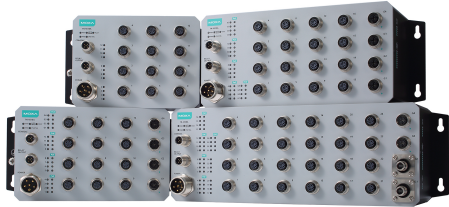


TN-4500A 系列

符合 EN 50155 標準、最多有 20 個 PoE 連接埠的 12+4G/24+4G 連接埠千兆乙太網路交換器



特色與優點

- 旁路型號具有 2 至 4 個包含旁路繼電器功能的千兆連接埠
- 光纖型號具備 2 個千兆光纖連接埠，內建多模 Q-ODC® 介面
- 最多 4 個具有 PoE 功能的千兆連接埠
- 最多 20 個 IEEE 802.3at/af 複合組合 PoE 及乙太網路連接埠
- Turbo Ring 和 Turbo Chain (250 個交換器時恢復時間 < 20 毫秒)¹，以及用於網路備援的 STP/RSTP/MSTP
- 符合所有 EN 50155 規範強制性測試項目²
- 隔離式電源，電源供應範圍為 24 至 110 VDC
- -40 至 70°C 系統操作溫度範圍

認證



EN 50155



EN 50121-4



簡介

ToughNet TN-4500A 系列 M12 網管型乙太網路交換器專為鐵路應用所設計，適用於軌道車輛及軌道沿線等應用。交換器使用 M12 和其他圓形接頭，確保連接緊密牢固，確保在振動和衝擊常見的工業環境中可正常運作。TN-4500A 系列乙太網路交換器提供 12 或 24 個快速乙太網路 M12 連接埠，包含或不包含 IEEE 802.3at/af 相容 PoE 功能，而千兆型號擁有 4 個千兆乙太網路介面，具有 PoE 和選購的旁路繼電器功能。此外，光纖型號提供 2 個 Gigabit 光纖介面連接埠，內建 2 公里多模光纖收發器。PoE 交換器被歸類為供電設備 (PSE)。

此系列交換器的每個連接埠最高可提供 30 瓦的電力，可向符合 IEEE 802.3at/af 標準的耗電裝置 (PD) 供電，例如 IP 攝影機、無線存取點和 IP 電話等。交換器支援 24 至 110 VDC 的寬電源輸入範圍和隔離式雙電源輸入，不僅可讓您在世界各地使用相同類型的電源，還能提升通訊系統的可靠性。此外，交換器的工作溫度範圍為 -40 至 70°C，可確保它們能夠承受嚴苛環境。TN-4500A 系列乙太網路交換器符合 EN 50155 標準中有關工作溫度、電源輸入電壓、突波、ESD 和振動的強制要求，而且採用保形塗層和電力絕緣技術，因此非常適合各種工業應用。

附加特色與優點

- 每個 PoE 連接埠最高可提供 30 瓦，每個交換器的總功率上限為 120 瓦
- DHCP Option 82 適用於以不同原則指派 IP 位址
- IGMP snooping 和 GMRP，用於過濾 multicast 流量
- 可基於連接埠實現 VLAN、IEEE 802.1Q VLAN 以及 GVRP，以簡化網路規劃
- QoS (IEEE 802.1p/1Q 和 ToS/DiffServ) 可將即時流量進行分類及排序
- IEEE 802.3ad、LACP 提供最佳化頻寬使用率
- SNMPv1/v2c/v3，支援不同層級的網路管理
- 支援 TACACS+、SNMPv3、IEEE 802.1X、HTTPS 和 SSH，強化網路安全
- RMON 提供主動且有效率的網路監控
- 頻寬管理可防止無法預測的網路狀態
- 鎖定連接埠，僅允許授權的 MAC 位址進行存取
- 可用連線埠鏡像進行線上除錯
- 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
- 線路切換快速恢復
- LLDP 在網路管理軟體中可用來進行自動拓撲探索
- 可透過網頁瀏覽器、Telnet/串列主控台、CLI 和 Windows 程式進行設定
- 迴圈保護，防止網路迴圈
- 壁掛安裝功能

規格

Input/Output Interface

Alarm Contact Channels

2 x relay output in one M12 A-coded 5-pin male connector with current carrying capacity of 1 A @ 30 VDC

1. 如果連接埠連結速度為 1 Gigabit 或更高，則恢復時間為 < 50 毫秒

2. 此產品適用於符合 EN 50155 標準所定義的所有軌道車輛應用。按此處取得更詳細內容：www.moxa.com/doc/specs/EN_50155_Compliance.pdf

Ethernet Interface

10/100/1000BaseT(X) Ports (M12 X-coded 8-pin female connector)	TN-4516A-4GTX-WV-T models: 4 TN-4516A-4GTX-WV-CT-T models: 4
10/100BaseT(X) Ports (M12 D-coded 4-pin female connector)	TN-4512A models: 12 TN-4516A non-PoE models: 16 TN-4516A-4GTX models: 12 TN-4516A-4GTXBP models: 12 TN-4524A/4528A models: 8
PoE Ports (10/100BaseT(X), M12 D-coded 4-pin female connector)	TN-4516A PoE models: 12 TN-4520A/4524A/4528A models: 16
PoE Ports (100/1000BaseT(X), M12 X-coded 8-pin female connector)	TN-4500A PoE models: 4 TN-4500A PoE fiber (ODC) and bypass (GTXBP) models: 2
10/100/1000BaseT(X) Ports (M12 X-coded 8-pin female connector with bypass relay)	TN-4516A-4GTXBP models: 4 TN-4516A-12PoE-2GPoE-2GTXBP models: 2 TN-4528A-16PoE-2GPoE-2GTXBP models: 2
10/100/1000BaseT(X) Ports, Q-ODC Fiber Connector	TN-4516A-12PoE-2GPoE-2GODC models: 2 TN-4528A-16PoE-2GPoE-2GODC models: 2
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 802.3af/at for PoE/PoE+ output 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

