

# PT-7528 Series

## IEC 61850-3 28-port Layer 2 managed rackmount Ethernet switches



### Features and Benefits

- IEC 61850-3, IEEE 1613 (power substations) compliant
- Built-in MMS server based on IEC 61850-90-4 switch data modeling for power SCADA
- Noise Guard™ wire speed zero packet loss technology
- Turbo Ring and Turbo Chain (recovery time < 20 ms @ 250 switches),<sup>1</sup> RSTP/STP, and MSTP for network redundancy
- Isolated redundant power inputs with universal 24 VDC, 48 VDC, or 110/220 VDC/VAC power supply range
- -40 to 85°C operating temperature range

### Certifications



## Introduction

The PT-7528 Series is designed for power substation automation applications that operate in extremely harsh environments. The PT-7528 Series supports Moxa's Noise Guard technology, is compliant with IEC 61850-3, and its EMC immunity exceeds IEEE 1613 Class 2 standards to ensure zero packet loss while transmitting at wire speed. The PT-7528 Series also features critical packet prioritization (GOOSE and SMVs), a built-in MMS server, and a configuration wizard designed specifically for substation automation.

With Gigabit Ethernet, redundant ring, and 110/220 VDC/VAC isolated redundant power supplies, the PT-7528 Series further increases the reliability of your communications and saves cabling/wiring costs. The wide range of PT-7528 models available support multiple types of port configuration, with up to 28 copper or 24 fiber ports, and up to 4 Gigabit ports. Taken together, these features allow greater flexibility, making the PT-7528 Series suitable for a variety of industrial applications.

### Additional Features and Benefits

- Switch data modeling based on the IEC 61850-90-4 standard
- Fiber Check™ provides monitoring and diagnosis functions on MST/MSC/SSC/SFP fiber ports
- VLAN Unaware: Supports priority-tagged frames to be received by specific IEDs
- EtherNet/IP and Modbus TCP industrial Ethernet protocols supported
- Configurable by web browser, Telnet/Serial console, CLI, Windows utility, and ABC-02 automatic backup configurator
- Turbo Ring and Turbo Chain (recovery time < 20 ms @ 250 switches),<sup>1</sup> RSTP/STP, and MSTP for network redundancy
- DHCP Option 82 for IP address assignment with different policies
- IGMP snooping and GMRP for filtering multicast traffic from industrial Ethernet protocols
- IEEE 802.3ad, LACP for optimum bandwidth utilization
- Bandwidth management to prevent unpredictable network status
- Multiport mirroring for online debugging
- Automatic warning by exception through email and relay output
- RMON for proactive and efficient network monitoring
- Automatic recovery of connected device's IP addresses
- Line-swap fast recovery
- Noise Guard™ provides a high level of EMC immunity for critical applications, exceeding IEEE 1613 Class 2

### Cybersecurity 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
- RADIUS/TACACS+ allows you to manage passwords from a central location
- 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
- Disable one or more ports to block network traffic
- SNMPv3 provides encrypted authentication and access security

1. Gigabit Ethernet recovery time < 50 ms

## Specifications

### Ethernet Interface

10/100BaseT(X) Ports (RJ45 connector)	PT-7528-4TX Series: 4 PT-7528-8TX Series: 8 PT-7528-12TX Series: 12 PT-7528-16TX Series: 16 PT-7528-24TX Series: 24
100/1000BaseSFP Ports	PT-7528-4GSFP Models: 4
100BaseFX Ports (multi-mode SC connector)	PT-7528-8MSC Series: 8 PT-7528-12MSC Series: 12 PT-7528-16MSC Series: 16 PT-7528-20MSC Series: 20
100BaseFX Ports (multi-mode ST connector)	PT-7528-8MST Series: 8 PT-7528-12MST Series: 12 PT-7528-16MST Series: 16 PT-7528-20MST Series: 20
100BaseFX Ports (single-mode SC connector)	PT-7528-8SSC Series: 8

### Optical Fiber

		100BaseFX			
		Multi-Mode		Single-Mode	
Fiber Cable Type	OM1	50/125 $\mu$ m	G.652		
		800 MHz x km			
Typical Distance		4 km	5 km	40 km	80 km
Wavelength	Typical (nm)	1300		1310	1550
	TX Range (nm)	1260 to 1360		1280 to 1340	1530 to 1570
	RX Range (nm)	1100 to 1600		1100 to 1600	1100 to 1600
Optical Power	TX Range (dBm)	-14 to -20*		0 to -5	0 to -5
	RX Range (dBm)	-3 to -32		-3 to -34	-3 to -34
	Link Budget (dB)	12		29	29
	Dispersion Penalty (dB)	3		1	1

\*This range only applies to the PT-7528 multi-mode SC and ST fiber modules.

