



KGS-1060

KGS-1060-HP

Industrial Managed
10-Port Gigabit Ethernet Switches
with 2 Dual-speed SFP Slots and 4 PoE PSE Ports

Firmware Rev1.05 up

User's Manual



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EN 61000-6-4:2007/A1:2011

EN 61000-3-2:2006/A1:2009/A2:2009

EN 61000-3-3:2008

EN 61000-6-2:2005

IEC 61000-4-2:2008

IEC 61000-4-3:2010

IEC 61000-4-4:2012

IEC 61000-4-5:2005

IEC 61000-4-6:2008

IEC 61000-4-8:2009

IEC 61000-4-11:2004

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1. Introduction

The KGS-1060 series is an 10-port industrial managed Gigabit Ethernet switch which is featured with the following switched ports:

- Eight 10/100/1000Mbps Gigabit copper ports
- Two dual-speed SFP slots for 100Base-FX 1000Base-X



Model Definitions

Model	Copper ports	SFP slots	PoE PSE function	Power via DC input	Powered via PoE capable	Software managed
KGS-1060-HP	8	2 dual-speed	4 PSE ports	✓	-	✓
KGS-1060	8	2 dual-speed	-	✓	✓	✓

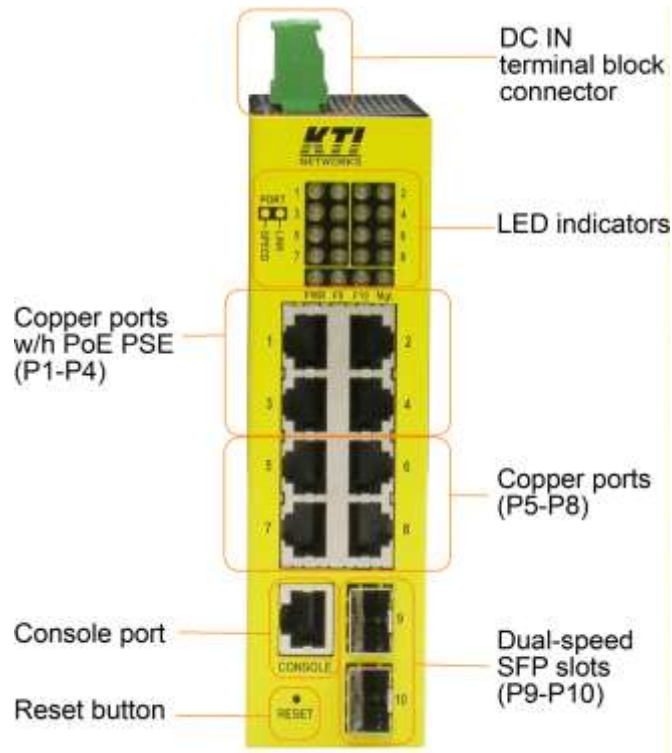
1.1 Features

- Eight 10/100/1000Mbps RJ-45 and two dual-speed SFP slots
- All copper ports support auto-negotiation and auto-MDI/MDI-X detection.
- Two SFP slots support dual speed for 100BASE-FX and 1000BASE-X SFP transceivers.
- Full wire speed forwarding
- Supports 802.3x flow control for full-duplex and backpressure for half-duplex
- Port link aggregation function with LACP support
- Supports SFP with Digital Diagnostic Monitoring (DDM)
- Alternatively powered via PoE if direct DC power not available
- Optional four 802.3at-compliant PoE+ PSE ports
- SNMP private MIB for DDM status, reboot, TFTP firmware update (MIB file Rev1.05 or up)
- Optical Power Alarm (OPA) function
- Auto Laser Shutdown (ALS) function (supported in H/W Ver.E up)

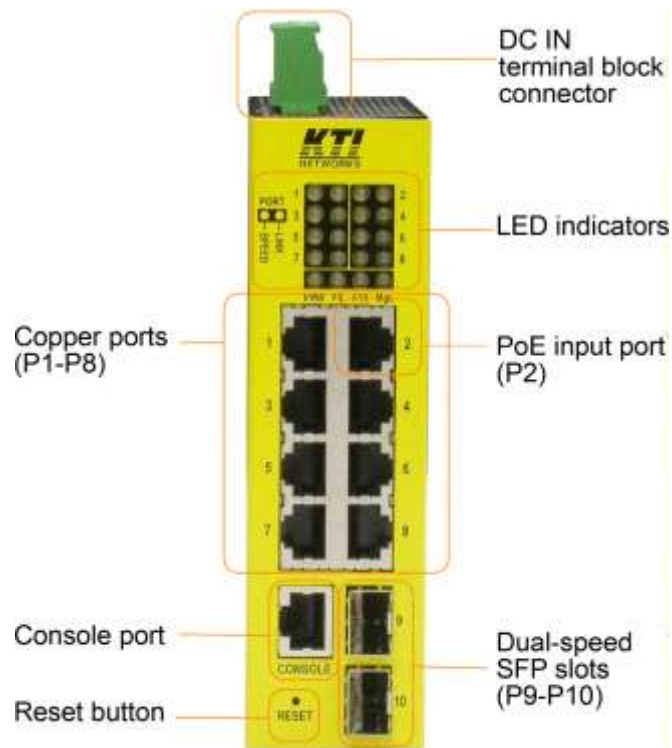
- Management:
 - HTTP/HTTPS/SSHv2/CLI telnet/CLI console/SNMP v1/v2c/v3/RMON
 - DHCP/DHCPv6 client, DHCP relay, DNS client, NTPv4
 - IPv6 support, System Syslog, Configuration down/upload, Software upload
- Security:
 - NAS, 802.1X, MAC-based/Web/CLI authentication
 - IP MAC binding, TACACS+, IP source guard
- Layer 2:
 - QoS, 802.1Q/MAC-based/Protocol-based/Private/IP subnet VLAN, Port Isolation
 - Storm control for UC/MC/BC packets, Static MAC configuration
 - IGMP v2/v3 snooping, MLD v1/v2 snooping, DHCP snooping
 - Multiple Spanning Tree - MSTP, RSTP, STP
- Auto Multi-Ring (KAMR) Technology:
 - Fast failover response time, Auto recovery when failure is repaired
 - Supports up to five redundant rings, Works with RSTP network