Broadcast Forwarding	Broadcast forwarding
Configuration Options	Command Line Interface (CLI) through Serial/Telnet/SSH Web Console (HTTP/HTTPS) Windows Utility
Filter	GMRP GVRP 802.1Q VLAN Port-based VLAN Static Multicast Multicast Filtering IGMP Snooping v1/v2/v3 IGMP Querier DHCP Filter
Management	IPv4/IPv6 Flow control LLDP ICMP Port Mirroring QoS/CoS/ToS RMON SMTP SNMP Inform SNMP Trap SNMPv1/v2c/v3 Syslog Account Management Loop Protection DNS Server DHCP option 82 (relay agent) Port-based DHCP Server

	DHCP Server (options 1/3/12/15/42/50/55) DHCP Client (options 1/3/50/51/53/54/55/57/61/66/67)
MIB	Bridge MIB Ethernet-like MIB MIB-II P-BRIDGE MIB Q-BRIDGE MIB RMON MIB Groups 1, 2, 3, 9 RSTP MIB
Redundancy Protocols	MSTP RSTP STP Turbo Chain Turbo Ring v1/v2 Turbo Ring with DRC Static Port Trunk LACP
Security	Access control list Trust access control Broadcast storm protection TACACS+ RADIUS HTTPS/SSL SSH Rate Limit SCP
Time Management	IEEE 1588 PTP v1/v2 NTP Server/Client SNTP Server/Client

Switch Properties

Max. No. of VLANs	64
VLAN ID Range	VID 1 to 4094
Jumbo Frame Size	9.712 KB
IGMP Groups	512 (shared with static multicast)

LED Interface

LED Indicators	PWR1, PWR2, FAULT, MSTR/HEAD, CPLR/TAIL, Ethernet ports, PoE ports
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Serial Interface

Console Port	M12 A-coded male connector
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Power Parameters

Input Current	TN-4512A models: Max. 0.30 A @ 24 VDC TN-4516A non-PoE models: Max. 0.33 A @ 24 VDC TN-4516A non-PoE 4GTx/4GTxBP models: Max. 0.62 A @ 24 VDC TN-4516A PoE models: Max. 7.0 A @ 24 VDC TN-4520A models: Max. 7.0 A @ 24 VDC TN-4524A models: Max. 6.5 A @ 24 VDC TN-4528A models: Max. 7.0 A @ 24 VDC
Input Voltage	24/36/48/72/96/110 VDC
No. of Power Inputs	2
Power Connector	M23 connector
Operating Voltage	16.8 to 137.5 VDC
Overload Current Protection	Supported

Reverse Polarity Protection	Supported
Power Consumption (Max.)	Non-PoE models: TN-4512A: 6.2 W @ 24 VDC, 6.1 W @ 110 VDC TN-4516A: 6.7 W @ 24 VDC, 6.5 W @ 110 VDC TN-4516A-4GTX: 12.7 W @ 24 VDC, 12.1 W @ 110 VDC TN-4516A-4GTXBP: 12.7 W @ 24 VDC, 12.1 W @ 110 VDC PoE models (with PoE disabled): TN-4516A-12PoE-2GPoE-2GODC: 16.2 W @ 24 VDC, 16.5 W @ 110 VDC TN-4516A-12PoE-4GPoE: 17.1 W @ 24 VDC, 17.1 W @ 110 VDC TN-4516A-12PoE-2GPoE-2GTXBP: 17.1 W @ 24 VDC, 17.1 W @ 110 VDC TN-4520A-16PoE-4GPoE: 16.1 W @ 24 VDC, 15.7 W @ 110 VDC TN-4524A-16PoE: 13.0 W @ 24 VDC, 13.1 W @ 110 VDC TN-4528A-16PoE-2GPoE-2GODC: 17.8 W @ 24 VDC, 17.7 W @ 110 VDC TN-4528A-16PoE-4GPoE: 18.7 W @ 24 VDC, 18.2 W @ 110 VDC TN-4528A-16PoE-2GPoE-2GTXBP: 18.7 W @ 24 VDC, 18.2 W @ 110 VDC PoE models (with PoE enabled): TN-4516A-12PoE-2GPoE-2GODC: 31.2 W @ 24 VDC, 23.4 W @ 110 VDC TN-4516A-12PoE-4GPoE: 32.1 W @ 24 VDC, 24.0 W @ 110 VDC TN-4516A-12PoE-2GPoE-2GTXBP: 32.1 W @ 24 VDC, 24.0 W @ 110 VDC TN-4520A-16PoE-4GPoE: 31.7 W @ 24 VDC, 23.1 W @ 110 VDC TN-4524A-16PoE: 28.8 W @ 24 VDC, 20.1 W @ 110 VDC TN-4528A-16PoE-2GPoE-2GODC: 35.7 W @ 24 VDC, 25.3 W @ 110 VDC TN-4528A-16PoE-4GPoE: 36.5 W @ 24 VDC, 25.8 W @ 110 VDC TN-4528A-16PoE-2GPoE-2GTXBP: 36.5 W @ 24 VDC, 25.8 W @ 110 VDC
Total PoE Power Budget	TN-4500A PoE models: 120 W

Physical Characteristics

Dimensions	TN-4512A models: 199.8 x 115 x 82.3 mm (7.87 x 4.53 x 3.24 in) TN-4516A models: 229.6 x 115 x 82.3 mm (9.04 x 4.53 x 3.24 in) TN-4516A-4GTX models: 229.6 x 115 x 92.3 mm (9.04 x 4.53 x 3.63 in) TN-4516A-4GTXBP models: 229.6 x 115 x 92.3 mm (9.04 x 4.53 x 3.63 in) TN-4516A-12PoE-4GPoE models: 229.6 x 115 x 122.3 mm (9.04 x 4.53 x 4.82 in) TN-4516A-12PoE-2GPoE-2GTXBP models: 229.6 x 115 x 122.3 mm (9.04 x 4.53 x 4.82 in) TN-4516A-12PoE-2GPoE-2GODC models: 229.6 x 115 x 122.3 mm (9.04 x 4.53 x 4.82 in) TN-4520A-16PoE-4GPoE models: 279.6 x 115 x 122.3 mm (11.01 x 4.53 x 4.82 in) TN-4524A-16PoE models: 347.8 x 115 x 122.3 mm (13.69 x 4.53 x 4.82 in) TN-4528A-16PoE-4GPoE models: 347.8 x 115 x 122.3 mm (13.69 x 4.53 x 4.82 in) TN-4528A-16PoE-2GPoE-2GTXBP models: 347.8 x 115 x 122.3 mm (13.69 x 4.53 x 4.82 in) TN-4528A-16PoE-2GPoE-2GODC models: 347.8 x 115 x 122.3 mm (13.69 x 4.53 x 4.82 in)
Housing	Metal
IP Rating	IP42
Weight	TN-4512A models: 1,032 g (2.28 lb) TN-4516A non-PoE models: 1,248 g (2.75 lb) TN-4516A PoE models: 2,090 g (4.61 lb) TN-4516A fiber (ODC) models: 2,180 g (4.81 lb) TN-4520A models: 2,292 g (5.05 lb) TN-4524A models: 2,388 g (5.27 lb) TN-4528A models: 2,559 g (5.64 lb) TN-4528A fiber (ODC) models: 2,645 g (5.83 lb)
Installation	Wall mounting
Protection	TN-4500A Series -CT models: PCB Conformal Coating

