1. Summary

MGA-ML4TWPoE++ is an Ethernet Ethernet Switch with management function which has 4 100M/1000M/2.5G/5GBASE-T compatible ports, 2 100M/1000M/2.5G/5G/10GBASE-T compatible ports, and 2 SFP+ extension slots (they are exclusively used with the twisted pair ports).
Ports 1 to 4 support IEEE802.3bt/at/af PoE power supply function.

2. Feature

(1) Ports 1 to 4 are 100BASE-TX/1000BASE-T/2.5GBASE-T/5GBASE-T ports corresponding to auto negotiation.
Also their speed and communication mode can be switched by configuration.
Ports 5 and 6 can be used as a 100BASE-TX/1000BASE-T/2.5GBASE-T/5GBASE-T/10GBASE-T port corresponding to auto negotiation or an SFP+ extension slot exclusively.

(2) Ports 1 to 4 can supply power conforming with IEEE802.3bt/at/af. Supplying power up to 95 W per port, and up to 240 W in total is possible.

(3) Is equipped with PoE auto reboot function, and monitoring, and the switching of the power supply OFF/ON to ports is possible via Ping, LLDP, and the 3 traffic volume methods.

(4) Is equipped with silent fan control functions, can be set to match the operating environment temperature and power supply, and be used with any of the fan rpm, “High”, “Low” and “Min”.

(5) All twisted pair ports support straight/cross cable auto sensing function.
Simply connect devices with straight cables, whether it is a terminal or a network device.
(This function does not work if the port communication configuration is set at Fixed or Link Aggregation.
Ports 1 to 4 are set at MDI-X. (default))

(6) Telnet/SSH allows remote configuration changes and verifications of the Ethernet Switch.
Remotely configure the PoE settings for each port (Ports 1 to 4).

(7) The connection status for each port is detected by the power saving mode, and it can suppress the power consumption to required volumes when not linked up. (Factory default: disabled)

(8) Rapid Spanning Tree Protocol is supported, allowing to build a system with redundancy.

(9) The IEEE802.1p compatible QoS function is supported.

(10) Supports triple authentication that can simultaneously wait on IEEE802.1X authentication, MAC authentication, and WEB authentication via one port, and an authentication network which is matched to the kinds of connection terminals can be constructed.

(11) Equipped with step authentication functions, and can prevent illegal access of the terminals.

(12) Since it is equipped with authentication supplicant functions, a more robust security configuration can be configured in combination with the upper switch’s IEEE802.1X authentication function.

(13) Due to the loop detection/shutoff function, a port where loop has occurred can be automatically shut off to prevent loop failures.
When a port is shut off and recovered automatically, SNMP trap can be sent to notify the incident to the administrator.
Moreover, the port with a loop can be identified by loop notification on the LEDs on the main unit and referring the history of loop on the setting screen.

(14) The PoE scheduler function enables scheduling of PoE power supply control.

(15) Supports ZEQUO assist Plus. Processes from introduction to maintenance can be performed easily.

3. Rated/Environmental Conditions

3－1. Power supply	AC100-240V, 50/60Hz, 3.8A (with a built-in power supply)
3－2. Power consumption	Normally, Max.303W (32.5W when not supplying power), Min. 20.8W
3－3. Operating environment	Temperature: 0 - 50℃ Humidity: 20 - 80%RH (no condensation) (Please note) Please note that if the aforementioned conditions are not satisfied, then that may cause fire, electrical shock, malfunctions or misoperations, which are not covered by the warranty. *If it is used beyond the operating environmental temperatures, then the protective devices will start working and the Ethernet Switch power will be shut off. *If the settings for the silent fan control functions are changed, then the upper limit for the operating environmental temperatures may change. For details, check "7-11. The Silent Fan Control Functions".
3－4. Storage environment	Temperature: -20 - 70℃ Humidity: 10 - 90%RH (no condensation)
3－5. EMC compliance	CISPR 32 Class A EN 55032 Class A AS/NZS CISPR32 Class A VCCI Class A EN 61000-3-3 EN 55024, EN55035 IEC 61000-4-2, IEC 61000-4-3, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-6, IEC 61000-4-8, IEC 61000-4-11 * Electrical surges (lightning-induced surges in wiring): 10 kV (Depending upon the twisted pair ports, and Panasonic's proprietary evaluations)
3－6. Safety compliance	IEC 62368-1 EN 62368-1
3－7. Environment compliance	RoHS compliant

4. Form

4－1. Form and materials/colors	Dimensions :44mm (Height) ×330mm (Width) ×230mm (Depth) (Excluding protruding sections) Case material :SECC Color : Main unit: Green 03, Front face: Black 03, Face plate label: Black 04
4－2. Mass (Weight)	3,100g

5. Hardware Specifications

5－1. Interface

Twisted pair port :RJ45 connector (Port 1 to 4, (*1))

Transmitting and receiving network system:

IEEE802.3u	100BASE-TX
IEEE802.3ab	1000BASE-T
IEEE802.3bz	2.5GBASE-T
IEEE802.3bz	5GBASE-T

Transmission speed :100Mbps, full/half duplex
1000M/2.5G/5Gbps, full duplex

Compatible cable :Twisted pair cable
(At least equivalent to EIA/TIA568 category 5e)

Maximum transmission distance :100m

Auto-Negotiation :Communication speed and full/half duplex are automatically recognized.
The setting can be fixed to 100Mbps and full duplex or half duplex.