1.2 Product Panels

The following figure illustrates the front panel and rear panel of the switch:



KGS-1060-HP Front panel



KGS-1060 Front panel



Terminal block connector

Up panel

1.3 LED Indicators

<u>LED</u>	<u>Function</u>
PWR	Power status
Mgt.	Management status
Port 1~ 8 SPEED LEDs	Speed & PoE status
Port 1~ 8 LINK LEDs	Link & activity status
SFP 9, 10 LED	Speed & link & activity status of SFP port

1.4 Specifications

10/100/1000 Copper Ports (Port 1 ~ Port 8)

Compliance	IEEE 802.3 10Base-T, IEEE 802.3u 100Base-TX, IEEE 802.3u 1000Base-T
Connectors	Shielded RJ-45 jacks
Pin assignments	Auto MDI/MDI-X detection
Configuration	Auto-negotiation or software control
Transmission rate	10Mbps, 100Mbps, 1000Mbps
Duplex support	Full/Half duplex
Network cable	Cat.5 UTP

Dual-speed SFP Slots (Port 9, Port 10)

Compliance	IEEE 802.3u 100Base-FX IEEE 802.3z 1000Base-SX/LX (mini-GBIC)
Connectors	SFP for optional SFP type fiber transceivers
Configuration	Auto 1000Mbps, Full duplex Forced 100Mbps, Full duplex
Transmission rate	100Mbps and 1000Mbps
Network cables	MMF 50/125 60/125, SMF 9/125
Eye safety	IEC 825 compliant

Console Port

Interface	RS-232, DTE type
Connector	Shielded RJ-45

Switch Functions

MAC Addresses Table	8K entries
Forwarding & filtering	Non-blocking, full wire speed
Switching technology	Store and forward
Maximum packet length	9.6K bytes
IP Multicast groups	8192 supported
Flow control	IEEE 802.3x pause frame base for full duplex operation Back pressure for half duplex operation

Power over Ethernet PSE Function (KGS-1060-HP)

PSE Ports	Port 1 ~ Port 4
Power output pins	Positive of power voltage: pin 4, 5 Negative of power voltage: pin 7, 8
Standard	IEEE 802.3at
Classification	PD Class 0 ~ 4 detection
Power Delivery	30W max. (per port) at port output for Cat.5 distance up to 100 meters
Protection	Under voltage protection Over voltage protection Over current detection

Powered via Power over Ethernet (KGS-1060)

PD Port	Port 2
PoE Standard	IEEE 802.3af PoE PD (Powered Device)
PSE Support	IEEE 802.3af & 802.3at PSE
Power Classification	Class 3
Input Voltage (V_{poe})	36 ~ 57VDC via Cat.5
Power reception pins	Positive of PoE power voltage: pin 1,2,4,5 Negative of power voltage: pin 3,6,7,8

Terminal Block Connector

DC power input	Screwed euro terminal block: 2 pairs of +/- contacts
Operating Input Voltages	+7 ~ +60VDC (General applications) +45 ~ +57VDC (PoE applications)
Power consumption	9W max. (Full load with no PoE support) 130W max. (Full load with 4 PoE max. output)
Alarm relay output	2 terminal contacts AR+/AR- (30VDC/1A max. or 120VAC/0.5A max.)
Alarm events	Power failure, Specific port link fault (software configured), OPA

* *Warning: The -48VDC power supply is not supported.*

Mechanical

Dimension (base)	140 x 106 x 42 mm (HxDxW)
Housing	Enclosed metal with no fan
Mounting	Din-rail mounting, Panel mounting (optional)

Environmental

Operating Temperature	Typical -30°C ~ +70°C*
Storage Temperature	-40°C ~ +85°C
Relative Humidity	5% ~ 90% non-condensing

* +60°C ~ +70°C with 1m/s air flow

Electrical Approvals

FCC	Part 15 rule Class A
CE	EMC, CISPR11 Class A
Safety / LVD	IEC 60950-1

2. Installation

2.1 Unpacking

The product package contains:

- The switch unit
- One product CD-ROM
- One console cable

2.2 Safety Cautions

To reduce the risk of bodily injury, electrical shock, fire, and damage to the product, observe the following precautions.

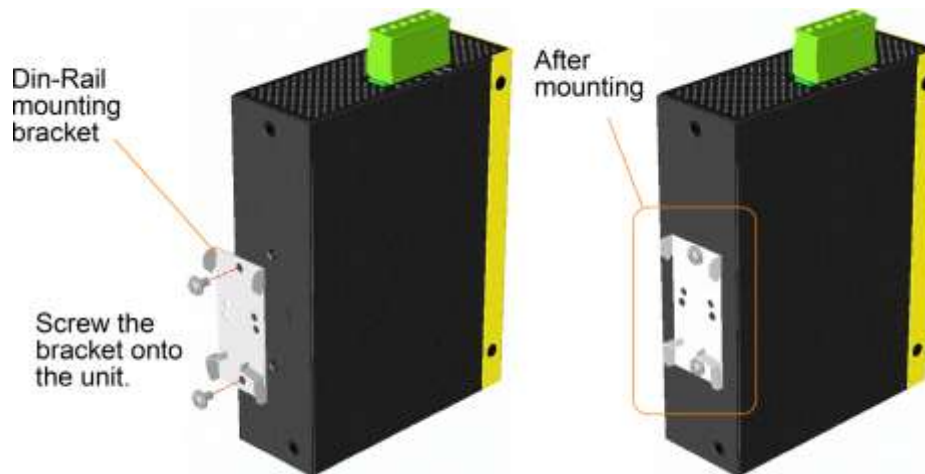
- Do not service any product except as explained in your system documentation.
- Opening or removing covers may expose you to electrical shock.
- Only a trained service technician should service components inside these compartments.
- If any of the following conditions occur, unplug the product from the electrical outlet and replace the part or contact your trained service provider:
 - The power cable, extension cable, or plug is damaged.
 - An object has fallen into the product.
 - The product has been exposed to water.
 - The product has been dropped or damaged.
 - The product does not operate correctly when you follow the operating instructions.
- Do not push any objects into the openings of your system. Doing so can cause fire or electric shock by shorting out interior components.
- Operate the product only from the type of external power source indicated on the electrical ratings label. If you are not sure of the type of power source required, consult your service provider or local power company.