Environmental Limits

Operating Temperature	-40 to 70°C (-40 to 158°F)
Storage Temperature (package included)	-40 to 85°C (-40 to 185°F)
Ambient Relative Humidity	5 to 95% (non-condensing)
Altitude	3000 m

Standards and Certifications

EMC	EN 55032/35
EMS	IEC 61000-4-2 ESD: Contact: 6 kV; Air: 8 kV IEC 61000-4-3 RS: 80 MHz to 1 GHz: 20 V/m IEC 61000-4-4 EFT: Power: 2 kV; Signal: 2 kV IEC 61000-4-5 Surge: Power: 2 kV; Signal: 2 kV IEC 61000-4-6 CS: 10 V IEC 61000-4-8 PFMF
Freefall	IEC 60068-2-31
Radio Frequency	FCC
Railway	EN 50121-4 EN 50155 IEC 60571
Railway Fire Protection	EN 45545-2
Safety	UL 62368-1 IEC 62368-1 EN 62368-1
Shock	IEC 60068-2-27, IEC 61373, EN 50155
Vibration	IEC 60068-2-64, IEC 61373, EN 50155

Declaration

Green Product	RoHS, CRoHS, WEEE
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MTBF

Standards	Telcordia Standard SR-332
Time	TN-4512A models: 816,541 hrs TN-4516A models: 815,913 hrs TN-4516A-4GTX models: 755,975 hrs TN-4516A-4GTXP models: 624,458 hrs TN-4516A-12PoE-4GPoE models: 459,971 hrs TN-4516A-12PoE-2GPoE-2GTXP models: 434,683 hrs TN-4516A-12PoE-2GPoE-2GODC models: 413,810 hrs TN-4520A-16PoE-4GPoE models: 437,198 hrs TN-4524A-16PoE models: 453,479 hrs TN-4528A-16PoE-4GPoE models: 421,101 hrs TN-4528A-16PoE-2GPoE-2GTXP models: 398,146 hrs TN-4528A-16PoE-2GPoE-2GODC models: 380,761 hrs

Warranty

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

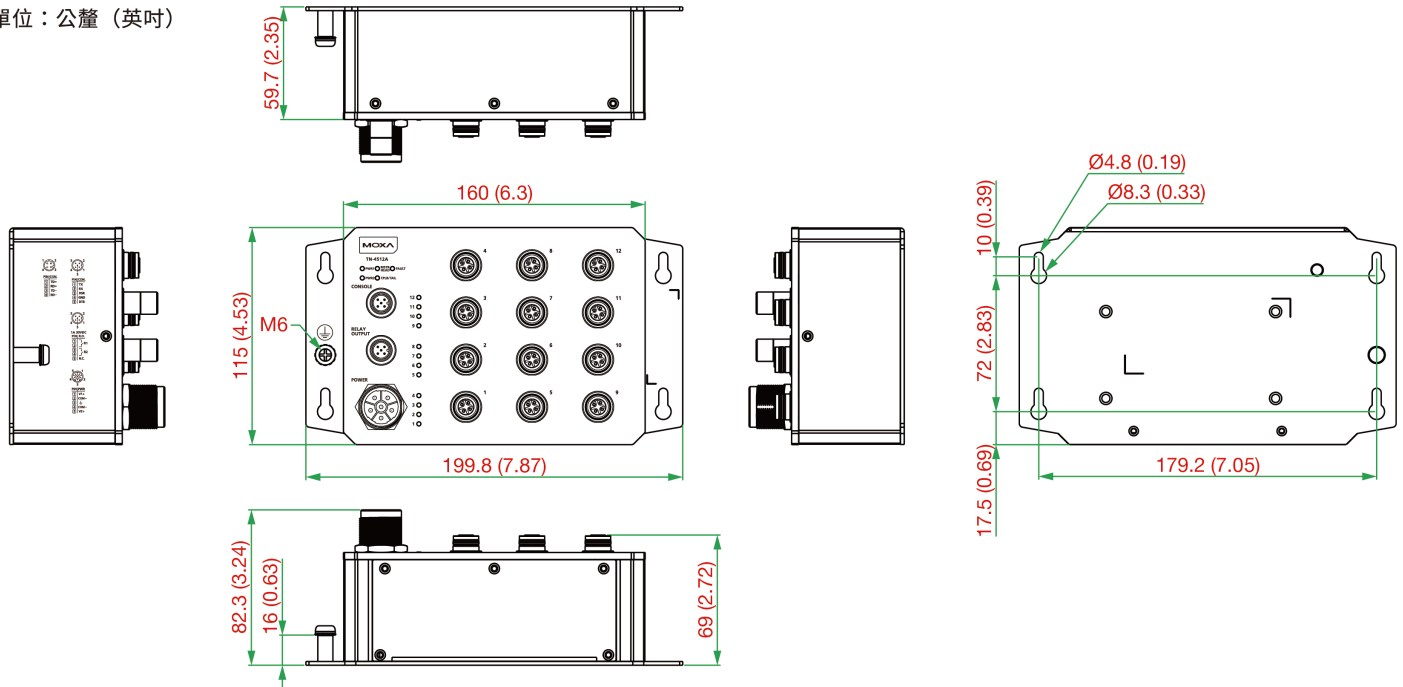
Package Contents

Device	1 x TN-4500A Series switch
Installation Kit	2 x cap, female, metal, for M12 port (console and relay ports, fixed on switch) 6/8/10/12/14 x cap, male, metal, for M12 port (Ethernet ports, fixed on switch) 1 x wall-mounting kit
Documentation	1 x quick installation guide 1 x warranty card