PoE power supply function :IEEE802.3bt/at/af
Up to 240W of power can be supplied to ports 1 to 4 in total.
Up to 90W of power can be supplied per port (factory default).
Up to 95W of power can be supplied per port (*2)(*3)

PoE power supply method :Alternative A
(Cable signal lines 1, 2, 3, and 6 are used.)
:Alternative A,B
(Cable signal lines 1 to 8 are used)

Twisted pair port :RJ45 connector (Port 5 to 6, (*1))

Transmitting and receiving network system:

IEEE802.3u	100BASE-TX
IEEE802.3ab	1000BASE-T
IEEE802.3bz	2.5GBASE-T
IEEE802.3bz	5GBASE-T
IEEE802.3an	10GBASE-T

Transmission speed :100Mbps, full/half duplex
1000M/2.5G/5G/10Gbps, full duplex

Compatible cable :Twisted pair cable
(At least equivalent to EIA/TIA568 category 5e)

Maximum transmission distance :100m

Auto-Negotiation :Communication speed and full/half duplex are automatically recognized.
The setting can be fixed to 100Mbps and full duplex or half duplex.

*1 Support two types of energy saving method :
1) Embedded power saving mode detects the connection status automatically and saves power consumption to minimum.

2) Energy Efficient Ethernet (EEE) conforming to IEEE802.3az (LPI).
When there is no data transmission at link up, the energy-saving state automatically starts so that power consumption can be reduced on each port.

These items are set to "Disabled" at factory default setting, and arrowed to be changed by the setting for application

(Refer to *2 and *3 in next page)

5. Hardware Specifications

5－1. Interface	*2 This is enabled when the limit of power supply per port is set to 95W. Power supply over 90W is available for only the Panasonic's PDs corresponding to PoE++. *3 AWG24 and 65 Celsius degree or higher rated temperature cables are recommended. SFP+ extension slot 5, 6 Transmitting and receiving network system: IEEE802.3z 1000BASE-X IEEE802.3ae 10GBASE-SR/LR * Select either of 1000BASE-T twisted pair port or SFP+ for use SFF-8472(DMI:Diagnostic Monitoring Interface) * Optional Accessories: 1000BASE-SX SFP Module(i) (PN54022-TH) 1000BASE-LX SFP Module(i) (PN54024-TH) 10GBASE-SR SFP+ Module(i) (PN59021-TH) 10GBASE-LR SFP+ Module(i) (PN59023-TH)
5－2. Switching mode	Switching method :Store and Forward Switching capacity :80.0 Gbps Packet transfer capability :Non-blocking Max 14,880,000pps/port (10Gbps) Max 7,440,000pps/port (5Gbps) Max 3,720,000pps/port (2.5Gbps) Max 1,488,000pps/port (1000Mbps) Max 148,800pps/port (100Mbps) MAC Address table :Max 16K entry/unit Automatic learning can be enabled/disabled for each port. Fixed registration is enabled. Buffer memory :2.0M Bytes/unit Flow control :half-duplex Back pressure full-duplex IEEE802.3x Aging timeout :10 to 1,000,000 sec. (Default: 300 sec.) Jumbo frame supported :9KB Transmittable frames :EAP,BPDU
5－3. Terminal emulator connection	Console port :RJ45 connector 1 port Transmission mode :RS-232C(ITU-TS V.24) Emulation mode :VT100 Communication configuration :9,600bps, 8bit, None Parity control, Stop bit 1 bit

