2 × 6, 2.54mm-spacing two-row pin (J6, J7).

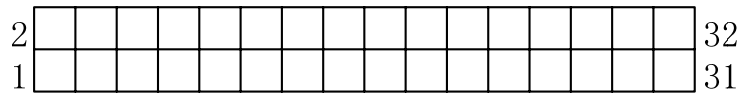
SICOM3004



SICOM3006



J5 pin diagram and pin explanation for SICOM3004:



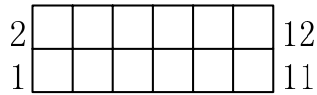
PIN number	1	2	3	4
Signal definition	GND	GND	+3.3V	+3.3V
PIN number	5	6	7	8
Signal definition	+3.3V	+3.3V		RUN2 operation LED (master or slave LED)
PIN number	9	10	11	12
Signal definition	RXD (LVTTTL level, 3.3V)	TXD (LVTTTL level, 3.3V)	CPU RUN1 operation LED	Port 1 LINK LED
PIN number	13	14	15	16
Signal definition	Port 1 SPEED LED	Port 2 LINK LED	Port 2 SPEED LED	Port 3 LINK LED
PIN number	17	18	19	20
Signal definition	Port 3 SPEED LED (fiber port doesn't has this LED)	Port 4 LINK LED	Port 4 SPEED LED (fiber port doesn't has this LED)	Reset: system reset signal (it takes effect at low level)
PIN number	21	22	23	24
Signal definition	V1 (Ring 1 alarm output signal)	V2 (Ring 2 alarm output signal)	TXD1+ (Port 1)	TXD1- (Port 1)
PIN number	25	26	27	28
Signal definition	RXD1+ (Port 1)	RXD1- (Port 1)	TXD2+(Port 2)	TXD2- (Port 2)

PIN number	29	30	31	32
Signal definition	RXD2+ (Port 2)	RXD2-(Port 2)	GND	GND

Note: V1 and V2 are for ring 1 and ring 2. When the switch is set to be master in a ring, if the ring is under normal connection, the pin 21 and pin 22 output high level; if the ring is disconnected, they output low level; when the switch is set to be slave in the ring, the pin 21 and pin 22 output high level.

J6 pin diagram and pin explanation for SICOM3004

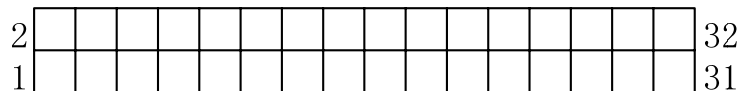
(This pin is for port 3 and port 4)



PIN number	1	2	3	4
Signal definition	GND	TXD3+ (port 3)	TXD3- (port 3)	RXD3+ (port 3)
PIN number	5	6	7	8
Signal definition	RXD3- (port 3)	TXD4+ (port 4)	TXD4- (port 4)	RXD4+ (port 4)
PIN number	9	10	11	12
Signal definition	RXD4- (port 4)	FX0_SD (SD signal of fiber port 1)	FX1_SD (SD signal of fiber port 2)	GND

Note: The pins which don't have explanation in the above table are unused. Power and reset signal are input signal to SICOM3004 and the rest are output signal from SICOM3004.

J5 pin diagram and pin explanation for SICOM3006:



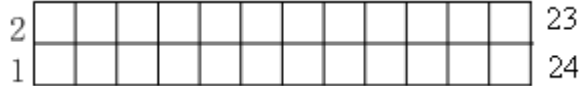
PIN number	1	2	3	4
Signal definition	GND	Port 5 LINK LED	Port 5 SPEED LED	+3.3V
PIN number	5	6	7	8
Signal definition	+3.3V	+3.3V	Port 6 LINK LED	RUN2 operation LED(master or slave LED)
PIN number	9	10	11	12
Signal definition	RXD (LVTTL level, 3.3V)	TXD (LVTTL level, 3.3V)	CPU RUN1 operation LED	Port 1 LINK LED
PIN number	13	14	15	16
Signal definition	Port 1 SPEED LED	Port 2 LINK LED	Port 2 SPEED LED	Port 3 LINK LED