Note: When connecting a single-mode fiber transceiver, we recommend using an attenuator to prevent damage caused by excessive optical power.

Note: Compute the "typical distance" of a specific fiber transceiver as follows: Link budget (dB) > dispersion penalty (dB) + total link loss (dB).

### Cabling Direction

Front cabling

Compatible Modules	PT-7528-24TX Series: Slot 1: PM-7500-2GTXSP, PM-7500-4GTXSFP, PM-7500-2MSC/4MSC, PM-7500-2MST/4MST, PM-7500-2SSC/4SSC
Standards	IEEE 802.1D-2004 for Spanning Tree Protocol IEEE 802.1p for Class of Service IEEE 802.1Q for VLAN Tagging IEEE 802.1s for Multiple Spanning Tree Protocol IEEE 802.1w for Rapid Spanning Tree Protocol IEEE 802.1X for authentication IEEE 802.3 for 10BaseT IEEE 802.3ab for 1000BaseT(X) IEEE 802.3ad for Port Trunk with LACP IEEE 802.3u for 100BaseT(X) and 100BaseFX IEEE 802.3x for flow control IEEE 802.3z for 1000BaseSX/LX/LHX/ZX
<b>Ethernet Software Features</b>	
Filter	802.1Q GMRP GVRP IGMP v1/v2c Port-based VLAN VLAN unaware
Industrial Protocols	EtherNet/IP Modbus TCP
Management	Back Pressure Flow Control BOOTP DHCP Option 66/67/82 DHCP Server/Client Flow control HTTP IPv4/IPv6 LLDP Port Mirror RARP RMON SMTP SNMP Inform SNMPv1/v2c/v3 Syslog Telnet TFTP Fiber check
MIB	Bridge MIB Ethernet-like MIB MIB-II P-BRIDGE MIB Q-BRIDGE MIB RMON MIB Groups 1, 2, 3, 9 RSTP MIB
Power Substation	IEC 61850 QoS MMS Configuration Wizard
Redundancy Protocols	Link Aggregation MSTP RSTP STP Turbo Chain Turbo Ring v1/v2

Security	Broadcast storm protection HTTPS/SSL TACACS+ Port Lock RADIUS Rate Limit SSH
Time Management	NTP Server/Client SNTP

#### Switch Properties

IGMP Groups	256
Jumbo Frame Size	9.6 KB
Max. No. of VLANs	256
VLAN ID Range	VID 1 to 4094
Priority Queues	4
Switching Capacity	12.8 Gbps
Forwarding Capacity	12.8 Gbps

#### USB Interface

Storage Port	USB Type A
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#### Serial Interface

Console Port	USB-serial console (Type B connector)
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#### Input/Output Interface

Alarm Contact Channels	Resistive load: 3 A @ 30 VDC, 240 VAC
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#### Power Parameters

Connection	10-pin terminal block
Input Voltage	PT-7528-HV-HV/WV-WV/WV-HV Series: Redundant power modules PT-7528-WV Series: 24/48 VDC (18 to 72 VDC) PT-7528-HV Series: 110/220 VAC/VDC (85 to 264 VAC, 88 to 300 VDC)
Input Current	For models with fewer than 8 fiber ports: PT-7528-WV Series: 0.741 A @ 24 VDC, 0.364 A @ 48 VDC PT-7528-HV Series: 0.147/0.077 A @ 110/220 VDC, 0.283/0.190 A @ 110/220 VAC  For models with 8 or more fiber ports: PT-7528-WV Series: 1.428 A @ 24 VDC, 0.735 A @ 48 VDC PT-7528-HV Series: 0.586/0.382 A @ 110/220 VAC, 0.313/0.167 A @ 110/220 VDC
Overload Current Protection	Supported
Reverse Polarity Protection	Supported

#### Physical Characteristics

Housing	Aluminum
IP Rating	IP40
Dimensions (without ears)	440 x 44 x 325 mm (17.32 x 1.73 x 12.80 in)
Weight	4900 g (10.89 lb)
Installation	19-inch rack mounting

## Environmental Limits

Operating Temperature	-40 to 85°C (-40 to 185°F) Note: Cold start requires minimum of 100 VAC @ -40°C
Storage Temperature (package included)	-40 to 85°C (-40 to 185°F)
Ambient Relative Humidity	5 to 95% (non-condensing)