2.3 DIN-Rail Mounting

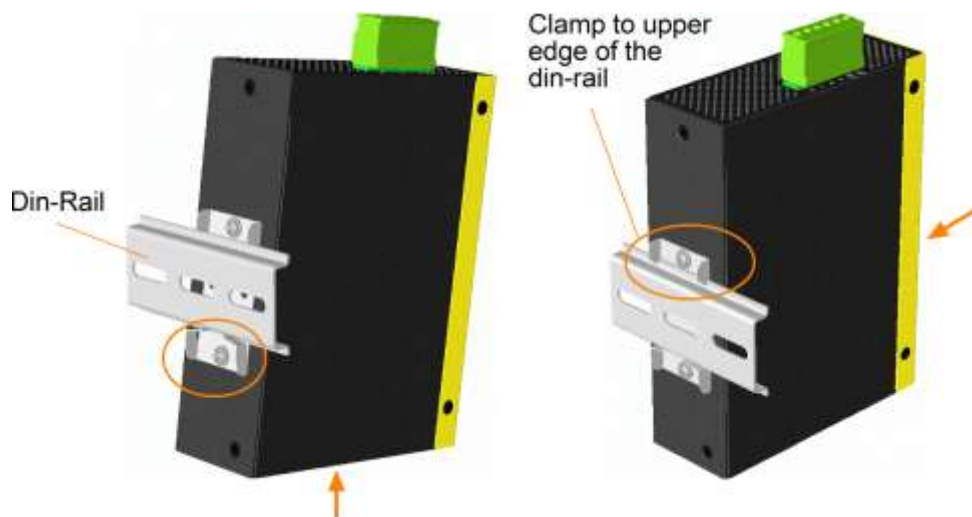
In the product package, a DIN-rail bracket is provided for mounting the switch in a industrial DIN-rail enclosure.

The steps to mount the switch onto a DIN rail are:

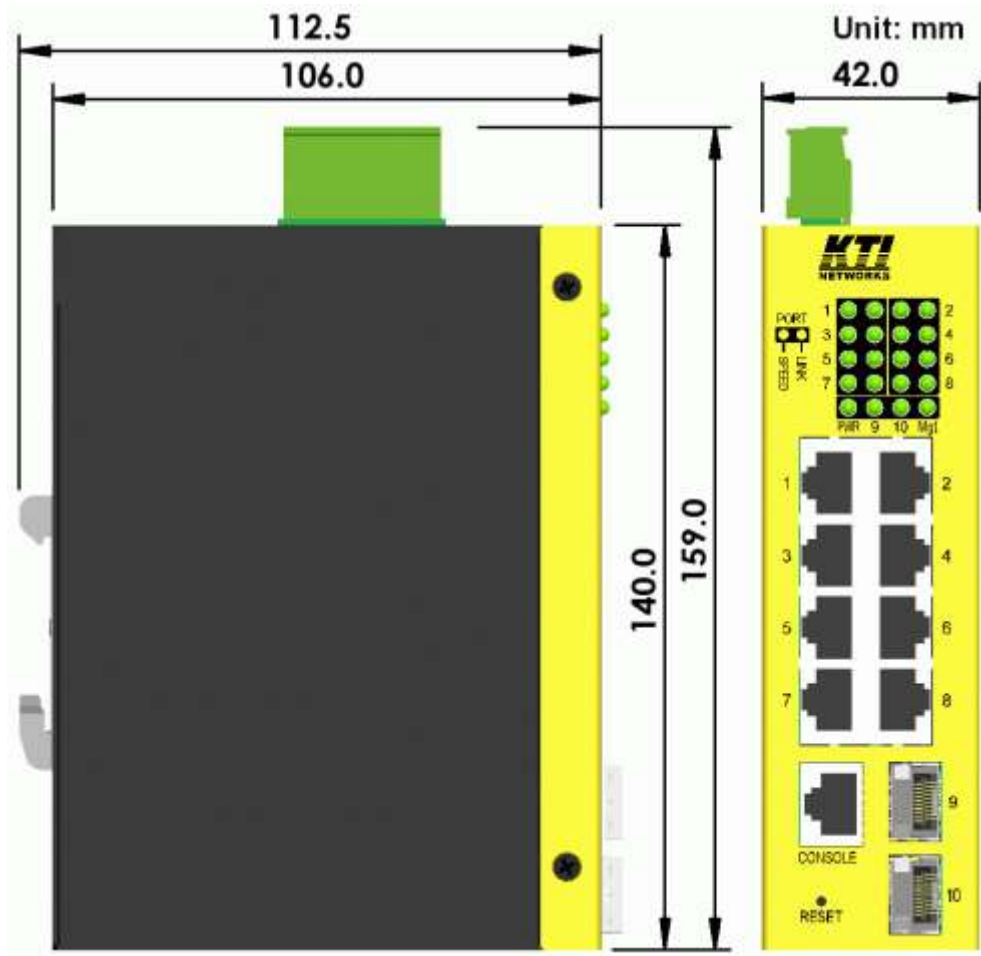
1. Install the mounting bracket onto the switch unit as shown below:



2. Attach bracket to the lower edge of the DIN rail and push the unit upward a little bit until the bracket can clamp on the upper edge of the DIN rail.
3. Clamp the unit to the DIN rail and make sure it is mounted securely.