5. Hardware Specifications

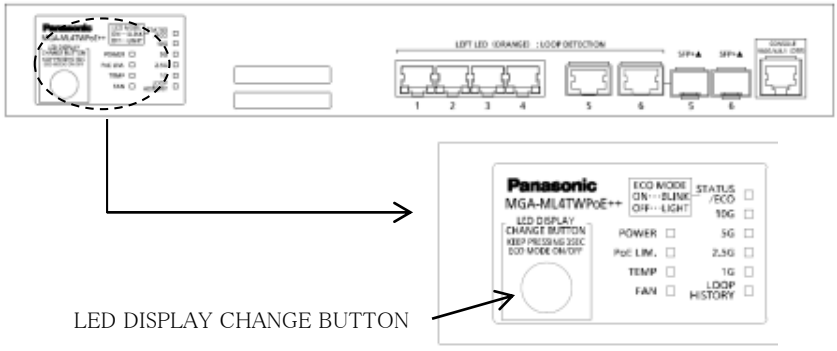
5－4. LED display	(1) POWER (Power) LED Green Light :Power is ON Off :Power is OFF (2) PoE LIM. (PoE limit) LED For silent fan control high-speed (High) * For factory default, or low-speed (Low2) Off : Supplying power in the range from 0 to 225 W. Green Light : Supplying power in the range of 225 to 240W Orange Blink : A single port's power supply is exceeding the upper limit, or the total power supply of the Ethernet Switches exceeding 240 W. For silent fan control low-speed (Low1), or Min-speed (Min) Off : Supplying power in the range from 0 to 105 W. Green Light : Supplying power in the range from 105 to 120 W. Orange Blink : A single port's power supply is exceeding the upper limit, or the total power supply of the Ethernet Switches exceeding 120 W. (3) TEMP (Temperature sensor) LED Green Light : The system is normally operating. Orange Blink : The temperature exceeded the set threshold of the internal temperature sensor. Set threshold of the internal temperature sensor: 73℃ (factory default) (4) FAN (Fan sensor) LED Green Light : The system is normally operating. Orange Blink : Fan failure (5) STATUS/ECO (Status/ECO mode) LED Green Light :Operating in status mode. Green Blink :Operating in ECO mode. All port LEDs are turned off. Orange Light :Starting. Orange Blink :Malfunction (Contact the seller). (6) 10G (10G mode) LED Green light : Operating in 10G mode. (7) 5G (5G mode) LED Green light : Operating in 5G mode. (8) 2.5G (2.5G mode) LED Green light : Operating in 2.5G mode. (9) 1G (1G mode) LED Green light : Operating in 1G mode. (10) LOOP (Loop History mode) HISTORY LED Green Light : Operating in loop History mode Green Blink : Loop is occurring, or occurred within the last 3 days. Off : No loop detection. Display of each port is refer to table 1 of page 7 .

5. Hardware Specifications

5－4. LED display

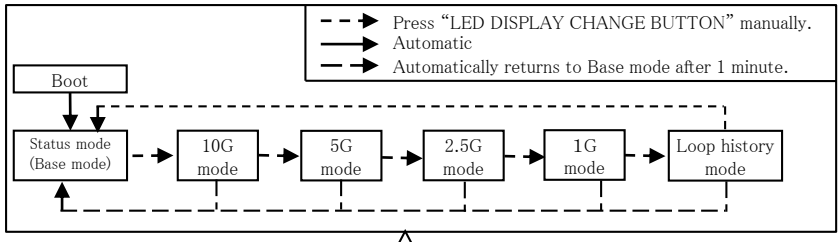
You can display the following items using the LED display switch button.
Display for the connection with a connected terminal (Status mode),
Display for the 10 Gbps transmission rate (10G mode),
Display for the 5 Gbps transmission rate (5G mode),
Display for the 2.5 Gbps transmission rate (2.5G mode),
Display for the 1000 Mbps transmission rate (1G mode),
Display for ports with a loop history (Loop history mode),
All port LED lamps can be turned OFF (ECO mode).

The mode at the start is called “Base mode.”
There are two types of Base modes: Status mode (factory default setting) and ECO mode.
You can change the Base mode by holding down the LED display switch button (for at least 3 sec).
When the Base mode is changed normally, all STATUS/ECO,10G,5G,2.5G,and 1G LED lamps light up at the same time. When you release the button, the Base mode is changed
to the selected mode.
If the mode is changed to the 10G mode,5G mode,2.5G mode,1G mode, or loop history mode and the LED display switch button is not used for one minute or longer, the mode automatically returns to a Base mode (Status mode or ECO mode).
The Base mode is maintained even after the power is turned OFF.



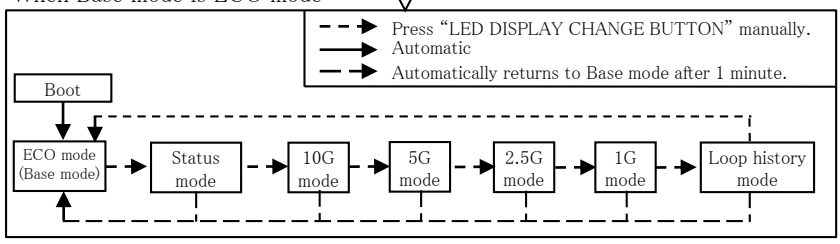
Switch two types of Base mode s and their LEDs in the following way:

When Base mode is Status mode (factory default setting)



Switch Base mode (keep pressing “LED DISPLAY CHANGE BUTTON” over 3 seconds)

When Base mode is ECO mode



LED lamps for each mode and LED lamps for ports 1 to 6 correspond as the following. (Table 1)