## Standards and Certifications

EMI	EN 55032 Class A CISPR 32, FCC Part 15B Class A
EMS	IEC 61000-4-2 ESD: Contact: 8 kV; Air: 15 kV IEC 61000-4-3 RS: 80 MHz to 1 GHz: 35 V/m IEC 61000-4-4 EFT: Power: 4 kV; Signal: 4 kV IEC 61000-4-5 Surge: Power: 4 kV; Signal: 4 kV IEC 61000-4-6 CS: 10 V IEC 61000-4-8 PFMF IEC 61000-4-11
Safety	UL 508
Power Substation	IEC 61850-3 IEEE 1613 Class 2 Note: Models with MCS and SSC fiber ports are compliant with IEEE 1613 Class 1
Railway	EN 50121-4
Traffic Control	NEMA TS2

## MTBF

Time	771,320 hrs
Standards	Telcordia SR332

## Warranty

Warranty Period	5 years
Details	See <a href="http://www.moxa.com/warranty">www.moxa.com/warranty</a>

## Package Contents

Device	1 x PT-7528 Series switch
Cable	1 x USB type A male to USB type B male
Installation Kit	4 x cap, plastic, for RJ45 port 4 x cap, plastic, for SFP slot 2 x rack-mounting ear
Documentation	1 x document and software CD 1 x quick installation guide 1 x product certificates of quality inspection, Simplified Chinese 1 x product notice, Simplified Chinese 1 x warranty card
Note	SFP modules and/or modules from the PM-7500 Module Series need to be purchased separately for use with this product.

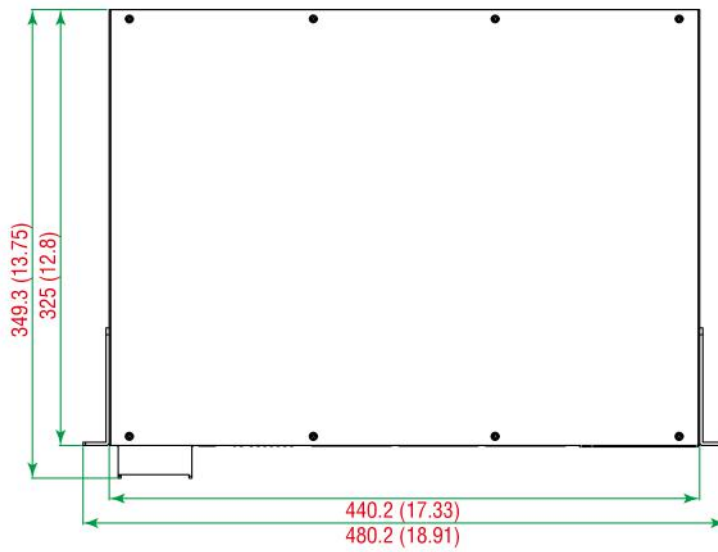
## Dimensions

Unit: mm (inch)

Rear View



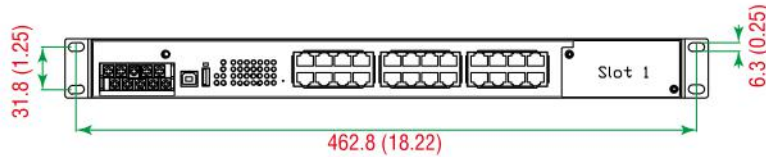
Top View



Side View



Front View



## Ordering Information

Model Name	1000Base SFP Slots	10/100BaseT(X)	100BaseFX	Input Voltage 1	Input Voltage 2	Redundant Power Module	Operating Temp.
PT-7528-24TX-WV-HV	-	24	-	24/48 VDC	110/220 VDC/ VAC	✓	-45 to 85°C
PT-7528-24TX-WV	-	24	-	24/48 VDC	-	-	-45 to 85°C
PT-7528-24TX-HV	-	24	-	110/220 VDC/ VAC	-	-	-45 to 85°C
PT-7528-24TX-WV-WV	-	24	-	24/48 VDC	24/48 VDC	✓	-45 to 85°C
PT-7528-24TX-HV-HV	-	24	-	110/220 VDC/ VAC	110/220 VDC/ VAC	✓	-45 to 85°C
PT-7528-8MSC-16TX-4GSFP-WV	4	16	8 x multi-mode, SC connector	24/48 VDC	-	-	-45 to 85°C
PT-7528-8MSC-16TX-4GSFP-WV-WV	4	16	8 x multi-mode, SC connector	24/48 VDC	24/48 VDC	✓	-45 to 85°C
PT-7528-8MSC-16TX-4GSFP-HV	4	16	8 x multi-mode, SC connector	110/220 VDC/ VAC	-	-	-45 to 85°C
PT-7528-8MSC-16TX-4GSFP-HV-HV	4	16	8 x multi-mode, SC connector	110/220 VDC/ VAC	110/220 VDC/ VAC	✓	-45 to 85°C
PT-7528-12MSC-12TX-4GSFP-WV	4	12	12 x multi-mode, SC connector	24/48 VDC	-	-	-45 to 85°C
PT-7528-12MSC-12TX-4GSFP-WV-WV	4	12	12 x multi-mode, SC connector	24/48 VDC	24/48 VDC	✓	-45 to 85°C
PT-7528-12MSC-12TX-4GSFP-HV	4	12	12 x multi-mode, SC connector	110/220 VDC/ VAC	-	-	-45 to 85°C