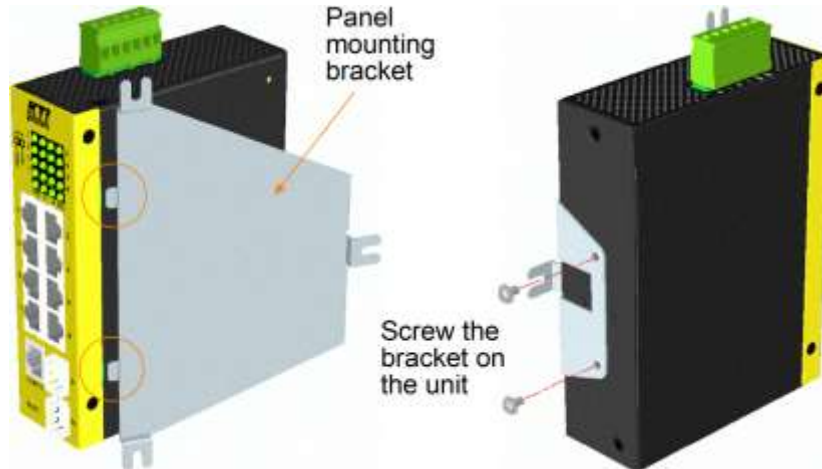
Dimensions:



2.4 Panel Mounting

The switches are provided with an optional panel mounting bracket. The bracket supports mounting the switch on a plane surface securely. The mounting steps are:

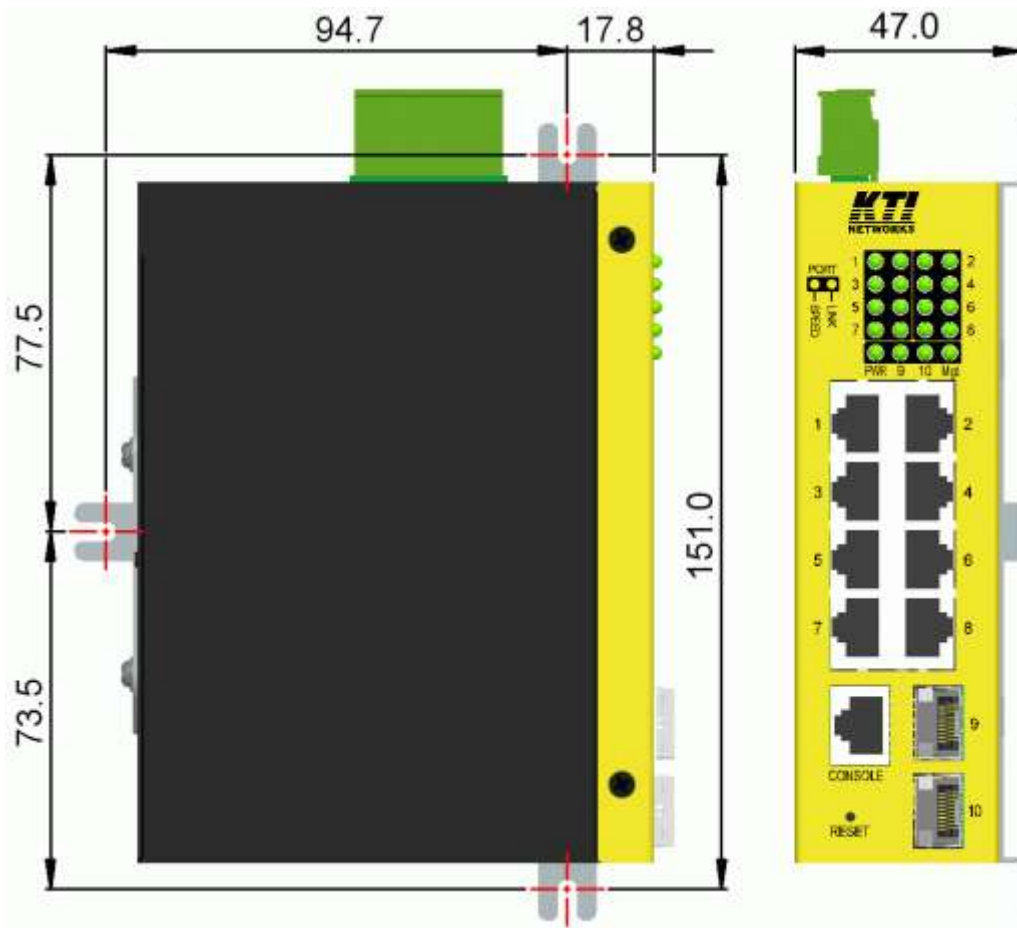
1. Install the mounting bracket on the switch unit.



2. Screw the bracket on the switch unit.
3. Screw the switch unit on a panel. Three screw locations are shown below:



Dimensions:



2.5 Applying Power



Terminal block connector

Pin Assignments of the terminal block connector

+	Vdc Positive (+) input terminal
-	Vdc Negative (-) input terminal
+	Vdc Positive (+) input terminal
-	Vdc Negative (-) input terminal
AR+	Alarm relay output positive (+) terminal
AR-	Alarm relay output negative (-) terminal

Any of the Vdc+/Vdc- pairs can be used to receive DC power from an external power system. Or, one can be used to deliver the power received on another to next switch in cascading way.

Vdc Input specifications

Applications	Power per PSE port	DC working voltage
General	-	+7V ~ +60VDC
PoE	15.4W max.	+45V ~ +57VDC (Typical 48V)
High power PoE (PoE+)	30W max.	+45V ~ +57VDC (+48V up for 30W)

WARNING: The -48VDC power supply is not supported.

Caution:

Do not apply direct DC IN power and PoE power at the same time.

Unplug DC IN when PoE power is connected.

Disconnect PoE power when DC IN is used.