PIN number	17	18	19	20
Signal definition	Port 3 SPEED LED (fiber port doesn't has this LED)	Port 4 LINK LED	Port 4 SPEED LED (fiber port doesn't has this LED)	Reset: system reset signal (it takes effect at low level)
PIN number	21	22	23	24
Signal definition	V1 (Ring 1 alarm output signal)	V2 (Ring 2 alarm output signal)	TXD1+ (Port 1)	TXD1- (Port 1)
PIN number	25	26	37	28
Signal definition	RXD1+ (Port 1)	RXD1- (Port 1)	TXD2+(Port 2)	TXD2- (Port 2)
PIN number	29	30	31	32
Signal definition	RXD2+ (Port 2)	RXD2-(Port 2)	Port 6 SPEED LED	GND

Note: V1 and V2 are for ring 1 and ring 2. When the switch is set to be master in a ring, if the ring is under normal connection, the pin 21 and pin 22 output high level; if the ring is disconnected, they output low level; when the switch is set to be slave in the ring, the pin 21 and pin 22 output high level.

J6+J7 pin diagram and pin explanation for SICOM3006

(These two pins are for port 3, port 4, port 5 and port 6)



PIN number	1	2	3	4
Signal definition	GND	TXD3+ (port 3)	TXD3- (port 3)	RXD3+ (port 3)
PIN number	5	6	7	8
Signal definition	RXD3- (port 3)	TXD4+ (port 4)	TXD4- (port 4)	RXD4+ (port 4)
PIN number	9	10	11	12
Signal definition	RXD4- (port 4)	FX0_SD (SD signal of fiber port 1)	FX1_SD (SD signal of fiber port 2)	GND
PIN number	13	14	15	16
Signal definition	GND	TXD5+ (port 5)	TXD5- (port 5)	RXD5+ (port 5)
PIN number	17	18	19	20
Signal definition	RXD5- (port 5)	TXD6+ (port 6)	TXD6- (port 6)	RXD6+ (port 6)
PIN number	21	22	23	24
Signal definition	RXD6- (port 6)	FX3_SD (SD signal of fiber port 3)	FX4_SD (SD signal of fiber port 4)	

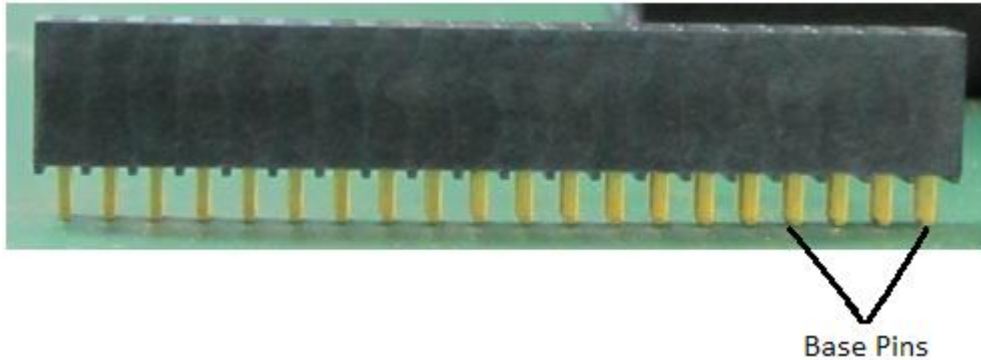
Note: The pins which don't have explanation in the above table are unused. Power and reset signal

are input signal to SICOM3006 and the rest are output signal from SICOM3006.

We provide sockets for each J5, J6 and J7 pin on OEM board as below.