尺寸

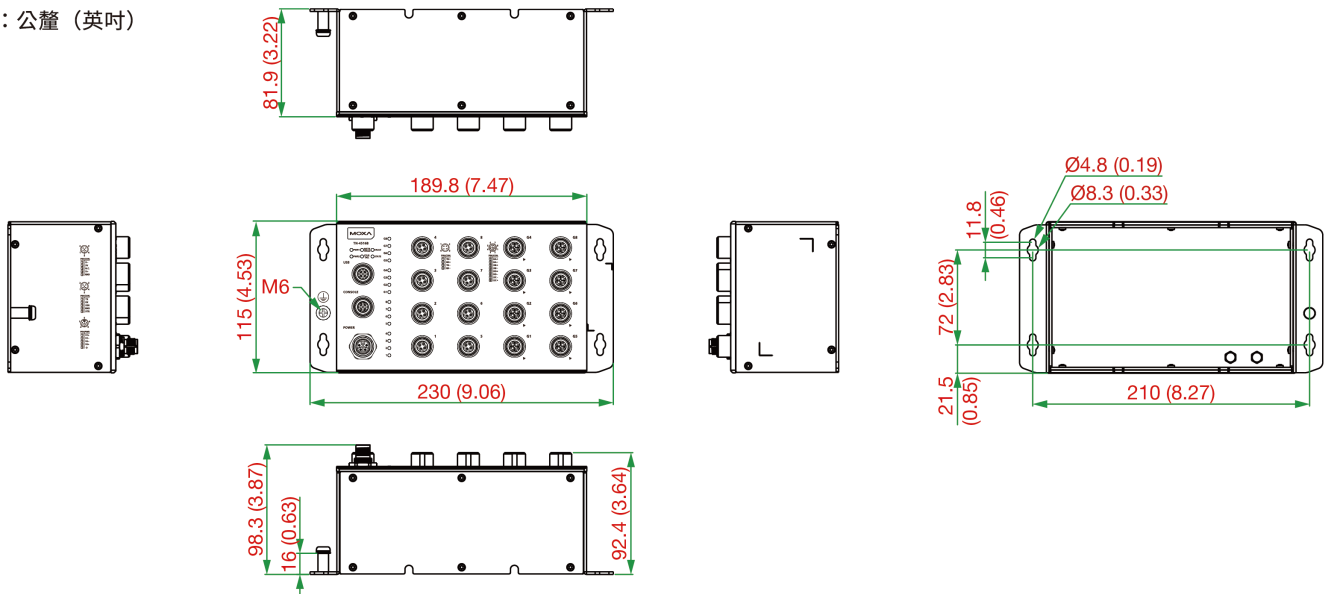
TN-4512A 型號

單位：公釐（英吋）



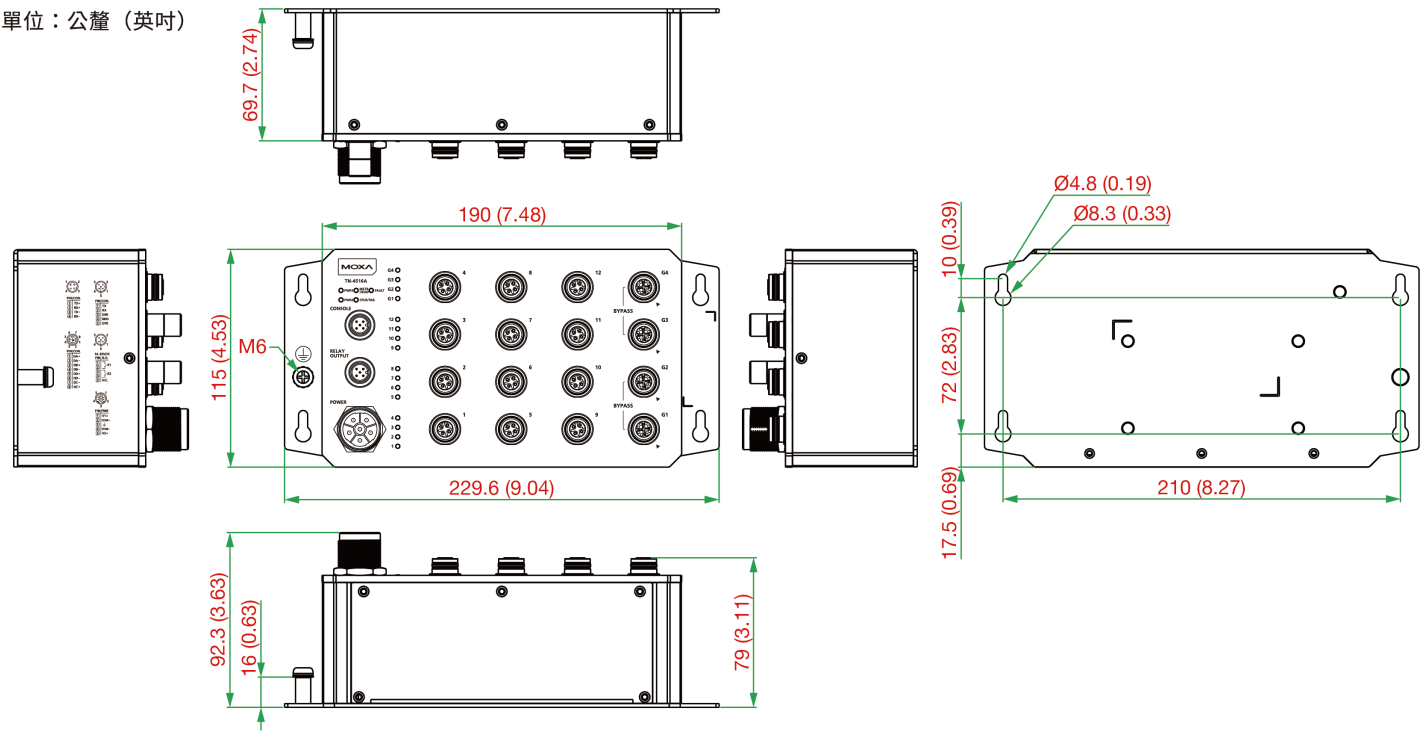
TN-4516A Non-PoE 型號

單位：公釐（英吋）