Three 2P terminal plugs are provided together with the switch. Two of the three plugs are used for Vdc interfaces respectively. The plug is shown below:



Power wires : 24 ~ 12AWG (IEC 0.5~2.5mm²)

Install the power source wires with the plug properly. Then, plug in input contacts. If cascading the power to next switch device is needed, install the power wires and plug for another switch. Then, use another Vdc contacts.

Note:

- 1. Only up to four device units can be cascaded to receive power from one main power input source.*
- 2. The maximal length of the power wire is 1 meter.*

2.6 Alarm Relay Output

Alarm relay output is provided for reporting failure events to a remote alarm relay monitoring system. The relay output is provided with two contacts in the terminal block connector next Vdc interfaces.



Terminal block connector

Pin Assignments of the Alarm Relay output

- AR+ Alarm relay output positive (+) terminal
- AR- Alarm relay output negative (-) terminal

Use the provided 2P terminal plug for signal wiring and plug into the AR+/- contacts.

Alarm Events

- Input power failure
- Specific port link down (The specific ports can be configured by software.)
- OPA alarm if optical power is higher than a upper limit setting or lower than a lower limit setting

Relay Logic

Normal: AR+ and AR- shorted

Alarm: AR+ and AR- open

Note: Be sure the voltage applied on AR+/- contacts is within the specification of 30VDC/1A max. or 120VAC/0.5A max.

2.7 Powered via PoE over Cat.5 (KGS-1060)

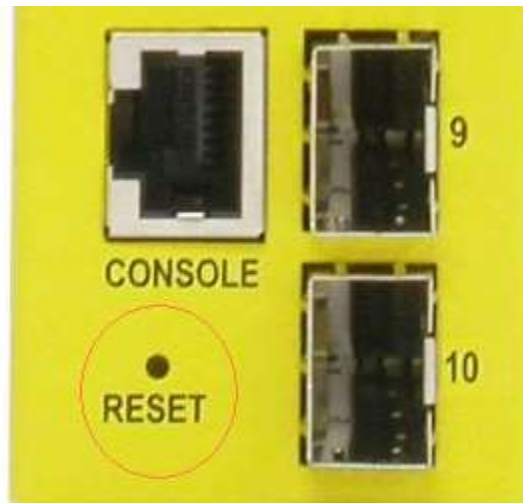
Port 2 is equipped with function of receiving power from connected PoE PSE device over Cat.5 cable. The remote PoE PSE devices can be a mid-span PoE injector or end-span PoE switched port.

The switches can support the following PSE:

- 802.3af compliant PSE (Typical, Type 1 PSE)
Possible voltages received: +36 ~ +57VDC
- 802.3at compliant PSE (High power PoE, Type 2 PSE)
Possible voltages received: +42.5 ~ +57VDC

2.8 Reset Button

The reset button is used to perform a reset to the switch. It is not used in normal cases and can be used for diagnostic purpose. If any network hanging problem is suspected, it is useful to push the button to reset the switch without turning off the power. Check whether the network is recovered.



The button can also be used to restore the software configuration settings to factory default values.

The operations are:

Operation	Function
Press the button and release during switch operation	Reset & boot up the switch. The behavior is same as power boot procedure.
Press the button until MNGT-LED steady ON	Boot & restore all factory default settings

2.9 Making UTP Connections

The 10/100/1000 RJ-45 copper ports support the following connection types and distances:

Network Cables

10BASE-T:	2-pair UTP Cat. 3, 4, 5 , EIA/TIA-568B 100-ohm
100BASE-TX:	2-pair UTP Cat. 5, EIA/TIA-568B 100-ohm
1000BASE-T:	4-pair UTP Cat. 5 or higher (Cat.5e is recommended), EIA/TIA-568B 100-ohm
Link distance:	Up to 100 meters for all above

Auto MDI/MDI-X Function

This function allows the port to auto-detect the twisted-pair signals and adapts itself to form a valid MDI to MDI-X connection with the remote connected device automatically. No matter a straight through cable or crossover cable is connected, the ports can sense the receiving pair automatically and configure itself to match the rule for MDI to MDI-X connection. It simplifies the cable installation.

Auto-negotiation Function

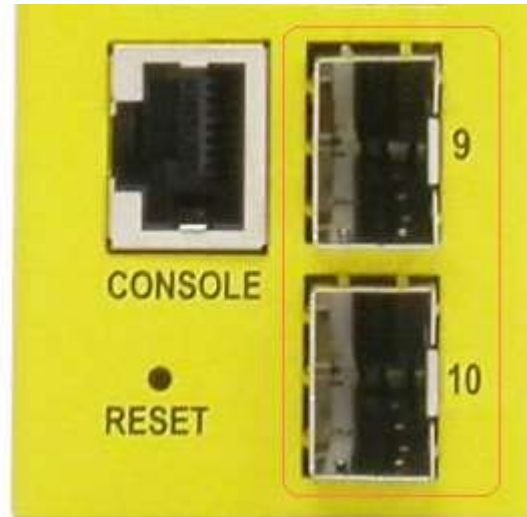
The ports are featured with auto-negotiation function and full capability to support connection to any Ethernet devices. The port performs a negotiation process for the speed and duplex configuration with the connected device automatically when each time a link is being established. If the connected device is also auto-negotiation capable, both devices will come out the best configuration after negotiation process. If the connected device is incapable in auto-negotiation, the switch will sense the speed and use half duplex for the connection.

Port Configuration Management

For making proper connection to an auto-negotiation incapable device, it is suggested to use port control function via software management to set forced mode and specify speed and duplex mode which match the configuration used by the connected device.

2.10 Making Fiber Connection

The dual-speed SFP slots, Port 9 and Port 10 must be installed with an SFP fiber transceiver for making fiber connection. Your switch may come with one or two SFP transceivers pre-installed when it is shipped.



