

# PT-7728-PTP Series

## IEC 61850-3 24+4G-port IEEE 1588 v2 rackmount Ethernet switches



- > IEEE 1588v2 PTP with hardware time stamping for precise time synchronization of networks
- > IEC 61850-3 and IEEE 1613 (power substations) compliant
- > VLAN Unaware: Supports priority-tagged frames to be received by specific IEDs
- > Turbo Ring, Turbo Chain, RSTP/STP, and MSTP\* for network redundancy
- > Isolated redundant power inputs with universal 24/48 VDC or 110/220 VDC/VAC power supply range
- > -40 to 85°C operating temperature range

\*Available in Q3, 2011



### Introduction

PowerTrans PT-7728-PTP switches are designed to meet the demands of power substation automation systems (IEC 61850-3, IEEE 1613). The PT-7728-PTP's Gigabit and fast Ethernet backbone, redundant ring, and 24/48 VDC or 110/220 VDC/VAC dual isolated redundant power supplies increase the reliability of your communications and save on cabling/wiring costs.

Moxa's PT-7728-PTP IEC 61850-3 fast Ethernet switches support the latest version of IEEE 1588 v2 technology to fulfill precision time synchronization requirements for protection and control applications.

These Ethernet switches guarantee time-stamping accuracy within 1 µs for the IEC 61850 process layer. They can be configured for 1588 v2 Master, Boundary Clock, and Transparent Clock functionality.

The modular design of the PT-7728-PTP also makes network planning easy, and allows greater flexibility by letting you install up to 4 Gigabit ports, 24 fast Ethernet ports, and up to 14 IEEE 1588 fast Ethernet ports. Along with a choice of either front or rear wiring, these features together make the PT-7728-PTP suitable for a variety of industrial applications.

### IEEE 1588 PTP Features

- IEEE 1588 PTP V2 (Precision Time Protocol) with hardware time stamping for precise time synchronization of networks
- Support for both IEEE 1588 Boundary Clock and Transparent Clock
- Support for both End to End (1-step & 2-step) and Peer to Peer (2-step) modes in Transparent Clock
- High precision time accuracy (under 1 µs)

### General Features and Benefits

- IPv6 Ready logo awarded (IPv6 Logo Committee certified)
- VLAN Unaware: Supports priority-tagged frames to be received by specific IEDs
- DHCP Option 82 for IP address assignment with different policies
- EtherNet/IP\* and Modbus/TCP industrial Ethernet protocols supported
- Turbo Ring, Turbo Chain, RSTP/STP, and MSTP for network redundancy
- IGMP snooping and GMRP for filtering multicast traffic from industrial Ethernet protocols
- Supports advanced VLAN capability with Q-in-Q tagging\*
- IEEE 802.3ad, LACP for optimum bandwidth utilization
- Bandwidth management prevents unpredictable network status
- Multi-port mirroring for online debugging
- Automatic warning by exception through email, relay output
- RMON for efficient network monitoring and proactive capability
- Automatic recovery of connected device's IP addresses
- Line-swap fast recovery
- Configurable by Web browser, Telnet/Serial console, CLI\*, Windows utility, and ABC-01 automatic backup configurator

\*Available in Q3, 2011

### Cyber-security Features

- User passwords with multiple levels of security protect against unauthorized configuration
- SSH/HTTPS is used to encrypt passwords and data
- Lock switch ports with 802.1x port-based network access control so that only authorized clients can access the port
- Disable one or more ports to block network traffic
- 802.1Q VLAN allows you to logically partition traffic transmitted between selected switch ports
- Secure switch ports so that only specific devices and/or MAC addresses can access the ports
- Radius/TACACS+ allows you to manage passwords from a central location (available in Q1 Y2011)
- SNMPv3 provides encrypted authentication and access security

## Specifications

### Technology

#### Standards:

- IEEE 802.3 for 10BaseT
- IEEE 802.3u for 100BaseT(X) and 100Base FX
- IEEE 802.3ab for 1000BaseT(X)
- IEEE 802.3z for 1000BaseX
- IEEE 802.3x for Flow Control
- IEEE 802.1D for Spanning Tree Protocol
- IEEE 802.1w for Rapid STP
- IEEE 802.1Q for VLAN Tagging
- IEEE 802.1p for Class of Service
- IEEE 802.1X for Authentication
- IEEE 802.3ad for Port Trunk with LACP