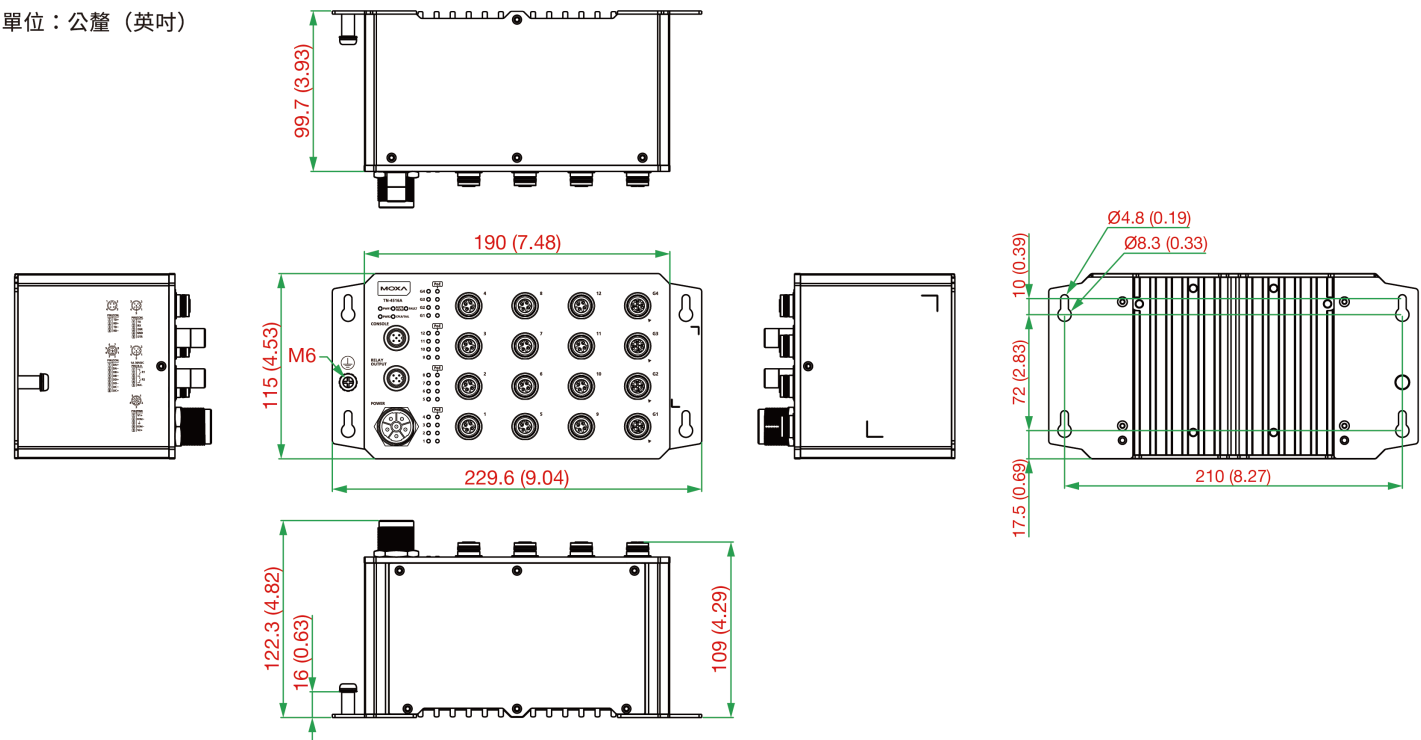
TN-4516A Non-PoE 4GTx/4GTxBP 型號

單位：公釐（英吋）



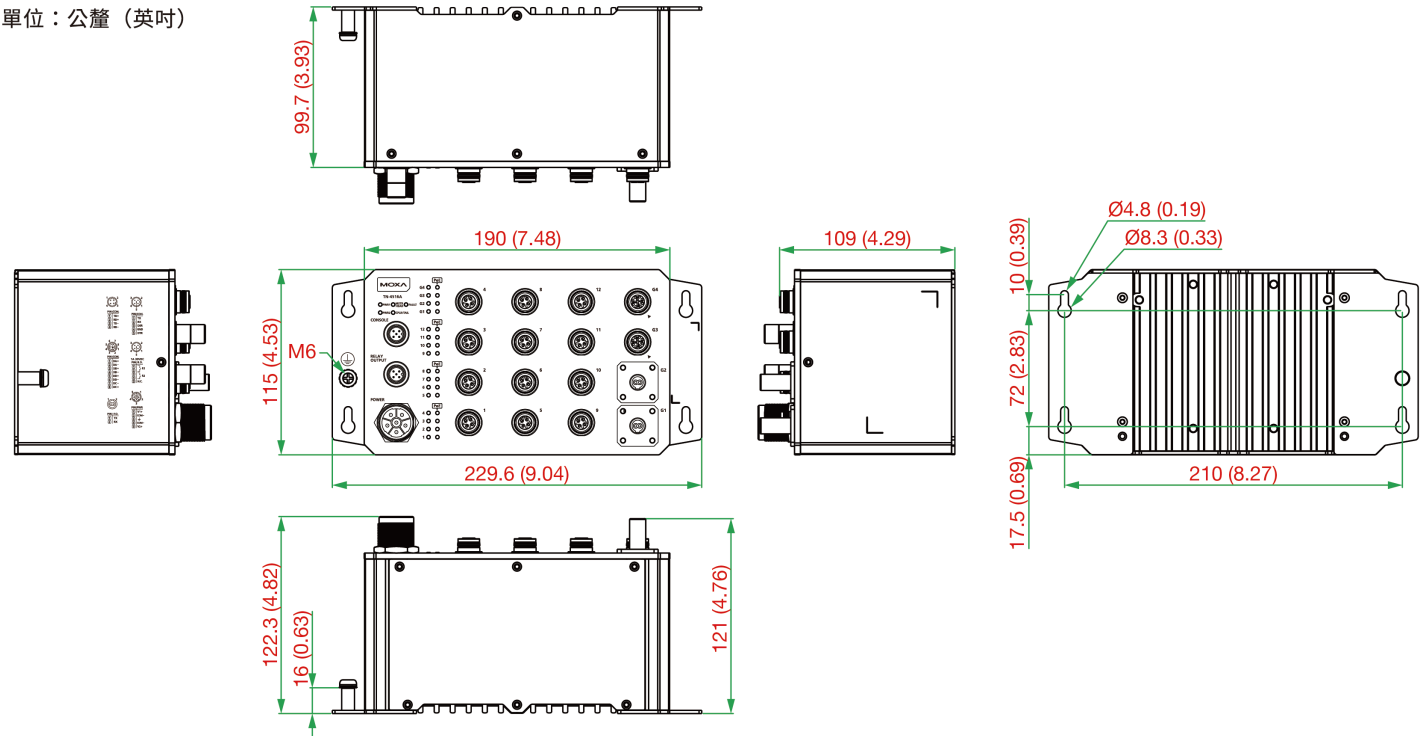
TN-4516A PoE 型號

單位：公釐（英吋）