Types of the SFP Fiber transceivers supported:

1000Mbps based 1000BASE-X SFP transceivers

100Mbps based 100BASE-FX SFP transceivers

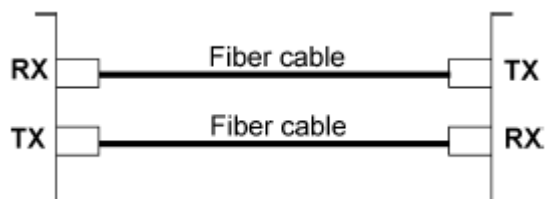
Installing SFP Fiber Transceiver

To install an SFP fiber transceiver into SFP slot, the steps are:

1. Turn off the power to the switch.
2. Insert the SFP fiber transceiver into the SFP slot. Normally, a bail is provided for every SFP transceiver. Hold the bail and make insertion.
3. Until the SFP transceiver is seated securely in the slot, place the bail in lock position.

Connecting Fiber Cables

LC connectors are commonly equipped on most SFP transceivers. Identify TX and RX connector before making cable connection. The following figure illustrates a connection example between two fiber ports:



Make sure the Rx-to-Tx connection rule is followed on the both ends of the fiber cable.

Network Cables

Multimode (MMF) - 50/125, 62.5/125

Single mode (SMF) - 9/125

Port Speed Configuration

There are three options for configuring port speed via software for SFP Port 9 and Port 10.

The options are:

Auto	Auto-detection for the type of the installed SFP transceiver by reading DDM data 100Mbps transceiver: Non-auto-negotiation (forced), 100Mbps, full duplex 1000Mbps transceiver: Auto-negotiation, 1000Mbps, full duplex
100Mbps FDX	Non-auto-negotiation (forced), 100Mbps, full duplex
1Gbps FDX	Auto-negotiation, 1000Mbps, full duplex

2.11 Making PoE PSE Connections (KGS-1060-HP)

This section describes how to make a connection between a PSE port and a PoE PD device. In PoE model, four copper ports, P1 ~ P4 are equipped with PoE PSE function. The ports are enabled to deliver power together with network signal to a connected powered device via Cat.5 cable.

To make a PoE connection, the following check points should be noted:

1. For safety reason, the connected PoE PD (Powered Device) must be a IEEE 802.3af or IEEE 802.3af-compliant device. Incompliant devices are not supported by the PoE switch model.
2. The Cat.5 cables used for the connections must be 4-pair cables. The power is sent over the spare pairs (4,5) (7,8) of the cable. The maximum distance supported is 100 meters.
3. The power voltage supplied to the switch must be within the range as specified in [section 2.5](#) to make PoE function working.

The PSE ports are equipped with the following capabilities:

1. Detection for an IEEE 802.3af /802.3at compliant PD.
2. No power is supplied to a device which is classified non-IEEE 802.3af compliant PD.
3. No power is supplied when no connection exists on the port.
4. The power is cut off immediately from powering condition when a disconnection occurs.
5. The power is cut off immediately from powering condition when overload occurs.
6. The power is cut off immediately from powering condition when over-current occurs.
7. The power is cut off immediately from powering condition when short circuit condition occurs.

The figure below illustrates a connection example:



2.12 LED Indication

LED	Function	Color	State	Interpretation	
PWR	Power status	Green	ON	The power is supplied to the switch.	
			OFF	The power is not supplied to the switch.	
Mgt.	Management status	Green	OFF	The switch is in initialization and diagnostics.	
			Yellow	BLINK	Initialization completed with diagnostic error or system error found during normal operation
			Green	ON	Initialization completed with no error

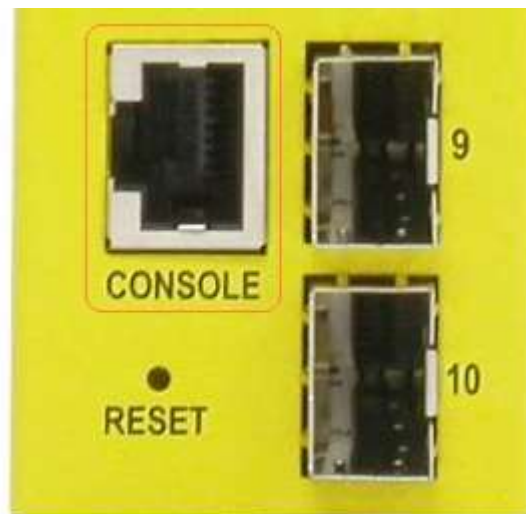
Port 1 ~ Port 8

SPEED_LED	Port speed status	Green	ON	Speed is 1000Mbps.	
			Yellow	ON	Speed is 10Mbps or 100Mbps.
			BLINK	PoE power is on.	
LINK_LED	Port link status	Green	ON	Port link is established. (No traffic)	
			Green	BLINK	Port link is up and there is traffic.
			OFF	Port link is down.	

Port 9 ~ Port 10

Speed_LED	Port speed/link status	Green	ON	A 1000Mbps link is established.	
			Yellow	ON	A 100Mbps link is established.
			BLINK	Activity status	
			OFF	Port link is down.	

2.13 Making Console Connection



The connector designed for the console port is RJ-45.

Pin Assignments

<u>Pin</u>	<u>RS-232 signals</u>	<u>IN/OUT</u>
1,2,7,8	NC	
3	RxD	IN
6	TxD	OUT
4,5	GND	

Baud Rate information

Baud rate - 115200

Data bits - 8

Parity - None

Stop bit - 1

Flow control – None

3. Manage the Switch

The switch provides the following methods to configure and monitor the switch as follows:

- Making out of band telnet CLI management via the console port
- Making in-band management via telnet CLI over TCP/IP network
- Making in-band management via web interface over TCP/IP network
- Making in-band SNMP management over TCP/IP network

3.1 IP Address & Password

The IP Address is an identification of the switch in a TCP/IP network. Each switch should be designated a new and unique IP address in the network. The switch is shipped with the following factory default settings for software management:

Default IP address of the switch: **192.168.0.2 / 255.255.255.0**

The switch uses local authentication instead of RADIUS authentication with factory defaults.