Model Name	1000Base SFP Slots	10/100BaseT(X)	100BaseFX	Input Voltage 1	Input Voltage 2	Redundant Power Module	Operating Temp.
PT-7528-12MSC-12TX-4GSFP-HV-HV	4	12	12 x multi-mode, SC connector	110/220 VDC/VAC	110/220 VDC/VAC	✓	-45 to 85°C
PT-7528-16MSC-8TX-4GSFP-WV	4	8	16 x multi-mode, SC connector	24/48 VDC	-	-	-45 to 85°C
PT-7528-16MSC-8TX-4GSFP-WV-WV	4	8	16 x multi-mode, SC connector	24/48 VDC	24/48 VDC	✓	-45 to 85°C
PT-7528-16MSC-8TX-4GSFP-HV	4	8	16 x multi-mode, SC connector	110/220 VDC/VAC	-	-	-45 to 85°C
PT-7528-16MSC-8TX-4GSFP-HV-HV	4	8	16 x multi-mode, SC connector	110/220 VDC/VAC	110/220 VDC/VAC	✓	-45 to 85°C
PT-7528-20MSC-4TX-4GSFP-WV	4	4	20 x multi-mode, SC connector	24/48 VDC	-	-	-45 to 85°C
PT-7528-20MSC-4TX-4GSFP-WV-WV	4	4	20 x multi-mode, SC connector	24/48 VDC	24/48 VDC	✓	-45 to 85°C
PT-7528-20MSC-4TX-4GSFP-HV	4	4	20 x multi-mode, SC connector	110/220 VDC/VAC	-	-	-45 to 85°C
PT-7528-20MSC-4TX-4GSFP-HV-HV	4	4	20 x multi-mode, SC connector	110/220 VDC/VAC	110/220 VDC/VAC	✓	-45 to 85°C
PT-7528-8SSC-16TX-4GSFP-WV-WV	4	16	8 x single-mode, SC connector	24/48 VDC	24/48 VDC	✓	-45 to 85°C
PT-7528-8SSC-16TX-4GSFP-HV-HV	4	16	8 x single-mode, SC connector	110/220 VDC/VAC	110/220 VDC/VAC	✓	-45 to 85°C
PT-7528-8MST-16TX-4GSFP-WV	4	16	8 x multi-mode, ST connector	24/48 VDC	-	-	-45 to 85°C
PT-7528-8MST-16TX-4GSFP-WV-WV	4	16	8 x multi-mode, ST connector	24/48 VDC	24/48 VDC	✓	-45 to 85°C
PT-7528-8MST-16TX-4GSFP-HV	4	16	8 x multi-mode, ST connector	110/220 VDC/VAC	-	-	-45 to 85°C
PT-7528-8MST-16TX-4GSFP-HV-HV	4	16	8 x multi-mode, ST connector	110/220 VDC/VAC	110/220 VDC/VAC	✓	-45 to 85°C
PT-7528-12MST-12TX-4GSFP-WV	4	12	12 x multi-mode, ST connector	24/48 VDC	-	-	-45 to 85°C
PT-7528-12MST-12TX-4GSFP-WV-WV	4	12	12 x multi-mode, ST connector	24/48 VDC	24/48 VDC	✓	-45 to 85°C
PT-7528-12MST-12TX-4GSFP-HV	4	12	12 x multi-mode, ST connector	110/220 VDC/VAC	-	-	-45 to 85°C
PT-7528-12MST-12TX-4GSFP-HV-HV	4	12	12 x multi-mode, ST connector	110/220 VDC/VAC	110/220 VDC/VAC	✓	-45 to 85°C
PT-7528-16MST-8TX-4GSFP-WV	4	8	16 x multi-mode, ST connector	24/48 VDC	-	-	-45 to 85°C
PT-7528-16MST-8TX-4GSFP-WV-WV	4	8	16 x multi-mode, ST connector	24/48 VDC	24/48 VDC	✓	-45 to 85°C
PT-7528-16MST-8TX-4GSFP-HV	4	8	16 x multi-mode, ST connector	110/220 VDC/VAC	-	-	-45 to 85°C
PT-7528-16MST-8TX-4GSFP-HV-HV	4	8	16 x multi-mode, ST connector	110/220 VDC/VAC	110/220 VDC/VAC	✓	-45 to 85°C
PT-7528-20MST-4TX-4GSFP-WV	4	4	20 x multi-mode, ST connector	24/48 VDC	-	-	-45 to 85°C
PT-7528-20MST-4TX-4GSFP-WV-WV	4	4	20 x multi-mode, ST connector	24/48 VDC	24/48 VDC	✓	-45 to 85°C