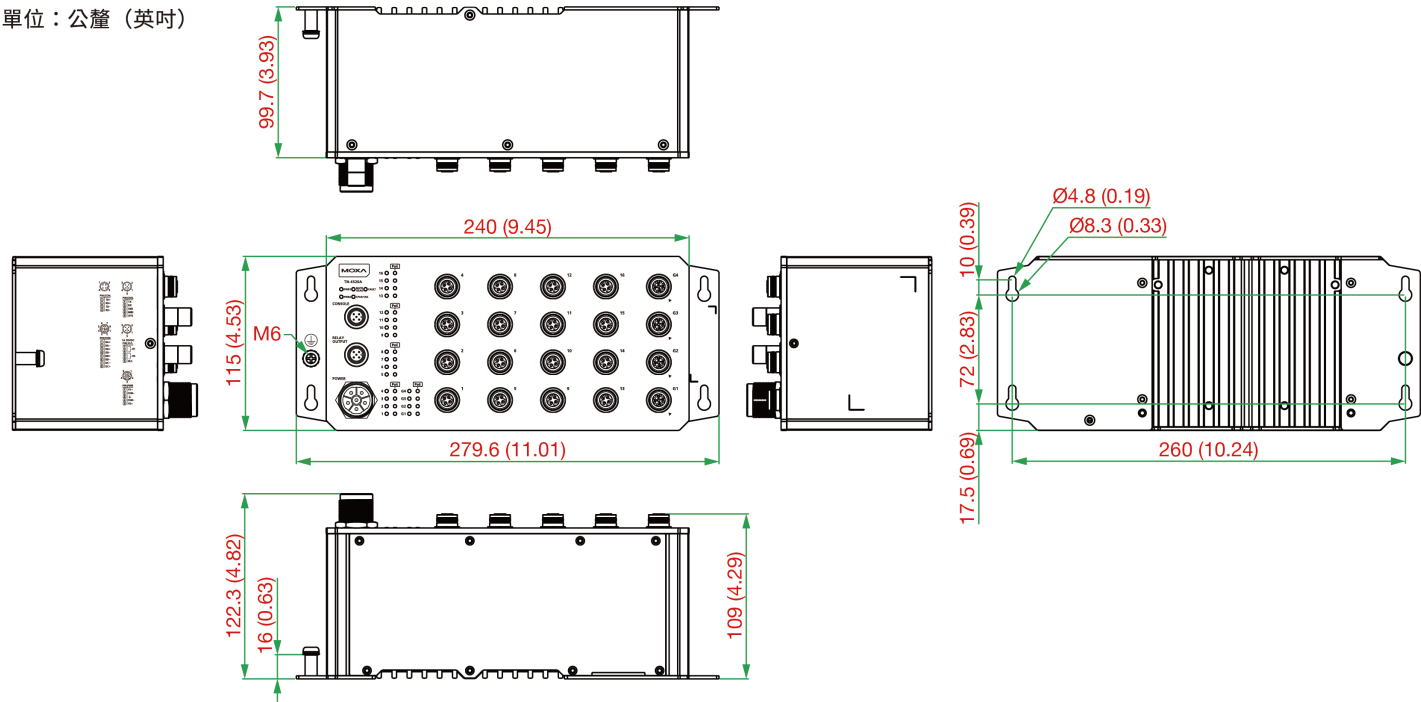
TN-4516A PoE 光纖 (ODC) 型號

單位：公釐（英吋）



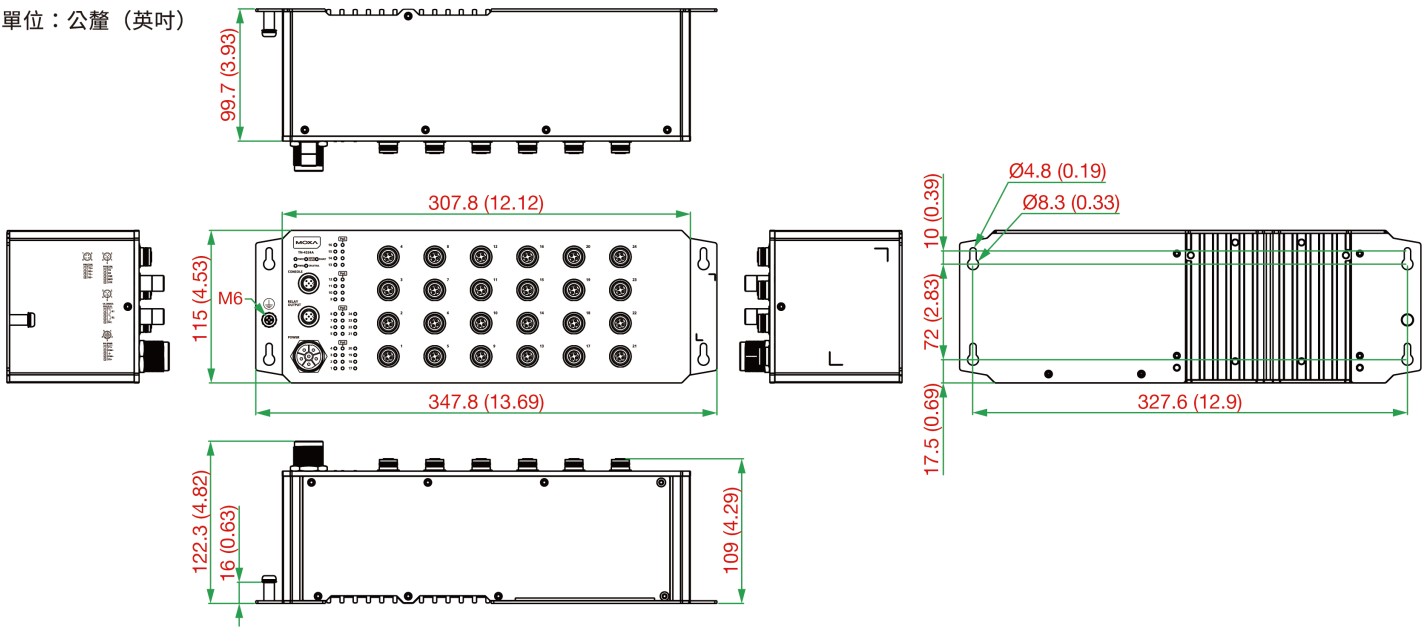
TN-4520A 型號

單位：公釐（英吋）