5. Hardware Specifications

5－4. LED display

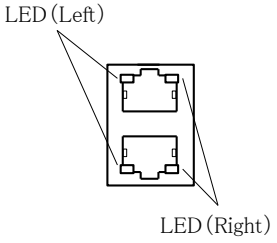


Table 1

Port LED	Display mode	Behavior	Description
Left	STATUS/ECO	Green Light Green Blink Orange Light Orange Blink Off	Link is established. Transmitting and receiving data. It is shut off via the loop detection and shut off function/storm control or the BPDU guard It is sending and receiving just the control packet. No device connected or the ECO mode is set.
	10G	Green Light Off	Link is established at 10 Gbps. Link is established at 5 Gbps, 2.5 Gbps, 1000 Mbps or 100 Mbps Or no device is connected.
	5G	Green Light Off	Link is established at 5 Gbps. Link is established at 10 Gbps, 2.5 Gbps, 1000 Mbps or 100 Mbps Or no device is connected.
	2.5G	Green Light Off	Link is established at 2.5 Gbps. Link is established at 10 Gbps, 5 Gbps, 1000 Mbps or 100 Mbps Or no device is connected.
	1G	Green Light Off	Link is established at 1 Gbps. Link is established at 10 Gbps, 5 Gbps, 2.5 Gbps or 100 Mbps Or no device is connected.
	LOOP HISTORY	Green Light Off	Loop has been detected within the last 3 days. No loop detection history.
Right		Green Light Orange Blink Off	PoE are being supplied power. Single port overload. Also, an overload of the Ethernet Switch occurs, and the ports are displayed which cannot be supplied power. Power is not being supplied, or the PoE receiving equipment are not connected. also, it is set in the ECO mode.

5－5. Cascade connections

Port 1-6 corresponding to the Auto MDI / MDI-X
(Allowed change by the setting for the application)
Ports 1-4 are set to "Disable" at factory default setting.

5－6. FAN

installed

6. Software Specifications

6－1. Configuration	Control parameters can be set by the following procedures: (1) Configuration from an asynchronous terminal connected to the console port. (2) Configuration from a remote terminal connected via TELNET and SSH. (3) It can be set from a remote terminal according to the Web screen.
6－2. Ethernet Switch Control	ZEQUO assist Plus can confirm the management/operation status of Ethernet Switch. Ethernet Switchcan be controlled by the following procedures: (1) Control from an asynchronous terminal connected to the console port. (2) Control from a remote terminal using SSH/TELNET and TCP/IP network connection (3) Control using SNMP Manager The Ethernet Switchoperation status can be checked using the following functions. (1) Internal temperature sensor function (2) Function to display the CPU usage and memory usage (3) SFP+ module status checking function (DDM: Digital Diagnostic Monitoring)
6－3. Rebooting	The system can be reset from the software in the following three modes: (1) Warm start. (2) Reset back to the factory default settings.
6－4. Supported Agent	Management protocol :SNMP v1/v2c /v3 (RFC 1157, RFC 1901, RFC 3411, RFC 3412, RFC 3413, RFC 3414, RFC 3415, RFC 3416) TELNET (RFC 854, RFC 855) SSH v2 (RFC 4252, RFC 4253, RFC 4254, RFC 4716, RFC4419) Data transfer protocol :TFTP (RFC 783, RFC 1350)
6－5. Supported MIB	RFC1213-MIB(MIBⅡ) (RFC 1213) (※1) BRIDGE-MIB (RFC 4188) (※2) SNMPv2-MIB (RFC 1907) RMON-MIB (RFC 2819) only etherStatsTable SNMP-FRAMEWORK-MIB (RFC 2571) SNMP-MPD-MIB (RFC 2572) SNMP-NOTIFICATION-MIB (RFC 2573N) SNMP-TARGET-MIB (RFC 2573T) SNMP-USER-BASED-SM-MIB (RFC 2574) SNMP-VIEW-BASED-ACM-MIB (RFC 2575) SNMP-COMMUNITY-MIB (RFC 2576) IP-MIB (RFC 4293) (※3) IF-MIB (RFC 2863) excluding IfMIB IEEE8021-PAE-MIB excluding dot1xPaeSupplicant POWER-ETHERNET-MIB (RFC 3621) (*4) *1 Excluding following items At , ipRouteTable, icmp, egp *2 Excluding following items dot1dStp, dot1dSr, dot1dStatic *3 Excluding following items ipDefaultRouterTable, ipv6RouterAdvertTable *4 Excluding following items deelxSoppConfigTable, dotlxSuppStatusTable
6－6. System log	Maximum number to be kept: 10,000 Transfers system logs to the Syslog server (IPv4/IPv6)

6. Software Specifications

6－7. Loop detection	Turns on the port LED with a orange light when a loop occurs in the corresponding port. At this time, the relevant port automatically shuts down (default setting: 60 sec.) to prevent loop from occurring .During loop is occurring, or if loop has occurred within the latest 3 days, LOOP HISTORY LED blinks to notify this. · Loop detection setting Enabled (factory default setting) Enabled/disabled can be switched by configuring a setting using the console.(*1) *1 The setting is kept even when the power is turned OFF. · Loop detection port Enabled: Ports 1 to 4 (factory default setting) Disabled: Ports 5 and 6 (factory default setting) · Loop shutoff time 60 to 86,400 sec. (Factory default setting: 60 sec.) The Set Time Port LED lights up orange and the port shuts off. · Loop history retention time 3 days The LOOP HISTORY LED blink for three days. The Port LED also remains lit for three days after the loop is eliminated. Loop shutoff mode has the following 2 types of modes. ・Block mode (factory default setting) When loops are detected, the port statuses are automatically blocked, and just the specified packets which include the loop detection packets will be transmitted and received. ・Shut-down mode When loops are being detected, the ports will be automatically linked down, and none of the packets will be transmitted and received.(*2) *2 Just the loop detection packets from 30 seconds before the set restoration times will automatically be transmitted and received.
6－8. Others	Syslog Client (Transfers system logs to the Syslog server.) TFTP Client (Upgrades the software and saves/loads configuration information.) SNTP Client TELNET Client DHCP Client LLDP LLDP-MED DNS Resolver DHCP Snooping DDM Statistics sFlow Ethernet OAM CFM UDLD (Scheduled to be supported)