Socket for pins (top view)



Socket for pins (front view)

SICOM3004:

Socket for J5: 2×16 p, 2.54mm-spacing two-row socket with the height of 12mm

Socket for J6: 2×6 p, 2.54mm-spacing two-row socket with the height of 12mm

SICOM3006:

Socket for J5: 2×16 p, 2.54mm-spacing two-row socket with the height of 12mm

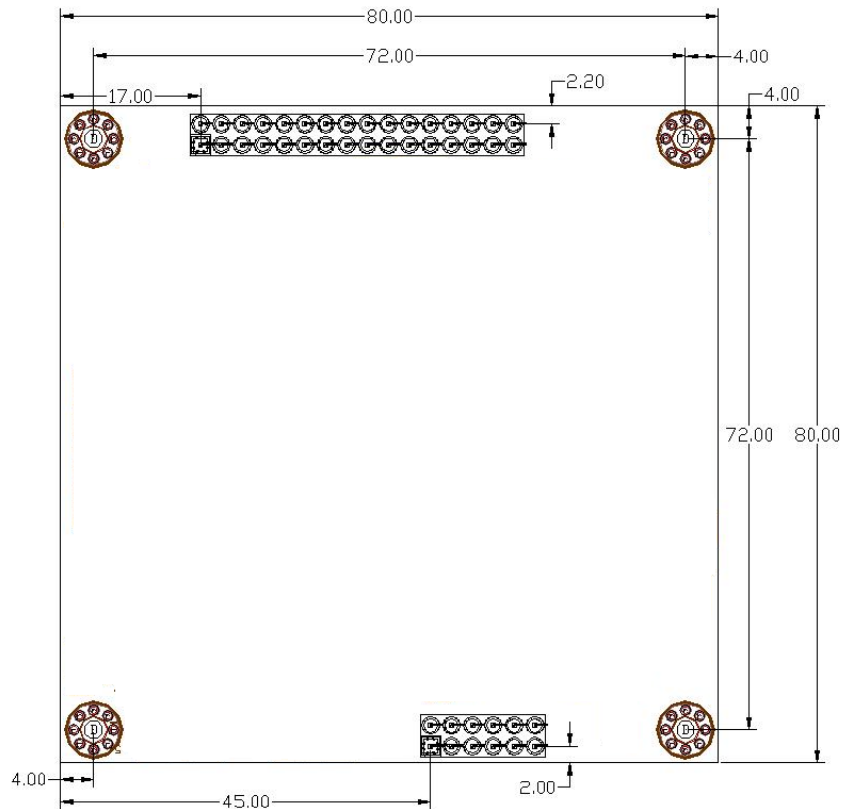
Socket for J6+J7: 2×12 p, 2.54mm-spacing two-row socket with the height of 12mm

The base pins on the socket should be soldered to the motherboard. The gilt thickness is more than 10U.