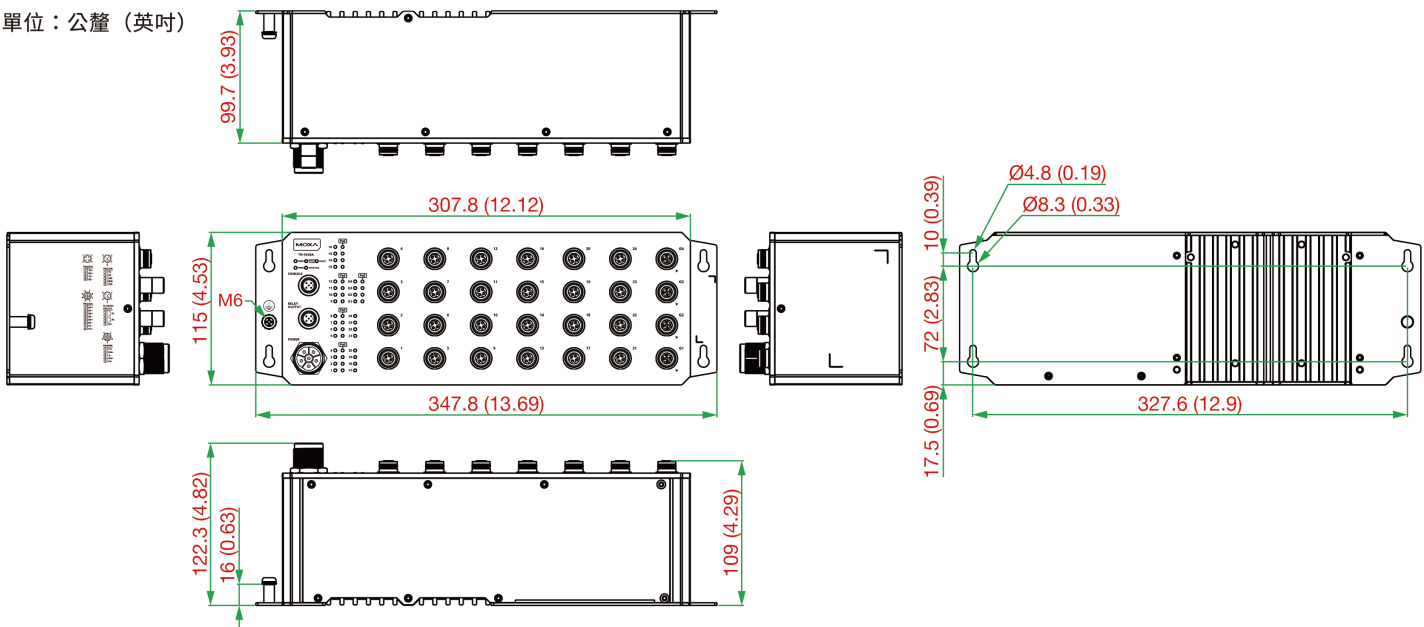
TN-4524A 型號

單位：公釐（英吋）



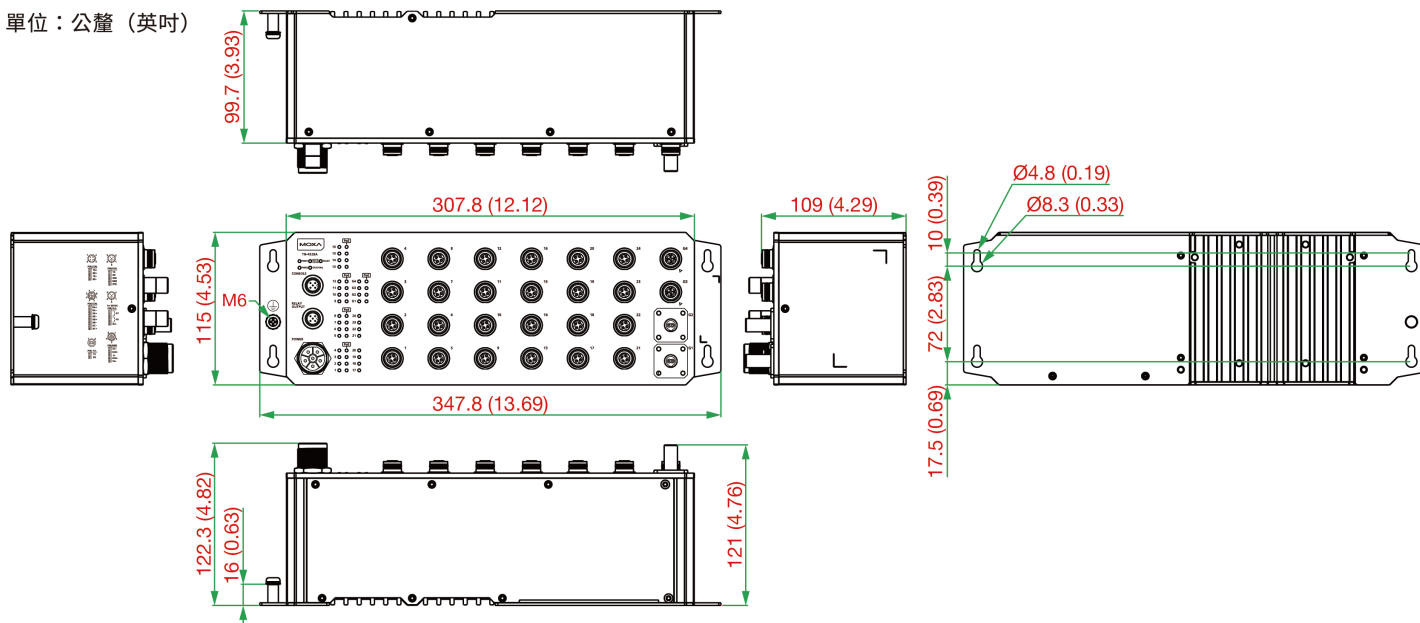
TN-4528A 型號

單位：公釐（英吋）



TN-4528A 光纖 (ODC) 型號

單位：公釐 (英吋)