Fixed Username: **admin**

Default password:

No password is required with factory default. However, the password is used for local authentication in accessing to the switch via console, telnet and Http web-based interface. For security reason, it is recommended to change the default settings for the switch before deploying it to your network.

3.2 Configuring IP Address & Password via console and telnet

[IP Address] setting command is in IP command group.

```
>IP Setup [<ip_addr>] [<ip_mask>] [<ip_router>] [<vid>]
```

Parameters:

```
<ip_addr>      : IP address (a.b.c.d)  
<ip_mask>     : IPv4 subnet mask (a.b.c.d)  
<ip_router>   : IPv4 router (a.b.c.d)  
<vid>         : VLAN ID (1-4095)
```

[IPv6 Address] setting command is also in IP command group.

```
>IP IPv6 Setup [<ipv6_addr>] [<ipv6_prefix>] [<ipv6_router>]
```

Parameters:

- <ipv6_addr> : IPv6 address is in 128-bit records represented as eight fields of up to four hexadecimal digits with a colon separates each field (:).
- <ipv6_prefix> : IPv6 subnet mask
- <ipv6_router> : IPv6 router

[Password] setting command is also in Security/Switch/Users command group.

Security Switch Users Configuration

Security Switch Users Add <user_name> <password> <privilege_level>

Security Switch Users Delete <user_name>

Refer to “Operation manual for telnet and console management”.

3.3 Configuring IP Address via Web Interface

Start Web Browser

Start your browser software and enter the default IP address of the switch unit to which you want to connect. The IP address is used as URL for the browser software to search the device.

URL: <http://192.168.0.2/>

Login to Switch Unit

When browser software connects to the switch unit successfully, a Login screen is provided for you to login to the device as the left display below:



Enter the following default values in the login page:

Default username: *admin*

Default password: ↵

No password is required.

Click to login into the switch.

Web Page after a Successful Login

KGS-1060 GigaBit Ethernet Switch

Port State Overview

Auto-refresh Refresh

Configuration

- Monitor
 - System
 - Thermal Protection
 - Ports
 - State
 - Traffic Overview
 - QoS Statistics
 - QCL Status
 - Detailed Statistics
 - Security
 - LACP
 - Loop Protection
 - Spanning Tree
 - MVR
 - IPMC
 - LLDP
 - PoE
 - MAC Table
 - VLANs
 - VCL
 - sFlow
 - Multi Ring Status
- Diagnostics
- Maintenance

Select [Configuration] -> [System] -> [IP] to configure IP address

IP Configuration

	Configured	Current
DHCP Client	<input type="checkbox"/>	<input type="button" value="Renew"/>
IP Address	192.168.0.179	192.168.0.179
IP Mask	255.255.255.0	255.255.255.0
IP Router	0.0.0.0	0.0.0.0
VLAN ID	1	1
DNS Server	0.0.0.0	0.0.0.0

IP DNS Proxy Configuration

DNS Proxy

Configuration	Description
DHCP Client	Enable the DHCP client by checking this box.
IP Address	Provide the IP address of this switch unit.
IP Mask	Provide the IP mask of this switch unit.
IP Router	Provide the IP address of the default router for this switch unit.
VLAN ID	Provide the managed VLAN ID. The allowed range is 1 through 4095.
DNS Server	Provide the IP address of the DNS Server in dotted decimal notation.
DNS Proxy	When DNS proxy is enabled, DUT will relay DNS requests to the current configured DNS server on DUT, and reply as a DNS resolver to the client device on the network.
<input type="button" value="Save"/>	Click to save the changes.
<input type="button" value="Reset"/>	Click to undo any changes made locally and revert to previously saved values.
<input type="button" value="Renew"/>	Click to renew DHCP. This button is only available if DHCP is enabled.

3.4 Reference Manuals for Web, Console, Telnet Management

The following operation manuals are also provided separately for Console, Telnet and Web management:

Operation manual - telnet & console management xxxxxx.doc

Operation manual - web management xxxxx.doc

The manuals describe the detailed commands and information.

3.5 Configuration for SNMP Management

The switch supports SNMP v1, SNMP v2c, and SNMP v3 management. Make sure the related settings are well-configured for the switch before you start the SNMP management from an SNMP manager.

Using Telnet Interface

The following are available commands in telnet SNMP command group to configure SNMP-related settings:

```
>SNMP Configuration
>SNMP Mode [enable/disable]
>SNMP Version [1/2c/3]
>SNMP Read Community [<community>]
>SNMP Write Community [<community>]
>SNMP Trap Mode [enable/disable]
>SNMP Trap Version [1/2c/3]
>SNMP Trap Community [<community>]
>SNMP Trap Destination [<ip_addr_string>]
>SNMP Trap IPv6 Destination [<ipv6_addr>]
>SNMP Trap Authentication Failure [enable/disable]
>SNMP Trap Link-up [enable/disable]
>SNMP Trap Inform Mode [enable/disable]
>SNMP Trap Inform Timeout [<timeout>]
>SNMP Trap Inform Retry Times [<retries>]
>SNMP Trap Probe Security Engine ID [enable/disable]
>SNMP Trap Security Engine ID [<engineid>]
>SNMP Trap Security Name [<security_name>]
>SNMP Engine ID [<engineid>]
>SNMP Community Add <community> [<ip_addr>] [<ip_mask>]
>SNMP Community Delete <index>
>SNMP Community Lookup [<index>]
>SNMP User Add <engineid> <user_name> [MD5/SHA] [<auth_password>] [DES] [<priv_password>]
>SNMP User Delete <index>
>SNMP User Changekey <engineid> <user_name> <auth_password> [<priv_password>]
>SNMP User Lookup [<index>]
>SNMP Group Add <security_model> <security_name> <group_name>
>SNMP Group Delete <index>
>SNMP Group Lookup [<index>]
>SNMP View Add <view_name> [included/excluded] <oid_subtree>
```

