

PT-7728 系列

IEC 61850-3 24+4G 連接埠 Layer2 Gigabit 模組化網管型機架式乙太網路交換器



特色與優點

- 符合 IEC 61850-3、IEEE 1613 (變電站) 和 EN 50121-4 (鐵路應用)
- 符合 IEC 62439-3 第 4 款 (PRP) 及第 5 款 (HSR) ¹
- 內建 MMS Server，採用 IEC 61850-90-4 交換器資料模型，適用於 Power SCADA
- 符合部份 EN 50155 規格
- 支援 Turbo Ring 和 Turbo Chain (對於 250 台交換器斷線復連時間小於 20 毫秒) ²、RSTP/STP 和 MSTP 網路備援
- VLAN Unaware：支援由特定 IED 接收的優先順序標記訊框
- 最多 12 個連接埠，配備 M12 連接器
- 隔離式備援電源輸入，具有通用 24 VDC、48 VDC 或 110/220 VDC/VAC 電源供應範圍
- -40°C 到 85°C 操作溫度範圍

認證



簡介

PT-7728 專為滿足變電站自動化系統 (IEC 61850-3、IEEE 1613) 和鐵路應用 (EN 50121-4) 的需求而設計，並具備關鍵封包優先順序 (GOOSE 和 SMV) 以及內建 MMS Server。PT-7728 的 Gigabit 和高速乙太網路骨幹、網路備援，以及 24 VDC、48 VDC 或 110/220 VDC/VAC 雙隔離式備援電源供應器，可提升通訊可靠性，並節省線材/佈線成本。PT-7728 的模組化設計讓您輕鬆進行網路規劃，並可安裝最多 4 個 Gigabit 連接埠和 24 個快速乙太網路連接埠，提供更大彈性。除了選購的前後配線外，這些功能結合在一起，讓 PT-7728 非常適合多種工業應用。

附加特色與優點

- 以 IEC 61850-90-4 標準為基礎的交換器資料建模
- IEEE 1588v2 PTP (精密時間通訊協定) 用於網路時間同步 (僅適用於 PTP 型號)
- VLAN Unaware：支援由特定 IED 接收的優先順序標記訊框
- DHCP Option 82 適用於以不同原則指派 IP 位址
- 支援 EtherNet/IP 和 Modbus TCP 工業級乙太網路通訊協定
- 線路交換快速恢復
- 可透過網頁瀏覽器、Telnet / 序列主控台、CLI、Windows 工具程式，以及 ABC-01 自動備份設定程式進行設定
- IGMP snooping 和 GMRP，用於篩選來自工業級乙太網路協定的廣播封包
- 透過 Q-in-Q 標籤支援進階 VLAN 功能
- IEEE 802.3ad、LACP 提供最佳頻寬使用率
- 頻寬管理可防止無法預測的網路狀態
- 多埠監控可用於線上除錯
- 發生例外狀況時透過電子郵件和繼電器輸出自動發出警告
- RMON 提供主動且有效率的網路監控
- 自動恢復連線設備的 IP 位址

網路安全功能

- 具有多層安全性的使用者密碼可防止未經授權的設定
- 採用 SSH/HTTPS 進行密碼和資料加密
- 透過 802.1X 連接埠型網路存取控制來鎖定交換器連接埠，只有授權的用戶端才能存取連接埠
- RADIUS/TACACS+ 允許您從中控位置管理密碼
- 802.1Q VLAN 可讓您以邏輯方式分割在所選交換器連接埠之間傳輸的流量
- 安全交換器連接埠，僅讓特定裝置及 / 或 MAC 位址存取連接埠
- 停用一或多個連接埠以封鎖網路流量
- SNMPv3 提供加密驗證及存取安全性

1. 只適用於 PM-7200-4GTX-PHR-PTP 及 PM-7200-4GSFP-PHR-PTP 模組。
2. Gigabit 乙太網路斷線復連時間小於 50 毫秒

規格

Ethernet Interface

Cabling Direction	PT-7728-F Series: Front cabling PT-7728-R Series: Rear cabling
Compatible Modules	Slot 1/2/3: 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-7200-8SFP PM-7200-4M12 PM-7200-8MTRJ PM-7200-4TX-PTP (PT-7728-PTP only) PM-7200-4MST-PTP (PT-7728-PTP only) PM-7200-4MSC-PTP (PT-7728-PTP only) Slot 4: PM-7200-4GTXSFP PM-7200-2GTXSFP PM-7200-4GSFP-PHR-PTP (PT-7728-PTP only) PM-7200-4GTX-PHR-PTP (PT-7728-PTP only) PM-7200-1BNC2MST-PTP (PT-7728-PTP only)
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