訂購資訊

Model Name	10/100/ 1000BaseT(X) Ports Q-ODC Fiber Connector	10/100/ 1000BaseT(X) Ports M12 X-Coded 8-Pin Female Connector	10/100/ 1000BaseT(X) Ports M12 X-Coded 8-Pin Female Connector with Bypass Relay	10/100BaseT(X) Ports M12 D-Coded 4-Pin Female Connector	PoE Ports 10/100BaseT(X), M12 D-Coded 4-Pin Female Connector	PoE Ports 100/ 1000BaseT(X), M12 X-Coded 8-Pin Female Connector	Conformal Coating
TN-4512A-WV-T	-	-	-	12	-	-	-
TN-4512A-WV-CT-T	-	-	-	12	-	-	√
TN-4516A-WV-T	-	-	-	16	-	-	-
TN-4516A-WV-CT-T	-	-	-	16	-	-	√
TN-4516A-4GTX-WV-T	-	4	-	12	-	-	-
TN-4516A-4GTXBP-WV-T	-	-	4	12	-	-	-
TN-4516A-4GTX-WV-CT-T	-	4	-	12	-	-	√
TN-4516A-4GTXBP-WV-CT-T	-	-	4	12	-	-	√
TN-4516A-12PoE-4GPoE-WV-T	-	-	-	-	12	4	-
TN-4516A-12PoE-4GPoE-WV-CT-T	-	-	-	-	12	4	√
TN-4516A-12PoE-2GPoE-2GTXBP-WV-T	-	-	2	-	12	2	-
TN-4516A-12PoE-2GPoE-2GTXBP-WV-CT-T	-	-	2	-	12	2	√
TN-4516A-12PoE-2GPoE-2GODC-WV-T	2	-	-	-	12	2	-
TN-4516A-12PoE-2GPoE-2GODC-WV-CT-T	2	-	-	-	12	2	√
TN-4520A-16PoE-4GPoE-WV-T	-	-	-	-	16	4	-

Model Name	10/100/ 1000BaseT(X) Ports Q-ODC Fiber Connector	10/100/ 1000BaseT(X) Ports M12 X-Coded 8-Pin Female Connector	10/100/ 1000BaseT(X) Ports M12 X-Coded 8-Pin Female Connector with Bypass Relay	10/100BaseT(X) Ports M12 D-Coded 4-Pin Female Connector	PoE Ports 10/100BaseT(X), M12 D-Coded 4-Pin Female Connector	PoE Ports 100/ 1000BaseT(X), M12 X-Coded 8-Pin Female Connector	Conformal Coating
TN-4520A-16PoE-4GPoE-WV-CT-T	–	–	–	–	16	4	√
TN-4524A-16PoE-WV-T	–	–	–	8	16	–	–
TN-4524A-16PoE-WV-CT-T	–	–	–	8	16	–	√
TN-4528A-16PoE-4GPoE-WV-T	–	–	–	8	16	4	–
TN-4528A-16PoE-4GPoE-WV-CT-T	–	–	–	8	16	4	√
TN-4528A-16PoE-2GPoE-2GTXP-WV-T	–	–	2	8	16	2	–
TN-4528A-16PoE-2GPoE-2GTXP-WV-CT-T	–	–	2	8	16	2	√
TN-4528A-16PoE-2GPoE-2GODC-WV-T	2	–	–	8	16	2	–
TN-4528A-16PoE-2GPoE-2GODC-WV-CT-T	2	–	–	8	16	2	√

配件 (選購)

Storage Kits

ABC-01-P-M12-CT-T	Configuration backup and restoration tool with M12 connector for Moxa's ToughNet series of managed Ethernet switches and wireless APs/bridges/clients, -40 to 75°C operating temperature, conformal coating
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Cables

CBL-M12D(MM4P)/RJ45-100 IP67	D-coded male M12-to-RJ45 Ethernet cable, black, IP67-rated, 1 m
CBL-M23(FF6P)/OPEN-BK-100 IP67	M23 female M23-to-6-pin open wire power cable, black, IP67-rated, 1 m
CBL-M12DMM4PM12DMM4P-BK-100-IP67	D-coded male M12-to-D-coded female M12 Ethernet cable, black, IP67-rated, 1 m
CBL-M12XMM8P-Y-100-IP67	X-coded male M12-to-8-pin open wire cable, yellow, IP67-rated, 1 m
CBL-M12XMM8P-Y-300-IP67	X-coded male M12-to-8-pin open wire cable, yellow, IP67-rated, 3 m
CBL-M12XMM8PRJ45-Y-200-IP67	X-coded male M12-to-RJ45 Ethernet cable, yellow, IP67-rated, 2 m

Connectors

M12D-4PMM-IP67	IDC type M12 connector, male 4-pin, D-coded, IP67-rated
M12D-4P-IP68	Solder type M12 connector, male 4-pin, D-coded, IP68-rated
A-PLG-WPM23-01-IP67	Crimp type M23 connector, female 6-pin, IP67-rated
M12A-5P-IP68	Solder type M12 connector, female 5-pin, A-coded, IP68-rated
M12X-8PMM-IP67-HTG	Crimp type M12 connector, male 8-pin, X-coded, IP67-rated

M12 Connector Caps

A-CAP-M12F-M-PP	Metal cap for M12 female push-pull connector
A-CAP-M12F-M	Metal cap for M12 female connector
A-CAP-M12M-M	Metal cap for M12 male connector

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