>SNMP View Delete <index>
>SNMP View Lookup [<index>]
>SNMP Access Add <group_name> <security_model> <security_level> [<read_view_name>] [<write_view_name>]
>SNMP Access Delete <index>
>SNMP Access Lookup [<index>]

Using Web Interface



The commands supports configuration for:

- Basic system configuration for SNMP v1 and SNMP v2c
- Basic system configuration for SNMP v1 trap, SNMP v2c trap and SNMP v3 trap
- Communities that permit to access to SNMPv3 agent
- USM (User-based Security Model) user table for SNMPv3
- VACM (View-based Access Control Model) Viewer table for SNMPv3
- Group table for SNMPv3
- Accesses group table for SNMPv3

3.6 SNMP MIBs

The switch provides the following SNMP MIBs:

- RFC 1213 - MIB II
- RFC 2674 - QBridge MIB (VLAN MIB)
- RFC 2819 - RMON (Group 1, 2, 3 & 9)
- RFC 2863 - Interface Group (IF) MIB
- RFC 3411 - SNMP Management Frameworks
- RFC 3414 - User Based Security Model (USM)
- RFC 3415 - View Based Access Control Model (VACM)
- RFC 3621 - Power Ethernet MIB
- RFC 3635 - EtherLike MIB
- RFC 3636 - 802.3 Medium Attachment Units (MAUs) MIB
- RFC 4133 - Entity MIB
- RFC 4188 - Bridge MIB

- RFC 4668 - RADIUS Authentication Client MIB
- RFC 5519 - Multicast Group Membership Discovery (MGMD) MIB
- IEEE 802.1 MSTP MIB
- IEEE 802.1AB LLDP MIB
- IEEE 802.1X Port Access Entity (PAE) MIB
- TIA 1057 LLDP Media Endpoint Discovery (MED) MIB
- IEEE 802.1-Q-BRIDGE MIB
- Private SFPDDM MIB (DDM status)
- Private reboot MIB (Remote boot over SNMP)
- Private TFTP firmware update MIB (TFTP Firmware update via SNMP)

One product MIB file is also available in the product CD for SNMP manager software.

4. Redundant Ring Applications

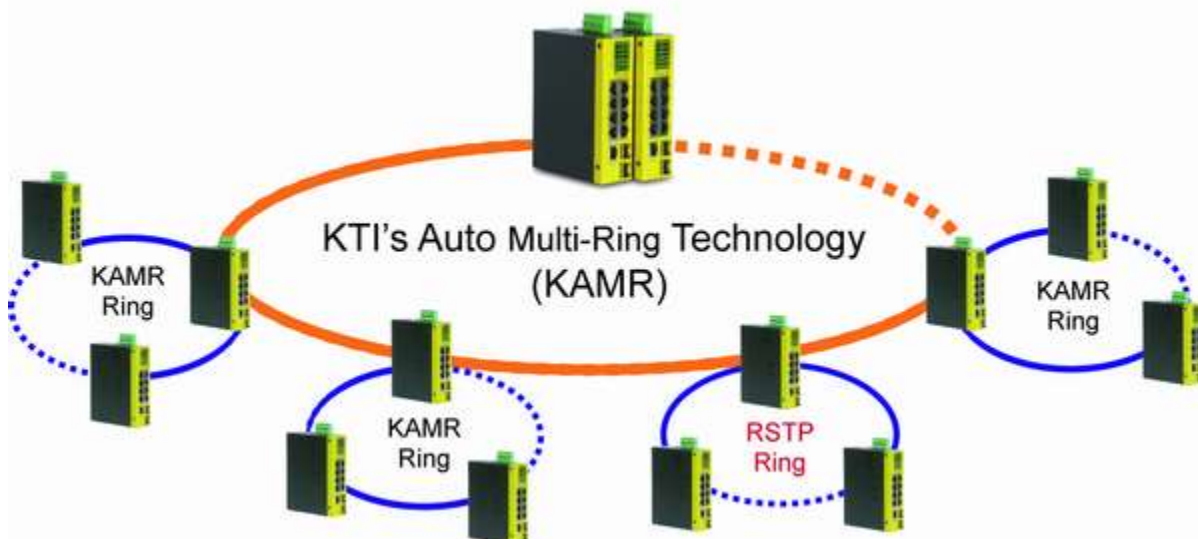
4.1 Auto Multi-Ring Technology

Auto Multi-Ring Technology was developed especially for switches connected in ring topology which needs redundant support when any failure occurs in ring. For large network, more than one ring connections are very common. Auto Multi-Ring Technology implementation can support more than one ring connection within a switch. It is also able to work with RSTP support concurrently in the switch.

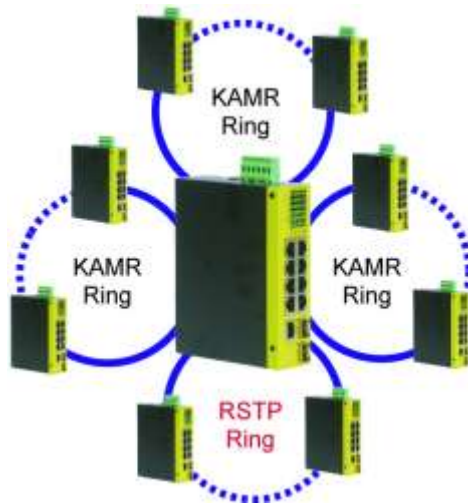
Some basic information is:

- Supports up to five rings in one switch
- Supports up to 30 member switches in one ring
- Provides fast response time than RSTP protocol
- Works with RSTP protocol concurrently within one switch

The following figure illustrates a configuration that three redundant rings and one RSTP ring hook on a main redundant ring. Some switches support two redundant rings concurrently.



The following figure shows one switch is configured to support three redundant rings and one RSTP ring at the same time.



4.2 Redundant Ring Applications with industrial standard RSTP protocol

It also can be done to support a ring connection using industrial standard RSTP function and establish a backup path. In case that any link failure occurs, the backup path can link up immediately to recover the network operation.