

# TN-4500B 系列

## EN 50155 8 至 28 連接埠乙太網路網管型交換器



### 特色與優點

- 最多 28 個乙太網路連接埠，配備 M12 推拉式連接器
- 最多 8 個 Gigabit 連接埠，具備可選式雙繼電器繞道功能
- 最多 24 個 PoE 連接埠，總 PoE 功率上限為 150 W
- 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
- 符合所有 EN 50155 規範強制性測試項目<sup>1</sup>
- 內建 MX-NOS 軌道版本，這是一個全面性管理軟體，專為車載軌道網路的獨特需求量身打造

### 認證



EN 50155



EN 50121-4



### 簡介

ToughNet TN-4500B 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安裝等應用。交換器使用 M12 圓形連接器，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-4500B 系列乙太網路交換器提供 8 到 28 個乙太網路連接埠，符合或不符合 IEEE 802.3at/af 標準的 PoE 功能。Gigabit 型號進一步提供最多 8 個 Gigabit 乙太網路連接埠。

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，可確保它們能夠部署在嚴苛環境中。TN-4500B 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

- 強固的 EN 50155 乙太網路交換器，適合軌道車輛應用
- Turbo Ring 與 RSTP/MSTP/STP/MRP 支援網路備援
- 壁掛安裝
- 自動復原所連接裝置的 IP 位址
- 可透過網頁瀏覽器、Telnet/序列主控台或 Windows 公用程式進行設定

### 規格

#### Ethernet Interface

|                                                                |                                                                                                                                                                          |
|----------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 10/100BaseT(X) Ports (M12 D-coded 4-pin female connector)      | TN-4508B-CT-T :8<br>TN-4512B-CT-T :12<br>TN-4516B-CT-T :16<br>TN-4516B-8G-CT-T :8                                                                                        |
| PoE Ports (10/100BaseT(X), M12 D-coded 4-pin female connector) | TN-4512B PoE models: 8<br>TN-4516B PoE models: 8<br>TN-4520B models: 12<br>TN-4524B models: 16<br>TN-4528B models: 20                                                    |
| 10/100/1000BaseT(X) Ports (M12 X-coded 8-pin female connector) | TN-4512B-8P-4G-CT-T: 4<br>TN-4516B-8G-CT-T: 8<br>TN-4516B-8P-4G-4GP-CT-T: 4<br>TN-4520B-12P-4G-4GP-CT-T: 4<br>TN-4524B-16P-4G-4GP-CT-T: 4<br>TN-4528B-20P-4G-4GP-CT-T: 4 |

1. 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](http://www.moxa.com/doc/specs/EN_50155_Compliance.pdf)

|                                                                                  |                                                                                                                                                                                                                                                                                                                                                                    |
|----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PoE Ports (100/1000BaseT(X), M12 X-coded 8-pin female connector)                 | TN-4516B PoE models: 4<br>TN-4520B PoE models: 4<br>TN-4524B PoE models: 4<br>TN-4528B PoE models: 4                                                                                                                                                                                                                                                               |
| 10/100/1000BaseT(X) Ports (M12 X-coded 8-pin female connector with bypass relay) | -4GBP models: 4                                                                                                                                                                                                                                                                                                                                                    |
| Standards                                                                        | IEEE 802.3 for 10BaseT<br>IEEE 802.3u for 100BaseT(X)<br>IEEE 802.3ab for 1000BaseT(X)<br>IEEE 802.3af/at for PoE/PoE+ output<br>IEEE 802.1D-2004 for Spanning Tree Protocol<br>IEEE 802.1p for Class of Service<br>IEEE 802.1Q for VLAN Tagging<br>IEEE 802.1w for Rapid Spanning Tree Protocol<br>IEEE 802.1X for authentication<br>IEEE 802.3x for flow control |

## Ethernet Software Features

|                       |                                                                                                                                                                                                                                                                                                                                                   |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Configuration Options | Command Line Interface (CLI) through Serial/Telnet/SSH<br>Web Console (HTTP/HTTPS)<br>Windows Utility                                                                                                                                                                                                                                             |
| Filter                | GMRP<br>GVRP<br>GARP<br>802.1Q VLAN<br>IGMP Snooping v1/v2/v3<br>IGMP Querier<br>Static Multicast                                                                                                                                                                                                                                                 |
| Management            | IPv4/IPv6<br>Flow control<br>Back Pressure Flow Control<br>DHCP Server<br>DHCP Client<br>DHCP Relay Agent (Option 82)<br>QoS/CoS/ToS<br>ARP<br>RARP<br>LLDP<br>Port Mirroring<br>Linkup Delay<br>SMTP<br>SNMP Trap<br>SNMP Inform<br>SNMPv1/v2c/v3<br>RMON<br>TFTP<br>SFTP<br>HTTP<br>HTTPS<br>Telnet<br>Syslog<br>Private MIB<br>Loop Protection |
| MIB                   | P-BRIDGE MIB<br>Q-BRIDGE MIB<br>Ethernet-like MIB<br>IEEE8021-SPANNING-TREE-MIB<br>IEEE8021-PAE-MIB<br>IEEE8023-LAG-MIB<br>LLDP-EXT-DOT1-MIB<br>LLDP-EXT-DOT3-MIB<br>SNMPv2-MIB<br>RMON MIB Groups 1, 2, 3, 9                                                                                                                                     |
| Redundancy Protocols  | STP<br>RSTP<br>MSTP                                                                                                                                                                                                                                                                                                                               |