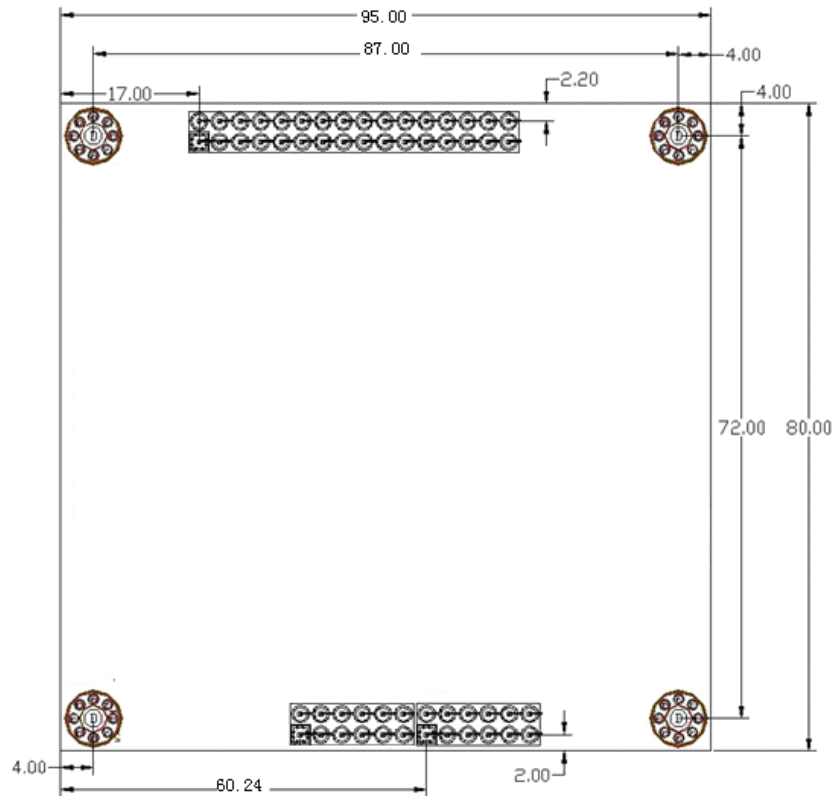
Chapter 4 Hardware Installation

4.1 Installation requirement

SICOM3004 product mechanical drawing for installation is as below (top view). Dimension is 80mm × 80mm. The square pin is pin 1.



SICOM3006 product mechanical drawing for installation is as below (top view). Dimension is 95mm × 80mm. The square pin is pin 1.



Note: Because SICOM3004/SICOM3006 is mounted on user's board, the pins showed in above drawings are welding points. That means the welding points are on front and the pins are on the reverse side.

Meanwhile, SICOM3004/SICOM3006's electrical space is big enough to meet insulated electrical requirements of customer's whole system (international level 4).

Chapter 5: Test Methods

5.1 Self inspection

When the equipment is powered on, all port indicators will blink one time, showing that ports are working smoothly. The startup complete after 30 seconds and the RUN indicators will blink.

5.2 TP Port Test

As shown in Figure 5-1, SICOM3004/SICOM3006 is powered on, then 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.

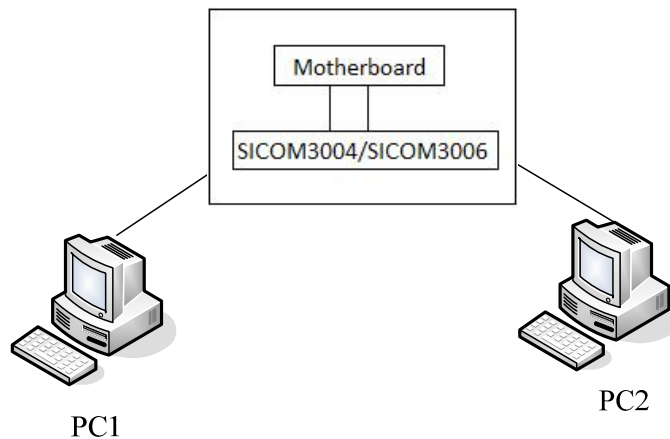


Figure 5-1 TP port test

5.3 Fiber Port Test

As shown in Figure 5-2, firstly two units of SICOM3004/SICOM3006 are connected to a fiber chain network. Then connect any RJ45 port in each switch 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 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.