Model Name	1000Base SFP Slots	10/100BaseT(X)	100BaseFX	Input Voltage 1	Input Voltage 2	Redundant Power Module	Operating Temp.
PT-7528-20MST-4TX-4GSFP-HV	4	4	20 x multi-mode, ST connector	110/220 VDC/VAC	–	–	-45 to 85°C
PT-7528-20MST-4TX-4GSFP-HV-HV	4	4	20 x multi-mode, ST connector	110/220 VDC/VAC	110/220 VDC/VAC	✓	-45 to 85°C

## Accessories (sold separately)

### PM-7500 Module Series

PM-7500-2GTXSFP	Gigabit Ethernet module with 2 100/1000BaseSFP slots or 2 100/1000BaseT(X) ports, compliant with IEC 61850-3, -40 to 85°C operating temperature
PM-7500-2MSC	Fast Ethernet module with 2 100BaseFX multi-mode ports with SC connectors, compliant with IEC 61850-3, -40 to 85°C operating temperature
PM-7500-2MST	Fast Ethernet module with 2 100BaseFX multi-mode ports with ST connectors, compliant with IEC 61850-3, -40 to 85°C operating temperature
PM-7500-2SSC	Fast Ethernet module with 2 100BaseFX single-mode ports with SC connectors, compliant with IEC 61850-3, -40 to 85°C operating temperature
PM-7500-4GTXSFP	Gigabit Ethernet module with 4 100/1000BaseSFP slots or 4 100/1000BaseT(X) ports, compliant with IEC 61850-3, -40 to 85°C operating temperature
PM-7500-4MSC	Fast Ethernet module with 4 100BaseFX multi-mode ports with SC connectors, compliant with IEC 61850-3, -40 to 85°C operating temperature
PM-7500-4MST	Fast Ethernet module with 4 100BaseFX multi-mode ports with ST connectors, compliant with IEC 61850-3, -40 to 85°C operating temperature
PM-7500-4SSC	Fast Ethernet module with 4 100BaseFX single-mode ports with SC connectors, compliant with IEC 61850-3, -40 to 85°C operating temperature

### Storage Kits

ABC-02-USB-T	Configuration backup and restoration tool, firmware upgrade, and log file storage tool for managed Ethernet switches and routers, -40 to 75°C operating temperature
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### SFP Modules