Ethernet Software Features

Filter	802.1Q, GMRP, GVRP, IGMP v1/v2c, QinQ 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
Redundancy Protocols	All models: Link Aggregation, MSTP, RSTP, STP, Turbo Chain, Turbo Ring v1/v2 PTP models: HSR, PRP
Security	Broadcast storm protection, HTTPS/SSL, TACACS+, Port Lock, RADIUS, Rate Limit, SSH
Time Management	All models (except PTP models): NTP Server/Client, SNTP PTP models: NTP Server/Client, SNTP, IEEE 1588 PTP v1/v2 (hardware-based)

Switch Properties

IGMP Groups	256
Max. No. of VLANs	64

VLAN ID Range	VID 1 to 4094
Priority Queues	4
Serial Interface	
Console Port	RS-232 (RJ45)
Input/Output Interface	
Alarm Contact Channels	Resistive load: 3 A @ 30 VDC, 240 VAC
Power Parameters	
Input Voltage	-24-24/-48-48/-HV-HV/-24-HV/-48-HV models: Redundant power modules PT-7728-24 Series: 24 VDC (18 to 36 VDC) PT-7728-48 Series: 48 VDC (36 to 72 VDC) PT-7728-HV Series: 110/220 VAC/VDC (85 to 264 VAC, 88 to 300 VDC)
Overload Current Protection	Supported
Reverse Polarity Protection	Supported
Connection	10-pin terminal block
Input Current	PT-7728-24 Series: 2.38 A @ 24 VDC PT-7728-48 Series: 1.12 A @ 48 VDC PT-7728-HV Series: 0.49/0.26 A @ 110/220 VAC, 0.59/0.30 A @ 110/220 VDC
Physical Characteristics	
Housing	Aluminum
IP Rating	IP30
Dimensions (without ears)	440 x 44 x 325 mm (17.32 x 1.73 x 12.80 in)
Weight	5900 g (13.11 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	
Safety	UL 60950-1
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 DIPs
Power Substation	IEC 61850-3, IEEE 1613
Railway	EN 50121-4, EN 50155 (complies with a portion of EN 50155 specifications)
Traffic Control	NEMA TS2

MTBF

Time	393,828 hrs
Standards	Telcordia SR332

Warranty

Warranty Period	5 years
Details	See www.moxa.com/tw/warranty

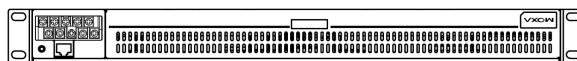
Package Contents

Device	1 x PT-7728 Series switch
Cable	1 x DB9 female to RJ45 10-pin
Installation Kit	4 x cap, plastic, for RJ45 port 2 x rack-mounting ear
Documentation	1 x document and software CD 1 x quick installation guide 1 x warranty card 1 x product certificates of quality inspection, Simplified Chinese 1 x product notice, Simplified Chinese
Note	SFP modules and/or modules from the PM-7200 Module Series need to be purchased separately for use with this product.

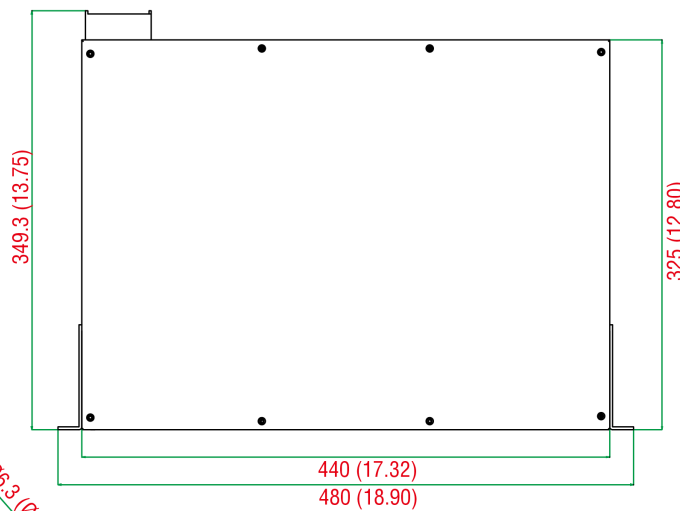
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單位：公釐（英吋）