**Protocols:** IGMPv1/v2, GMRP, GVRP, SNMPv1/v2c/v3, DHCP Server/Client, BootP, TFTP, SNTP, SMTP, RARP, RMON, HTTP, HTTPS, Telnet, SSH, Syslog, DHCP Option 66/67/82, LLDP, Modbus/TCP, IEEE 1588 PTP, IPv6, SNMP Inform

**MIB:** MIB-II, Ethernet-like MIB, P-BRIDGE MIB, Q-BRIDGE MIB, Bridge MIB, RSTP MIB, RMON MIB Group 1, 2, 3, 9

**Flow Control:** IEEE 802.3x flow control, back pressure flow control

### Switch Properties

**Priority Queues:** 4

**Max. Number of Available VLANs:** 64

**VLAN ID Range:** VID 1 to 4094

**IGMP Groups:** 256

### Interface

#### Fast Ethernet:

- Slots 1, 2, and 3 for combinations of 2, 4, 6, 7, or 8-port PM-7200 fast Ethernet modules with 10/100BaseT(X) (TP/M12 interface), 100BaseFX (SC/ST/MTRJ connector), or 100BaseSFP
- Slot 4 for BNC port.

**Gigabit Ethernet:** Slot 4 for 2 or 4-port PM-7200 Gigabit Ethernet combo module, 10/100/1000BaseT(X) or 1000BaseSFP

**Console Port:** RS-232 (RJ45)

**System LED Indicators:** STAT, PWR1, PWR2, FAULT, MSTR/HEAD, CPLR/TAIL

**Mode LED Indicators:** LNK/ACT, FDX/HDX, RING/CHAIN PORT, COUPLER PORT, SPEED

**Alarm Contact:** 1 relay output with current carrying capacity of 3 A @ 30 VDC or 3 A @ 240 VAC

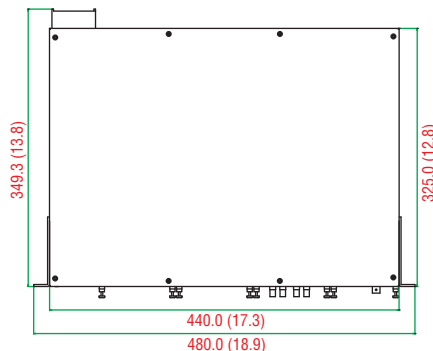
**IEEE 1588 PTP:** Up to 12 10/100BaseT(X) or 14 100BaseFX (Multi-mode ST or SC connector) IEEE 1588 ports with hardware time stamping

### Dimensions

Rear View



Top View

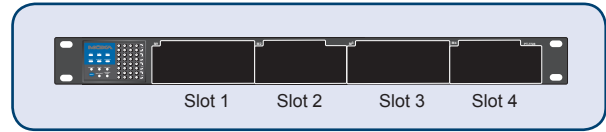


Front View



Unit: mm (inch)

### Modular Rackmount Ethernet Switch System, PT-7728-PTP



### Power Requirements

#### Input Voltage:

- 24 VDC (18 to 36 V)
- 48 VDC (36 to 72 V)
- 110/220 VDC/VAC (88 to 300 VDC, 85 to 264 VAC)

#### Input Current: (all ports are equipped with fiber)

- Max. 2.58 A @ 24 VDC
- Max. 1.21 A @ 48 VDC
- Max. 0.64/0.33 A @ 110/220 VDC
- Max. 0.53/0.28 A @ 110/220 VAC

**Overload Current Protection:** Present

**Connection:** 10-pin terminal blocks

**Reverse Polarity Protection:** Present

### Physical Characteristics

**Housing:** IP30 protection

**Dimensions:** 440 x 44 x 325 mm (17.32 x 1.73 x 12.80)

**Weight:** 5900 g

**Installation:** 19" rack mounting

### Environmental Limits

**Operating Temperature:** -40 to 85°C (-40 to 185°F), cold start requires min. of 100 VAC at -40°C

**Storage Temperature:** -40 to 85°C (-40 to 185°F)

**Ambient Relative Humidity:** 5 to 95% (non-condensing)

### Standards and Certifications

**Safety:** UL 60950-1, CSA C22.2 No. 60950-1, EN 60950-1

**EMI:** FCC Part 15 Subpart B Class A, EN 55022 Class A

**Power Automation:** IEC 61850-3, IEEE 1613

*Note: Please check Moxa's website for the most up-to-date certification status.*

### Warranty

**Warranty Period:** 5 years

**Details:** See [www.moxa.com/warranty](http://www.moxa.com/warranty)

## Ordering Information

Step 1: Select Ethernet switch system

PT-7728 with power supply

Step 2: Select interface modules

PM-7200 modules  
(Gigabit or fast Ethernet)

Note: The PT-7728-PTP Ethernet switch system is delivered without interface module. See page 2-42 to choose PM-7200 interface modules.