7. Layer 2 Switching Functions

7－1. Spanning Tree	IEEE 802.1D Spanning Tree Protocol, Rapid Spanning Tree Protocol IEEE 802.1Q Multiple Spanning Tree Protocol BPDU guard
7－2. VLAN	IEEE802.1Q Private VLAN MAC-based VLAN Subnet based VLAN Protocol-based VLAN Number of VLAN registrations: 4,094 (including default) Asymmetric VLAN Voice VLAN (LLDP-MED) Dynamic VLAN Guest VLAN Internet mansion function
7－3. Link aggregation	IEEE802.3ad Link Aggregation function (LACP/Manual) Up to 3 groups can be created (up to 6 ports per group).
7－4. SPAN,RSPAN	Subject port traffic can be copied and transmitted to designated ports (multiple subject ports can be designated) Remote switching packets can be monitored via RSPAN.
7－5. Port grouping	Members of the port group can communicate only among member ports in the same group. (Number of group registrations: 256)
7－6. QoS	IEEE802.1p 8 levels of Priority Queue supported Scheduling Method: Strict Priority Queuing (SPQ:Strict priority queuing) Weighted Round Robin (WRR:Weighted round robin scheduling) Weighted Deficit Round Robin (WDRR: Weighted Deficit Round Robin scheduling)
7－7. Authentication Function	IEEE802.1X Port-based authentication Mac-based authentication using IEEE 802.1X Dynamic VLAN function using IEEE 802.1X Guest VLAN using IEEE 802.1X (EAP-MD5/TLS/PEAP Authentication method) IEEE802.1X supplicant Force Authorized MAC Address Configuration EAP Packet Forwarding function (Enable/disable EAP transmission can be specified for each port.) MAC authentication WEB authentication Triple authentication (*1) Step authentication (*2) *1 IEEE802.1X MAC-based/MAC/WEB authentication can be simultaneously *2 2 authentications can be combined in phases MAC-WEB authentication MAC-802.1X authentication 802.1X-WEB authentication
7－8. PoE power supply function	IEEE802.3bt/at/af power supply function. Up to 240 W of power can be supplied to ports 1 to 4 in total. (Maximum power supplied to a port: 90 W (factory default)) (Maximum power supplied to a port: 95 W (*3)(*4)) Supply method: IEEE802.3at/af:Alternative A(Cable signal lines 1, 2, 3, and 6 are used.) IEEE802.3bt: Alternative A, B(Cable signal lines 1 to 8 are used.) *3 This is enabled when the limit of power supply per port is set to 95W. Power supply over 90W is available for only the Panasonic's PDs corresponding to PoE++. *4 AWG24 and 65 Celsius degree or higher rated temperature cables are recommended.

7. Layer 2 Switching Functions

<table>
<tr><td>7－9. PoE scheduler function</td><td>PoE power supply control can be scheduled.
The setting can be configured by the month, week, day or specific date.
The maximum number of schedules to be registered: 32</td></tr>
<tr><td>7－10. PoE auto reboot function</td><td>Monitoring, and the switching of the power supply OFF/ON to ports is possible via Ping, LLDP, and the 3 traffic volume methods.</td></tr>
<tr><td>7－11. Silent fan control</td><td>The fan rpm can be set in accordance with the usage environments.
If the fan rpm are set, the available power supply will be automatically restricted.
If the fan rpm (Fan Speed) are set to Low1,or Min, the device's overall available power supply (Power Budget) will be automatically restricted, and it can be used with the fan noise reduced.
<table>
<tr><th colspan="2" rowspan="2">Fan Speed</th><th rowspan="2">Operating environment temperature</th><th rowspan="2">Maximum Power Supply (Power Budget)</th><th>Noise Characteristics (*)</th><th rowspan="2">Comments</th></tr>
<tr><th>LpA</th></tr>
<tr><td colspan="2">High</td><td rowspan="2">0-50℃</td><td>240W</td><td>40 dB</td><td>Factory default</td></tr>
<tr><td rowspan="2">Low</td><td>(Low1)</td><td>120W</td><td rowspan="2">33 dB</td><td></td></tr>
<tr><td>(Low2)</td><td rowspan="2">0-40℃</td><td>240W</td><td></td></tr>
<tr><td colspan="2">Min</td><td>120W</td><td>26 dB</td><td></td></tr>
</table>
(*) The noise characteristics measuring values in the surrounding area while in each mode are in accordance with JIS X 7779, thus the performances of the average values are not guaranteed.</td></tr>
<tr><td>7－12. Ring redundant protocol</td><td>Redundancy is enabled by ring configuration. (Up to 5 group can be registered.)</td></tr>
<tr><td>7－13. Multicast</td><td>IGMP snooping(IGMPv1/v2/v3) function (can be up to 1,024 groups of registration)
IGMP Querier function
MLD snooping(MLDv2) function (can be up to 1,024 groups of registration)
Multicast filtering function</td></tr>
<tr><td>7－14. Access control</td><td>Access control can be controlled by the following parameters:
(1) IP address, IPv6 address (Source or Destination)
(2) MAC address (Source or Destination)
(3) TCP/UDP port number (Source or Destination)
(4) VLAN ID
(5) IEEE 802.3p Priority
(6) DSCP,DSDP6
(7) Protocol
(8) ICMP type
(9) TCP SYN Flag</td></tr>
<tr><td>7－15. Time setting</td><td>SNTP settings, time manual setting</td></tr>
<tr><td>7－16. Storm control function</td><td>Unknown unicast, Broadcast, Multicast of possible control the storm</td></tr>
</table>