SFP-1G10ALC	WDM-type (BiDi) SFP module with 1 1000BaseSFP port with LC connector for 10 km transmission; TX 1310 nm, RX 1550 nm, 0 to 60°C operating temperature
SFP-1G10ALC-T	WDM-type (BiDi) SFP module with 1 1000BaseSFP port with LC connector for 10 km transmission; TX 1310 nm, RX 1550 nm, -40 to 85°C operating temperature
SFP-1G10BLC	WDM-type (BiDi) SFP module with 1 1000BaseSFP port with LC connector for 10 km transmission; TX 1550 nm, RX 1310 nm, 0 to 60°C operating temperature
SFP-1G10BLC-T	WDM-type (BiDi) SFP module with 1 1000BaseSFP port with LC connector for 10 km transmission; TX 1550 nm, RX 1310 nm, -40 to 85°C operating temperature
SFP-1G20ALC	WDM-type (BiDi) SFP module with 1 1000BaseSFP port with LC connector for 20 km transmission; TX 1310 nm, RX 1550 nm, 0 to 60°C operating temperature
SFP-1G20ALC-T	WDM-type (BiDi) SFP module with 1 1000BaseSFP port with LC connector for 20 km transmission; TX 1310 nm, RX 1550 nm, -40 to 85°C operating temperature
SFP-1G20BLC	WDM-type (BiDi) SFP module with 1 1000BaseSFP port with LC connector for 20 km transmission; TX 1550 nm, RX 1310 nm, 0 to 60°C operating temperature
SFP-1G20BLC-T	WDM-type (BiDi) SFP module with 1 1000BaseSFP port with LC connector for 20 km transmission; TX 1550 nm, RX 1310 nm, -40 to 85°C operating temperature
SFP-1G40ALC	WDM-type (BiDi) SFP module with 1 1000BaseSFP port with LC connector for 40 km transmission; TX 1310 nm, RX 1550 nm, 0 to 60°C operating temperature
SFP-1G40ALC-T	WDM-type (BiDi) SFP module with 1 1000BaseSFP port with LC connector for 40 km transmission; TX 1310 nm, RX 1550 nm, -40 to 85°C operating temperature
SFP-1G40BLC	WDM-type (BiDi) SFP module with 1 1000BaseSFP port with LC connector for 40 km transmission; TX 1550 nm, RX 1310 nm, 0 to 60°C operating temperature



SFP-1G40BLC-T	WDM-type (BiDi) SFP module with 1 1000BaseSFP port with LC connector for 40 km transmission; TX 1550 nm, RX 1310 nm, -40 to 85°C operating temperature
SFP-1GEZXLC	SFP module with 1 1000BaseEZXC port with LC connector for 110 km transmission, 0 to 60°C operating temperature
SFP-1GEZXLC-120	SFP module with 1 1000BaseEZXC port with LC connector for 120 km transmission, 0 to 60°C operating temperature
SFP-1GLHLC	SFP module with 1 1000BaseLH port with LC connector for 30 km transmission, 0 to 60°C operating temperature
SFP-1GLHLC-T	SFP module with 1 1000BaseLH port with LC connector for 30 km transmission, -40 to 85°C operating temperature
SFP-1GLHXLC	SFP module with 1 1000BaseLHX port with LC connector for 40 km transmission, 0 to 60°C operating temperature
SFP-1GLHXLC-T	SFP module with 1 1000BaseLHX port with LC connector for 40 km transmission, -40 to 85°C operating temperature
SFP-1GLSXLC	SFP module with 1 1000BaseLSX port with LC connector for 1km/2km transmission, 0 to 60°C operating temperature
SFP-1GLSXLC-T	SFP module with 1 1000BaseLSX port with LC connector for 1km/2km transmission, -40 to 85°C operating temperature
SFP-1GLXLC	SFP module with 1 1000BaseLX port with LC connector for 10 km transmission, 0 to 60°C operating temperature
SFP-1GLXLC-T	SFP module with 1 1000BaseLX port with LC connector for 10 km transmission, -40 to 85°C operating temperature
SFP-1GSXLC	SFP module with 1 1000BaseSX port with LC connector for 300m/550m transmission, 0 to 60°C operating temperature
SFP-1GSXLC-T	SFP module with 1 1000BaseSX port with LC connector for 300m/550m transmission, -40 to 85°C operating temperature
SFP-1GZXLC	SFP module with 1 1000BaseZX port with LC connector for 80 km transmission, 0 to 60°C operating temperature
SFP-1GZXLC-T	SFP module with 1 1000BaseZX port with LC connector for 80 km transmission, -40 to 85°C operating temperature
SFP-1GTXRJ45-T	SFP module with 1 1000BaseT port with RJ45 connector for 100 m transmission, -40 to 75°C operating temperature
SFP-1FELLC-T	SFP module with 1 100Base single-mode with LC connector for 80 km transmission, -40 to 85°C operating temperature
SFP-1FEMLC-T	SFP module with 1 100Base multi-mode, LC connector for 2/4 km transmission, -40 to 85°C operating temperature
SFP-1FESLC-T	SFP module with 1 100Base single-mode with LC connector for 40 km transmission, -40 to 85°C operating temperature

#### Software

MXview-50	MXview license for 50 nodes
MXview-100	MXview license for 100 nodes
MXview-250	MXview license for 250 nodes
MXview-500	MXview license for 500 nodes
MXview-1000	MXview license for 1000 nodes
MXview-2000	MXview license for 2000 nodes
MXview Upgrade-50	MXview license expansion for 50 nodes

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