### PT-7728-PTP Modular Rackmount Ethernet Switch System

The PT-7728-PTP switch system consists of 18 modular managed rackmount Ethernet switch systems with 3 slots for fast Ethernet modules, and 1 slot for a Gigabit Ethernet module. A total of 28 or 24+4G ports can be installed, and the switch can be used in a temperature range from -40 to 85°C.

Available Models		Power Supply					
Front Cabling, Front Display	Rear Cabling, Front Display	Isolated Power Supply 1			Isolated Power Supply 2		
		24 VDC (18 to 36 V)	48 VDC (36 to 72 V)	HV: 88 to 300 VDC and 85 to 264 VAC	24 VDC (18 to 36 V)	48 VDC (36 to 72 V)	HV: 88 to 300 VDC and 85 to 264 VAC
PT-7728-PTP-F-24	PT-7728-PTP-R-24	1	-	-	-	-	-
PT-7728-PTP-F-24-24	PT-7728-PTP-R-24-24	1	-	-	1	-	-
PT-7728-PTP-F-24-48	PT-7728-PTP-R-24-48	1	-	-	-	1	-
PT-7728-PTP-F-24-HV	PT-7728-PTP-R-24-HV	1	-	-	-	-	1
PT-7728-PTP-F-48	PT-7728-PTP-R-48	-	1	-	-	-	-
PT-7728-PTP-F-48-48	PT-7728-PTP-R-48-48	-	1	-	-	1	-
PT-7728-PTP-F-48-HV	PT-7728-PTP-R-48-HV	-	1	-	-	-	1
PT-7728-PTP-F-HV	PT-7728-PTP-R-HV	-	-	1	-	-	-
PT-7728-PTP-F-HV-HV	PT-7728-PTP-R-HV-HV	-	-	1	-	-	1

Note: The PT-7728-PTP Ethernet switch systems provide combinations of 1 slot for a Gigabit Ethernet interface module, 3 slots for fast Ethernet interface modules. See page 2-42 to select the PM-7200 Gigabit Ethernet and fast Ethernet interface modules that you need for your own application.

PT-7728-PTP-F series  
(Front Cabling, Front Display)



PT-7728-PTP-R series  
(Rear Cabling, Front Display)



### Gigabit/Fast Ethernet Modules for the PT-7728-PTP

	Interface Modules																																	
	PM-7200-4GTXSFP	PM-7200-2GTXSFP	PM-7200-1MSC	PM-7200-1MST	PM-7200-2MSC	PM-7200-2MST	PM-7200-1SSC	PM-7200-2SSC	PM-7200-8TX	PM-7200-2MSC4TX	PM-7200-2MST4TX	PM-7200-2SSC4TX	PM-7200-4MSC2TX	PM-7200-4MST2TX	PM-7200-4SSC2TX	PM-7200-6MSC	PM-7200-6MST	PM-7200-6SSC	PM-7200-1LSC6TX	PM-7200-1MST6TX	PM-7200-1SSC6TX	PM-7200-1MSC6TX	PM-7200-8PoE	PM-7200-8SFP	PM-7200-4M12	PM-7200-2M1RJ	PM-7200-8M1RJ	PM-7200-4MST-FL	PM-7200-4TX-PTP	PM-7200-4MST-PTP	PM-7200-4MSC-PTP	PM-7200-1BNC2MST-PTP		
Slot 1	-	-	-	-	-	-	-	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	
Slot 2	-	-	-	-	-	-	-	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-
Slot 3	-	-	-	-	-	-	-	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-
Slot 4	✓	✓	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓

#### Optional Accessories (can be purchased separately)

**MXview:** Moxa industrial network management software with 50, 100, 250, 500, or 1000 nodes

**EDS-SNMP OPC Server Pro:** OPC server software that works with all SNMP devices

**ABC-01 Series:** Configuration backup and restoration tool for managed Ethernet switches, 0 to 60°C operating temperature

#### Package Checklist

- PT-7728-PTP series switch
- RJ45-to-DB9 console port cable
- Protective caps for unused ports
- 2 rackmount ears
- Documentation and software CD
- Hardware installation guide
- Warranty card

# PM-7200 Series

*Gigabit and fast Ethernet modules for PT and IKS series switches*

## Specifications



PM-7200-4GTXSFP



PM-7200-2GTXSFP

### Interface

**RJ45 Ports:** 10/100/1000BaseT(X) auto negotiation speed, and auto MDI/MDI-X connection

**Fiber Ports:** 1000BaseSFP slots

**Note:** The PM-7200-2G/4G series Gigabit Ethernet combo modules support 2 or 4 SFP slots. See page 1-87 to select the SFP-1G series Gigabit Ethernet modules for your application.