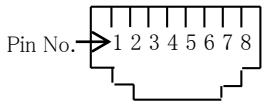
8. WEB Browser-based Control (WEB control screen)

8－1. System Requirements		
8－1－1. WEB Browser	Microsoft Internet Explorer 11	
8－2. Configuration Function		
8－2－1. Switch configuration	Administration IP Address SNMP SNTP Port System Security ID/Password Change Forwarding Database(FDB) Time(SNTP) LLDP VLAN Link Aggregation QoS Storm Control Access control ARP entry manual registration Port grouping Port monitoring Port counter	Authentication IGMP Querier IGMP Snooping Spanning Tree MSTP (Multiple Spanning Tree) Loop Detection DDM Ring protocol PoE Statistics System Log Syslog Transmission
8－3. Monitoring Configuration	Firmware upgrade, Reboot, Save current configuration, file transfer, Ping execution	

9. Connector Pin Arrangement

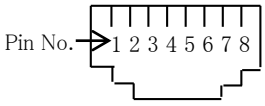
9－1. Port 1 - 6

Status	Pin No.	1	2	3	6	4	5	7	8
MDI-X	Signal	BI_DB+	BI_DB-	BI_DA+	BI_DA-	BI_DD+	BI_DD-	BI_DC+	BI_DC-
MDI	Signal	BI_DA+	BI_DA-	BI_DB+	BI_DB-	BI_DC+	BI_DC-	BI_DD+	BI_DD-



9－2. Console port

Pin No.	Signal	Pin No.	Signal
1	NC	5	GND
2	NC	6	RXD
3	TXD	7	NC
4	GND	8	NC



10. Installation Procedures and Accessories

10－1. Installation Procedures	(1) Mounting to rack
10－2. Accessories	(1) Installation Guide (English) :1 (2) Rubber foot :4 (3) Rack mount bracket (for 19-inch rack) :2 (4) Screw (for 19-inch rack) :4 (5) Screw (for fixing the mount brackets to the Ethernet Switch) :8 (6) Power cord (Plug Type : TIS166-2549)(*) :1 (7) Installation Guide (Thai) :1 *The attached power cord is dedicated for AC 100 - 240 V use.

11. Optional Accessories

11－1. 1000BASE-SX SFP Module(i) (Model No.:PN54022-TH)	Fiber optic port connector type :LC connector (Duplex) Standards :IEEE802.3z 1000BASE-SX Transmission speed :1000Mbps, full duplex Compatible cable :Fiber cable 50/125μm Multi Mode Fiber 62.5/125μm Multi Mode Fiber Maximum transmission distance :550 m at 50/125 μm 220 m at 62.5/125 μm Operating Temperature :0 - 60℃
11－2. 1000BASE-LX SFP Module(i) (Model No.:PN54024-TH)	Fiber optic port connector type :LC connector (Duplex) Standards :IEEE802.3z 1000BASE-LX Transmission speed : 1000Mbps, full duplex Compatible cable:Fiber cable 10/125μm Single Mode Fiber 50/125μm Multi Mode Fiber 62.5/125μm Multi Mode Fiber Maximum transmission distance :10 km when Single Mode Fiber is used 550 m when Multi Mode Fiber is used Operating Temperature :0 - 60℃
11－3. 10GBASE-SR SFP+ Module (Model No.:PN59021-TH)	Fiber optic port connector type :LC connector (Duplex) Standards :IEEE802.3ae 10GBASE-SR Transmission speed : 10Gbps Compatible cable:Fiber cable 50/125μm Multi Mode Fiber 62.5/125μm Multi Mode Fiber Maximum transmission distance :300m (50/125μm/2000MHz・km Fiber) 82m (50/125μm/500MHz・km Fiber) 66m (50/125μm/400MHz・km Fiber) 33m (62.5/125μm/200MHz・km Fiber) 260m (62.5/125μm/160MHz・km Fiber Operating Temperature :0 - 50℃
11－4. 10GBASE-LR SFP+ Module (Model No.:PN59023-TH)	Fiber optic port connector type :LC connector (Duplex) Standards :IEEE802.3ae 10GBASE-LR Transmission speed : 10Gbps Compatible cable:Fiber cable Single Mode Fiber cable Maximum transmission distance :10km Operating Temperature :0 - 50℃

12. Prohibitions when Using the Product to Guarantee Safety

Denotes that "Death or serious injuries might be sustained".
The manufacturer assumes no responsibility for any problems occurring when the following conditions are not satisfied.
Observe the following items when using the product.