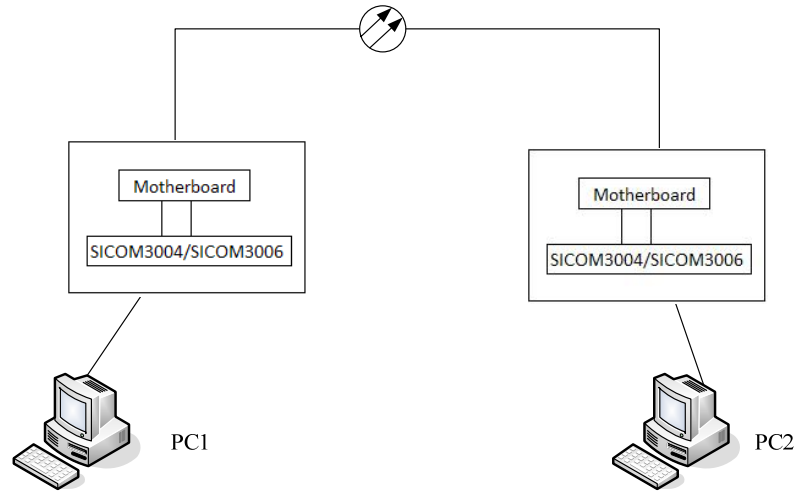


Figure 5-2 Fiber port test

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 TTL=128”, Test computer 2 returns “Reply from 192.168.100.10: bytes=1000 time<10ms TTL=128”. Ten minutes later, use CTL+C command to get the packet loss rate. If the rate is “0”, it shows that the equipments are running well.

Chapter 6: Networking and Configurations

6.1 Networking

SICOM3004/SICOM3006 industrial Ethernet switch provides 2 10/100Base-TX RJ45 ports, each of which can provide direct links to the terminal devices, or be connected to another industrial Ethernet switch/hub before terminal devices as shared links.

Meanwhile, SICOM3004 provides 2 downlink redundant 100Base-FX SM/MM fiber ports or 2 10/100Based-TX RJ45 ports which can form 100M redundant ring network with the recovery time of less than 50ms.

SICOM3006 provides 4 downlink redundant 100Base-FX SM/MM fiber ports or 4 10/100Based-TX RJ45 ports which can form 100M redundant ring network with the recovery time of less than 50ms.

SICOM3004/SICOM3006 can be widely used in the fields of power, transportation, energy, water treatment, factory automation, etc.

The most typical networking topology of SICOM3004/SICOM3006 is redundant ring network. SICOM3004/SICOM3006 can form the redundant 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.

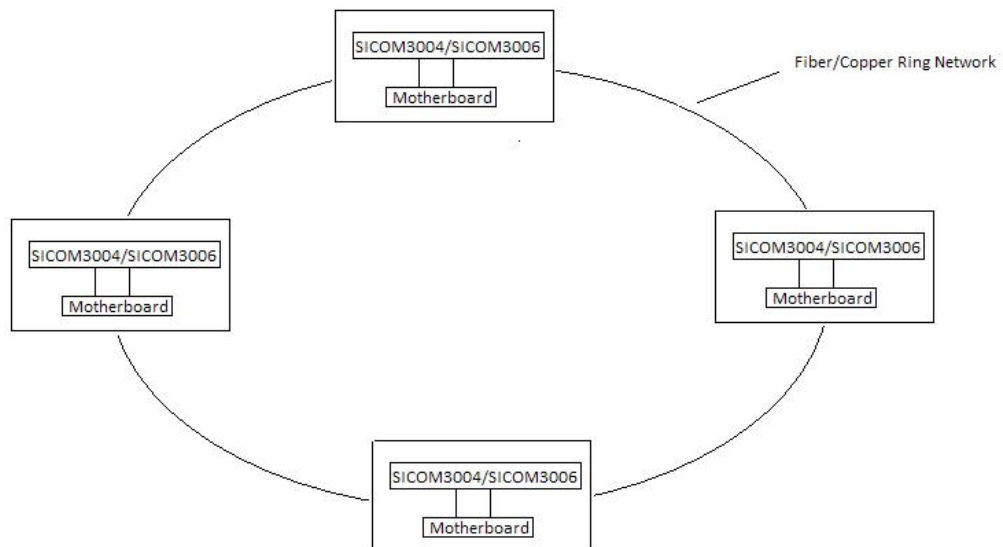


Figure 6-1 the redundant fiber ring network of SICOM3004/SICOM3006

6.2 System configuration

SICOM3004 industrial Ethernet switch is an integrative structure with the fixed configuration of 2 10/100Base-TX RJ45 ports, the optional configuration of 2 100Base-FX single mode or multi mode fiber ports or 2 10/100Base-TX RJ45 ports. Fiber connector can be SC/FC/ST.