PM-7200-8TX



PM-7200-6MSC  
PM-7200-6SSC



PM-7200-6MST



PM-7200-4MSC2TX  
PM-7200-4SSC2TX



PM-7200-4MST2TX



PM-7200-2MSC4TX  
PM-7200-2SSC4TX



PM-7200-2MST4TX



PM-7200-1LSC6TX



PM-7200-2MSC  
PM-7200-2SSC



PM-7200-2MST



PM-7200-1MSC  
PM-7200-1SSC



PM-7200-1MST



PM-7200-1MST6TX



PM-7200-1MSC6TX  
PM-7200-1SSC6TX



PM-7200-8PoE



PM-7200-8SFP\*



PM-7200-4M12



PM-7200-2MTRJ



PM-7200-8MTRJ



PM-7200-4MST-FL



PM-7200-4TX-PTP



PM-7200-4MST-PTP



PM-7200-4MSC-PTP



PM-7200-1BNC2MST-PTP

\* See page 1-87 and 1-89 to select SFP-1G/1FE series Gigabit Ethernet and fast Ethernet modules.

### Interface

**RJ45 Ports:** 10/100BaseT(X) auto negotiation speed, F/H duplex mode, and auto MDI/MDI-X connection

**Fiber Ports:** 100BaseFX ports (SC/ST/MTRJ or SFP LC connector)

**PoE Ports:** IEEE 802.3af Power-over-Ethernet Technology, provide up to 15.4 watts per port

**M12 Ports:** 10/100BaseT(X) auto negotiation speed, and auto MDI/MDI-X connection

**BNC Ports:** Time clock signal PPS (pulses per second) output for IEEE 1588 time synchronization


### Optical Fiber

	100BaseFX		
	Multi-mode	Single-mode	Single-mode, 80 km
Wavelength	1300 nm	1310 nm	1550 nm
Max. TX	-10 dBm	0 dBm	0 dBm
Min. TX	-20 dBm	-5 dBm	-5 dBm
RX Sensitivity	-32 dBm	-34 dBm	-34 dBm
Link Budget	12 dB	29 dB	29 dB
Typical Distance	5 km <sup>a</sup> 4 km <sup>b</sup>	40 km <sup>c</sup>	80 km <sup>d</sup>
Saturation	-6 dBm	-3 dBm	-3 dBm

- a. 50/125 μm, 800 MHz\*km fiber optic cable
- b. 62.5/125 μm, 500 MHz\*km fiber optic cable
- c. 9/125 μm single-mode fiber optic cable
- d. 9/125 μm single-mode fiber optic cable (80 km)