(1) Do not use power supply other than AC 100 - 240 V.
Deviation could lead to fire, electric shock, and/or equipment failure.

(2) Do not handle this Ethernet Switchand connection cables during a thunderstorm.
Deviation could lead to electric shock.

(3) Do not disassemble and/or modify this Ethernet Switch.
Deviation could lead to fire, electric shock, and/or equipment failure.

(4) Do not damage the power cord. Do not bend too tightly, stretch, twist, bundle with other cord, pinch, put under a heavy object and/or heat it.
Damaged power cord could lead to fire, short, and/or electric shock.

(5) Do not unplug nor plug in the power plug with wet hands.
Deviation could lead to electric shock, and/or equipment failure.

(6) Do not insert, nor drop foreign objects such as metal or combustible things into the inside through the openings, twisted pair port, console port and SFP+ extension slot.
Deviation could lead to fire, electric shock, and/or equipment failure.

(7) Do not store or use the Ethernet Switch in places where it might get splashed with liquids such as water, in places with a lot of humidity, in places with conductive dust, or in places where there are corrosive and combustible gases.
Deviation could lead to fire, electric shock, and/or equipment failure.

(8) Do not store or use the Ethernet Switch in places where it will be exposed to direct sunlight or high temperature.
The temperature inside will rise, which may cause fire.

(9) Do not store or use the Ethernet Switch in places where there are lots of vibrations and impacts, or in unstable areas.
it might fall, which may cause injuries and/or equipment failure.

(10) Do not put the Ethernet Switch into fire.
Deviation could lead to explosion and/or fire.

(11) Do not connect the console ports with any other console cables except for our optional PN72001 RJ45-Dsub 9-pin console cable.
Deviation could lead to fire, electric shock, and/or equipment failure.

(12) Do not use the Ethernet Switch in dusty environments such as on floors, underneath floors, the backside of ceilings, or wiring panels.
Do not use the Ethernet Switch in very dusty areas such as in floors, underneath floors, the backside of ceilings, or wiring panels Deviation could lead to fire, electric shock, and/or equipment failure. It is recommended that the Ethernet Switch be operated in environments such as the inside of racks where it is difficult for dust to be generated.

13. Cautions when Using the Product to Guarantee Safety

Denotes that "Minor injuries might be sustained, or property damage might occur".
The manufacturer assumes no responsibility for any problems occurring when the following conditions are not satisfied.
Observe the following items when using the product.

(1) Use the bundled power cord (AC 100 - 240 V specifications).
Deviation could lead to electric shock, malfunction, and/or equipment failure.

(2) Unplug the power cord in case of equipment failure.
Deviation, such as keeping connected for a long time, could lead to fire.

(3) Be sure to connect the ground cable.
Otherwise this might cause electrical shocks, misoperations and malfunctions.
Connect the Ethernet Switch via the supplied power cord to the outlet which is connected to the ground.
If the outlet is not connected to a ground, connect the ground cable to the ground terminal screw.

(4) Connect the power cord firmly to the power port.
Otherwise this might cause electrical shocks and malfunctions.

(5) Unplug the power cord if the STATUS/ECO LED (Status/ECO mode) or FAN LED (Fan sensor) blinks in orange (system fault).
Deviation, such as keeping connected for a long time, could lead to fire.

(6) Handle the Ethernet Switch carefully so that fingers or hands may not be damaged by twisted pair port, SFP+ extension slot, console port or power cord hook block.

(7) When mounting the Ethernet Switch on a wall, mount it securely using wall mount brackets to prevent the Ethernet Switch from falling due its weight and that of the connection cables.
Deviation could lead to falling, injury and/or equipment failure.

(8) If the device is going to be mounted onto a rack, use the 2 installation brackets(for 19-inch rack mounting) which include the 19 inch rack mounting brackets (for 1 rack) and the 8 screws (for the rack installation brackets and for the main unit connections), and install the installation brackets into each of the 4 horizontal holes in the device, then securely secure it and set it up.
If it is not firmly secured, then deviation could lead to falling, injury and/or equipment failure.

(9) Up to two Ethernet Switches can be connected by using the connection brackets and connection bracket screws.
Attach the connection brackets to the connection bracket screw holes on the front and back panels to securely fix the Ethernet Switches before installation.
If the Ethernet Switches are not fixed securely, they may fall, leading to injury and/or equipment failure.

(10) Check whether the optical fiber cable connectors are contaminated with dust, etc.
This might cause the optical signal to not be transmitted normally, and cause misoperations and malfunctions. If they are contaminated, make sure to clean them off, then connect them to the optical fiber ports.