Detailed configuration and models are shown in Table 6-1

Table 6-1 Configuration table of SICOM3004

Models	Description
SICOM3004-4TX	2 10/100Base-TX ports and 2 redundant 10/100Base-TX RJ45 ports
SICOM3004-2S(M)-2TX	2 10/100Base-TX ports and 2 redundant 100Base-FX single mode or multimode fiber ports

SICOM3006 industrial Ethernet switch is an integrative structure with the fixed configuration of 2 10/100Base-TX RJ45 ports, the optional configuration of 4 100Base-FX single mode or multi mode fiber ports or 4 10/100Base-TX RJ45 ports. Fiber connector can be SC/FC/ST.

Detailed configuration and models are shown in Table 6-2

Table 6-2 Configuration table of SICOM3006

Models	Description
SICOM3006-6TX	2 10/100Base-TX ports and 4 redundant 10/100Base-TX RJ45 ports
SICOM3006-2S(M)-4TX	2 10/100Base-TX ports, 2 redundant 10/100Base-TX RJ45 ports and 2 redundant 100Base-FX single mode or multimode fiber ports
SICOM3006-4S(M)-2TX	2 10/100Base-TX ports, 4 redundant 100Base-FX single mode or multimode fiber ports

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.

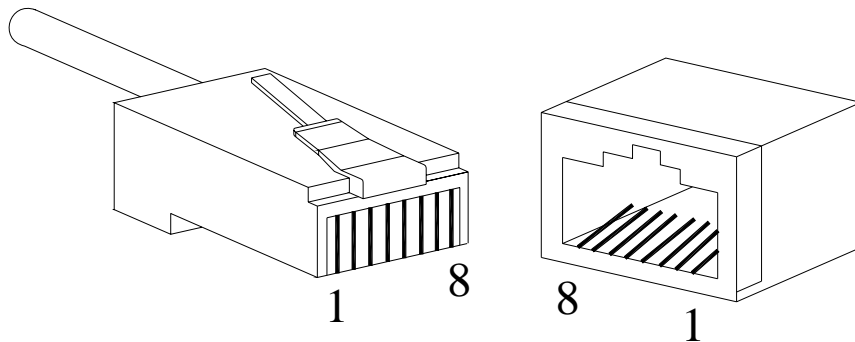


Figure A-1 Connector of RJ-45

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 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

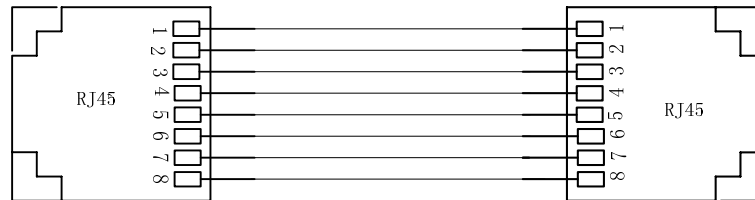
straight-through cable respectively. Cross-over cable must be used for switch or hub with MDI-X port. The pin distribution of 10Base-T/100Base-TX is listed in the table A-1.

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.

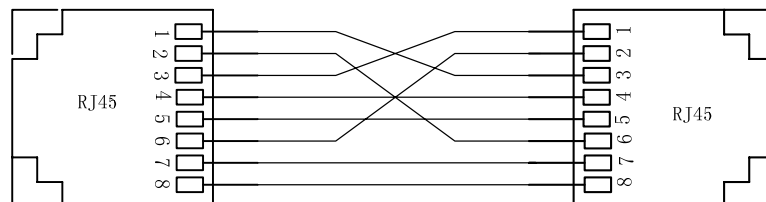
Definition of straight-through cable from RJ45 (8-pin) to RJ45 (8-pin)



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 -100ohm UTP	100m	RJ-45
100Base-FX	50/125 or 62.5/125 μ m core multi-mode fiber (MMF)	5km (1310nm MM)	SC/FC/ST
100Base-FX	9/125 μ m single-mode fiber (SMF)	40km (1310nm SM) 80km (1550nm SM)	SC/FC/ST

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.
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