## Ordering Information

**PT-7828/PT-7728-PTP/  
PT-7728**




Slot 1 Slot 2 Slot 3 Slot 4

**PT-7710**




Slot 1 Slot 2

**IKS-6726**




Slot 1 Slot 2 Slot 3

**IKS-6726-8PoE**



Slot 1 Slot 2

**IKS-6324**



Slot 1

		Interface Modules																															
		PM-7200-4GTXSFP	PM-7200-2GTXSFP	PM-7200-1MSC	PM-7200-1MST	PM-7200-2MSC	PM-7200-2MST	PM-7200-1SSC	PM-7200-2SSC	PM-7200-8TX	PM-7200-2MSC4TX	PM-7200-2MST4TX	PM-7200-2SSC4TX	PM-7200-4MSC2TX	PM-7200-4MST2TX	PM-7200-4SSC2TX	PM-7200-6MSC	PM-7200-6MST	PM-7200-6SSC	PM-7200-1MSC6TX	PM-7200-1MST6TX	PM-7200-1SSC6TX	PM-7200-1LSC6TX	PM-7200-8PoE	PM-7200-8SFP*	PM-7200-4M12	PM-7200-2MTRJ	PM-7200-8MTRJ	PM-7200-4MST-FL	PM-7200-4TX-PTP	PM-7200-4MST-PTP	PM-7200-4MSC-PTP	PM-7200-1BNC2MST-PTP
PT-7828 PT-7728	Slots 1-3	-	-	-	-	-	-	-	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓	✓	✓	✓	-	-	-	-
	Slot 4	✓	✓	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PT-7728-PTP	Slots 1-3	-	-	-	-	-	-	-	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	-
	Slot 4	✓	✓	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓
PT-7710	Slot 1	-	-	-	-	-	-	-	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓	✓	✓	✓	-	-	-	-
	Slot 2	-	✓	✓	✓	✓	✓	✓	✓	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
IKS-6726	Slots 1-2	-	-	-	-	-	-	-	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓	-	-	-	-	-	-	-
	Slot 3	-	✓	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
IKS-6726-8PoE	Slot 1	-	-	-	-	-	-	-	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓	-	-	-	-	-	-	-
	Slot 2	-	✓	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
IKS-6324	Slot 1	-	✓	✓	✓	✓	✓	✓	✓	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

\* If you are using an SFP-1FELLC module, the operating temperature is limited to -40 to 75°C (-40 to 167°F).

### Gigabit Ethernet Modules for PT and IKS Series Rackmount Ethernet Switches, PM-7200-2G/4G Series

Available Models	Port Interface
	Combo Port, 10/100/1000BaseT(X) or 1000BaseSFP*
PM-7200-2GTXSFP	2
PM-7200-4GTXSFP	4

### Fast Ethernet Modules for PT and IKS Series Rackmount Ethernet Switches, PM-7200 Series

Available Models	Port Interface										
	10/100BaseT(X)			100BaseFX						100BaseSFP	PPS output, BNC connector
	TP	PoE	M12	Multi-mode, SC Connector	Multi-mode, ST Connector	Multi-mode, MTRJ Connector	Single-mode, SC Connector	Single-mode, SC Connector, 80 km			
PM-7200-8TX	8	-	-	-	-	-	-	-	-	-	
PM-7200-6MSC	-	-	-	6	-	-	-	-	-	-	
PM-7200-6MST	-	-	-	-	6	-	-	-	-	-	
PM-7200-6SSC	-	-	-	-	-	-	6	-	-	-	
PM-7200-4MSC2TX	2	-	-	4	-	-	-	-	-	-	
PM-7200-4MST2TX	2	-	-	-	4	-	-	-	-	-	
PM-7200-4SSC2TX	2	-	-	-	-	-	4	-	-	-	
PM-7200-2MSC4TX	4	-	-	2	-	-	-	-	-	-	
PM-7200-2MST4TX	4	-	-	-	2	-	-	-	-	-	
PM-7200-2SSC4TX	4	-	-	-	-	-	2	-	-	-	
PM-7200-1LSC6TX	6	-	-	-	-	-	-	1	-	-	
PM-7200-2MSC	-	-	-	2	-	-	-	-	-	-	
PM-7200-2MST	-	-	-	-	2	-	-	-	-	-	
PM-7200-2SSC	-	-	-	-	-	-	2	-	-	-	
PM-7200-1MSC	-	-	-	1	-	-	-	-	-	-	
PM-7200-1MST	-	-	-	-	1	-	-	-	-	-	
PM-7200-1SSC	-	-	-	-	-	-	1	-	-	-	
PM-7200-1MSC6TX	6	-	-	1	-	-	-	-	-	-	
PM-7200-1MST6TX	6	-	-	-	1	-	-	-	-	-	
PM-7200-1SSC6TX	6	-	-	-	-	-	1	-	-	-	
PM-7200-8SFP	-	-	-	-	-	-	-	-	8	-	
PM-7200-4M12	-	-	4	-	-	-	-	-	-	-	
PM-7200-2MTRJ	-	-	-	-	-	2	-	-	-	-	
PM-7200-8MTRJ	-	-	-	-	-	8	-	-	-	-	
PM-7200-4MST-FL	-	-	-	-	4	-	-	-	-	-	
PM-7200-4TX-PTP	4	-	-	-	-	-	-	-	-	-	
PM-7200-4MST-PTP	-	-	-	-	4	-	-	-	-	-	
PM-7200-4MSC-PTP	-	-	-	4	-	-	-	-	-	-	
PM-7200-1BNC2MST-PTP	-	-	-	-	2	-	-	-	-	1	
PM-7200-8PoE	-	8	-	-	-	-	-	-	-	-	