(11) This Ethernet Switches to be periodically serviced in order to maintain its performance.
Please choose a product administrator, and have them be sure to implement periodic maintenance. When doing maintenance, check the inspection chart that is posted on our website which has the requisite items listed on it.

(12) When using this Ethernet Switch to design systems, use it after applying appropriate measures such as setting up redundant configurations.
Communications failures might be generated due to causes such as malfunctions or misoperations while the Ethernet Switches being used.

(13) When using this Ethernet Switch for applications which require extremely high reliability, be careful to expend all possible means to ensure safety and reliability.
This Ethernet Switch was not designed nor manufactured with the intention that it be used for applications (in use with railways, aviation, and medical care, etc. whereas the influence rate due to communications failures is extremely high in regard to systems that directly affect systems and human lives) which require extremely high reliability.

(14) Be aware of glitches which are caused in the usage environments such as age-related degradation, etc.
This may vary depending upon conditions such as utilization rates and usage environments, but performance might decrease due to the age-related degradation, etc. of components. It is recommended that this Ethernet Switch be replaced about five years
after it has been installed.

(15) Be careful in regards to environmental restrictions whereby the Ethernet Switchc an be used.
Please isolate the business power lines and communications lines. Isolate distribution lines and other distribution lines, and low current power lines, optical fiber cables, metallic water conduits, and gas conduits, etc.
Noise may be generated in the communications lines which might cause communications glitches.

(16) Do not connect any other devices except for 100BASE-TX/1000BASE-T/2.5GBAST-T/5GBAST-T/10GBAST-T devices to the twisted pair ports.
Deviation could lead to equipment failure.

(17) Do not insert any other modules into the SFP+ expansion slots except for our optional SFP/SFP+ modules.
Deviation could lead to equipment failure.
Check our website for the latest information on supported SFP+ modules.

(18) Do not connect the console ports with any other device except for Serial communication terminal.
Deviation could lead to equipment failure.

(19) To connect a power receiving equipment supporting IEEE802.3bt/at to this Ethernet Switch, use a cable rated Cat5e or higher.
Using other cables may result in heat generation, ignition, and/or equipment failure.

(20) To connect an equipment supporting IEEE802.3bt to this Ethernet Switch, it is strongly recommended that AWG24 and 65 Celsius degree or higher rated temperature cables should be used.
Using other cables may result in heat generation, ignition, and/or equipment failure.

(21) It is strongly recommended that a lightning arrester(SPD) be installed on the twisted pair port side and the power supply side of this Ethernet Switch.
Malfunctions might be caused due to overcurrent and overvoltage due to the effects of lightning strikes.

14. Basic Instructions for the Use of This Product

(1) For inspection and/or diagnosis, consult the shop.

(2) Use commercial power supply from a wall socket, which is close and easily accessible to this Ethernet Switch.

(3) Unplug the power cord when installing or moving this Ethernet Switch.

(4) Unplug the power cord when cleaning this Ethernet Switch.

(5) Use this Ethernet Switch within the specifications. Deviation could lead to malfunction.

(6) Do not touch the twisted pair cable modular metal terminals which are connected to RJ45 connectors (twisted pair ports) or the connectors, nor place them near electrically-charged objects. Static electricity could lead to equipment failure.

(7) Do not put the modular plug of the connected twisted pair cable on objects that can carry static charge, such as carpet. Do not place it in the proximity. Static electricity could lead to equipment failure.

(8) Do not put a strong shock, including dropping, to this Ethernet Switch. Deviation could lead to equipment failure.

(9) Before connecting a console cable to the console port, discharge static electricity, for example by touching metal appliance (do not discharge by touching this Ethernet Switch).

(10) Please use this Ethernet Switch in place where ambient temperature is from 0 to 50℃.
In use of this Ethernet Switch where the FAN control is set to Low2 or Min, please store and/or use this Ethernet Switch in place where the ambient temperature is 0 to 40 Celsius degree.
And, do not store and/or use this Ethernet Switch in the environment with the characteristics listed below.
(Store and/or use this Ethernet Switch in the environment in accordance with the specification.)
- High humidity. Possible spilled liquid (water).
- Dusty. Possible static charge (such as carpet).
- Under direct sunlight.
- Possible condensation. High/low temperature exceeding the specifications environment.
- Strong vibration and/or strong shock.

Failure to satisfy the conditions above may result in a fire, electric shock, equipment failure, and/or malfunction.
Such events are not covered by the warranty.
(*) If it is used beyond the operating environmental temperatures, then the protective devices will start working and the Ethernet Switch power will be shut off.

(11) Do not block the ventilator of the Ethernet Switch.
Blocked ventilator induces the heat accumulation inside, causing equipment failure and/or malfunction.

(12) Operation is not guaranteed if a module other than the optional SFP+ extension modules is inserted into the SFP+ extension slot.
For the latest information about compatible SFP+ extension modules, check our website.

(13) When using two Ethernet Switches, do not stack them. When you place them side by side, allow for a space of 20 mm or more between them. This space is not necessary if you use supplied connection brackets.

(14) When Ethernet Switches mounting to rack, leave a minimum of 20mm space between them.