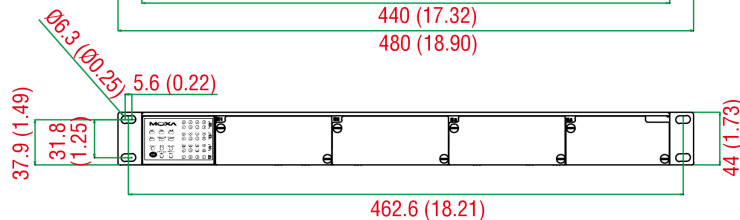
Rear View



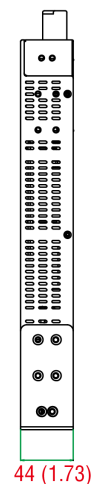
Top View



Front View



Side View



Model Name	Max. No. of Ports	Max. No. of Gigabit Ports	Max. No. of Fast Ethernet Ports	Cabling	Redundant Power Module	Input Voltage 1	Input Voltage 2	Operating Temp.
PT-7728-F-24	28	Up to 4	Up to 24	Front	–	24 VDC	–	-45 to 85°C
PT-7728-R-24	28	Up to 4	Up to 24	Rear	–	24 VDC	–	-45 to 85°C
PT-7728-F-24-24	28	Up to 4	Up to 24	Front	P	24 VDC	24 VDC	-45 to 85°C
PT-7728-R-24-24	28	Up to 4	Up to 24	Rear	P	24 VDC	24 VDC	-45 to 85°C
PT-7728-F-24-HV	28	Up to 4	Up to 24	Front	P	24 VDC	110/220 VDC/ VAC	-45 to 85°C
PT-7728-R-24-HV	28	Up to 4	Up to 24	Rear	P	24 VDC	110/220 VDC/ VAC	-45 to 85°C
PT-7728-F-48	28	Up to 4	Up to 24	Front	–	48 VDC	–	-45 to 85°C
PT-7728-R-48	28	Up to 4	Up to 24	Rear	–	48 VDC	–	-45 to 85°C
PT-7728-F-48-48	28	Up to 4	Up to 24	Front	P	48 VDC	48 VDC	-45 to 85°C
PT-7728-R-48-48	28	Up to 4	Up to 24	Rear	P	48 VDC	48 VDC	-45 to 85°C
PT-7728-F-48-HV	28	Up to 4	Up to 24	Front	P	48 VDC	110/220 VDC/ VAC	-45 to 85°C
PT-7728-R-48-HV	28	Up to 4	Up to 24	Rear	P	48 VDC	110/220 VDC/ VAC	-45 to 85°C
PT-7728-F-HV	28	Up to 4	Up to 24	Front	–	110/220 VDC/ VAC	–	-45 to 85°C
PT-7728-R-HV	28	Up to 4	Up to 24	Rear	–	110/220 VDC/ VAC	–	-45 to 85°C
PT-7728-F-HV-HV	28	Up to 4	Up to 24	Front	P	110/220 VDC/ VAC	110/220 VDC/ VAC	-45 to 85°C
PT-7728-R-HV-HV	28	Up to 4	Up to 24	Rear	P	110/220 VDC/ VAC	110/220 VDC/ VAC	-45 to 85°C
PT-7728-PTP-F-24	28	Up to 4	Up to 24	Front	–	24 VDC	–	-45 to 85°C
PT-7728-PTP-F-24-24	28	Up to 4	Up to 24	Front	P	24 VDC	24 VDC	-45 to 85°C
PT-7728-PTP-F-24-HV	28	Up to 4	Up to 24	Front	P	24 VDC	110/220 VDC/ VAC	-45 to 85°C
PT-7728-PTP-F-48	28	Up to 4	Up to 24	Front	–	48 VDC	–	-45 to 85°C
PT-7728-PTP-F-48-48	28	Up to 4	Up to 24	Front	P	48 VDC	48 VDC	-45 to 85°C
PT-7728-PTP-F-HV	28	Up to 4	Up to 24	Front	–	110/220 VDC/ VAC	–	-45 to 85°C
PT-7728-PTP-F-HV-HV	28	Up to 4	Up to 24	Front	P	110/220 VDC/ VAC	110/220 VDC/ VAC	-45 to 85°C
PT-7728-PTP-R-24	28	Up to 4	Up to 24	Rear	–	24 VDC	–	-45 to 85°C
PT-7728-PTP-R-24-24	28	Up to 4	Up to 24	Rear	P	24 VDC	24 VDC	-45 to 85°C
PT-7728-PTP-R-24-HV	28	Up to 4	Up to 24	Rear	P	24 VDC	110/220 VDC/ VAC	-45 to 85°C
PT-7728-PTP-R-48	28	Up to 4	Up to 24	Rear	–	48 VDC	–	-45 to 85°C
PT-7728-PTP-R-48-48	28	Up to 4	Up to 24	Rear	P	48 VDC (36-72 VDC)	48 VDC (36-72 VDC)	-45 to 85°C

Model Name	Max. No. of Ports	Max. No. of Gigabit Ports	Max. No. of Fast Ethernet Ports	Cabling	Redundant Power Module	Input Voltage 1	Input Voltage 2	Operating Temp.
PT-7728-PTP-R-HV	28	Up to 4	Up to 24	Rear	–	110/220 VDC/VAC	–	-45 to 85°C
PT-7728-PTP-R-HV-HV	28	Up to 4	Up to 24	Rear	P	110/220 VDC/VAC	110/220 VDC/VAC	-45 to 85°C

配件（選購）

PM-7200 Module Series

PM-7200-1BNC2MST-PTP	Fast Ethernet module for PT-7728-PTP series with 2 100BaseFX multi-mode ports with ST connectors, 1 PPS output with BNC connector, hardware-based IEEE 1588 PTP V2 protocol support
PM-7200-2GTXSFP	Gigabit Ethernet module with 2 10/100/1000BaseT(X) or 1000BaseSFP slot combo ports
PM-7200-2MSC4TX	Fast Ethernet module with 2 100BaseFX multi-mode ports with SC connectors and 4 10/100BaseT(X) ports
PM-7200-2MST4TX	Fast Ethernet module with 2 100BaseFX multi-mode ports with ST connectors and 4 10/100BaseT(X) ports
PM-7200-2SSC4TX	Fast Ethernet module with 2 100BaseFX single-mode ports with SC connectors and 4 10/100BaseT(X) ports
PM-7200-4GTXSFP	Gigabit Ethernet module with 4 10/100/1000BaseT(X) or 1000BaseSFP slot combo ports
PM-7200-4M12	Fast Ethernet module with 4 10/100BaseT(X) ports with M12 connectors
PM-7200-4MSC2TX	Fast Ethernet module with 4 100BaseFX multi-mode ports with SC connectors and 2 10/100BaseT(X) ports
PM-7200-4MST2TX	Fast Ethernet module with 4 100BaseFX multi-mode ports with ST connectors and 2 10/100BaseT(X) ports
PM-7200-4SSC2TX	Fast Ethernet module with 4 100BaseFX single-mode ports with SC connectors and 2 10/100BaseT(X) ports
PM-7200-6MSC	Fast Ethernet module with 6 100BaseFX multi-mode ports with SC connectors
PM-7200-6MST	Fast Ethernet module with 6 100BaseFX multi-mode ports with ST connectors
PM-7200-6SSC	Fast Ethernet module with 6 100BaseFX single-mode ports with SC connectors
PM-7200-8SFP	Fast Ethernet module with 8 100BaseSFP slots
PM-7200-8TX	Fast Ethernet module with 8 10/100BaseT(X) ports
PM-7200-8MTRJ	Fast Ethernet module with 8 100BaseFX multi-mode ports with MTRJ connectors
PM-7200-4TX-PTP	Fast Ethernet module for PT-7728-PTP series with 4 10/100BaseT(X) ports, hardware-based IEEE 1588 PTP V2 protocol support
PM-7200-4MST-PTP	Fast Ethernet module for PT-7728-PTP series with 4 100BaseFX multi-mode ports with ST connectors, hardware-based IEEE 1588 PTP V2 protocol support
PM-7200-4MSC-PTP	Fast Ethernet module for PT-7728-PTP series with 4 100BaseFX multi-mode ports with SC connectors, hardware-based IEEE 1588 PTP V2 protocol support
PM-7200-4GTX-PHR-PTP	Gigabit Ethernet module with 4 1000Base T(X) ports, PRP/HSR protocol support
PM-7200-4GSFP-PHR-PTP	Gigabit Ethernet module with 4 100/1000Base SFP slots, PRP/HSR protocol support

Software

MXview-50	Industrial network management software with a license for 50 nodes (by IP address)
MXview-100	Industrial network management software with a license for 100 nodes (by IP address)
MXview-250	Industrial network management software with a license for 250 nodes (by IP address)
MXview-500	Industrial network management software with a license for 500 nodes (by IP address)
MXview-1000	Industrial network management software with a license for 1000 nodes (by IP address)
MXview-2000	Industrial network management software with a license for 2000 nodes (by IP address)
MXview Upgrade-50	License expansion of MXview industrial network management software by 50 nodes (by IP address)

Storage Kits

ABC-01	Configuration backup and restoration tool for managed Ethernet switches and AWK Series wireless APs/bridges/clients, 0 to 60°C operating temperature
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SFP Modules

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 with LC connector for 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
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 1000BaseEZ port with LC connector for 110 km transmission, 0 to 60°C operating temperature
SFP-1GEZXLC-120	SFP module with 1 1000BaseEZ 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-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 500 m transmission, 0 to 60°C operating temperature
SFP-1GLSXLC-T	SFP module with 1 1000BaseLSX port with LC connector for 500 m 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 300/550 m transmission, 0 to 60°C operating temperature
SFP-1GSXLC-T	SFP module with 1 1000BaseSX port with LC connector for 300/550 m 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

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