|                 |                                                                                                                                                                             |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | Turbo Ring v2<br>Link Aggregation<br>Ring Coupling<br>Static Port Trunk<br>LACP<br>MRP                                                                                      |
| Security        | Rate Limit<br>Trust access control<br>Port Lock<br>Sticky MAC<br>HTTPS/SSL<br>SSH<br>RADIUS<br>TACACS+<br>Access control list<br>Login and password policy<br>DHCP Snooping |
| Time Management | SNTP Server/Client<br>NTP Server/Client                                                                                                                                     |

### Switch Properties

|                   |               |
|-------------------|---------------|
| MAC Table Size    | 16 K          |
| IGMP Groups       | 1024          |
| Max. No. of VLANs | 256           |
| VLAN ID Range     | VID 1 to 4094 |
| Priority Queues   | 8             |

### LED Interface

|                |                                                                           |
|----------------|---------------------------------------------------------------------------|
| LED Indicators | PWR1, PWR2, FAULT, STATE, MSTR/HEAD, CPLR/TAIL, Ethernet ports, PoE ports |
|----------------|---------------------------------------------------------------------------|

### Serial Interface

|              |                                             |
|--------------|---------------------------------------------|
| Console Port | M12 B-coded 5-pin female connector (RS-232) |
|--------------|---------------------------------------------|

### USB Interface

|               |                                                   |
|---------------|---------------------------------------------------|
| M12 Connector | M12 A-coded 5-pin female (for ABC-02 USB storage) |
|---------------|---------------------------------------------------|

### Power Parameters

|                             |                                                                                                                                                                                                       |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input Current               | TN-4508B models: 0.46 A @ 24 V<br>TN-4512B non-PoE models: 0.56 A @ 24 V<br>TN-4512B PoE models: 4.9 A @ 24 V<br>TN-4516B non-PoE models: 0.83 A @ 24 V<br>TN-4516/20/24/28B PoE models: 9.3 A @ 24 V |
| Input Voltage               | 24/36/48/72/96/110 VDC<br>Redundant dual inputs<br>No. of power inputs: 2                                                                                                                             |
| Operating Voltage           | 16.8 to 137.5 VDC                                                                                                                                                                                     |
| Power Connector             | M12 K-coded 5-pin male connector                                                                                                                                                                      |
| Overload Current Protection | Supported                                                                                                                                                                                             |
| Reverse Polarity Protection | Supported                                                                                                                                                                                             |

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Power Consumption (Max.) | TN-4508B-CT-T: Max. 11.3 W<br>TN-4512B-CT-T: Max. 13.3 W<br>TN-4512B-8P-4G-CT-T: Max. 23.7 W<br>TN-4516B-CT-T: Max. 15.9 W<br>TN-4516B-8G-CT-T: Max. 19.8 W<br>TN-4516B-8P-4G-4GP-CT-T: Max. 51.9 W<br>TN-4516B-8P-4GP-4GBP-CT-T: Max. 51.9 W<br>TN-4520B-12P-4G-4GP-CT-T: Max. 55.5 W<br>TN-4520B-12P-4GP-4GBP-CT-T: Max. 55.5 W<br>TN-4524B-16P-4G-4GP-CT-T: Max. 56.2 W<br>TN-4524B-16P-4GP-4GBP-CT-T: Max. 56.2 W<br>TN-4528B-20P-4G-4GP-CT-T: Max. 57.0 W<br>TN-4528B-20P-4GP-4GBP-CT-T: Max. 57.0 W<br>Note: The system power consumption refers to the maximum power consumption of the PoE model without PoE load (excluding the power consumption of the PD). |
| Total PoE Power Budget   | TN-4512B PoE models: 80 W<br>TN-4516B PoE models: 150 W<br>TN-4516B/20B/28B PoE models: 150 W<br>TN-4520B PoE models: 150 W<br>TN-4524B PoE models: 150 W<br>TN-4528B PoE models: 150 W                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

## Physical Characteristics

|              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Housing      | Metal                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Dimensions   | TN-4508B models: 180 x 115 x 83.5 mm (7.09 x 4.53 x 3.29 in)<br>TN-4512B non-PoE models: 200 x 115 x 83.5 mm (7.87 x 4.53 x 3.29 in)<br>TN-4512B PoE models: 200 x 115 x 102 mm (7.87 x 4.53 x 4.02 in)<br>TN-4516B non-PoE models: 230 x 115 x 98 mm (9.06 x 4.53 x 3.86 in)<br>TN-4516B PoE models: 230 x 115 x 133 mm (9.06 x 4.53 x 5.24 in)<br>TN-4520B models: 280 x 115 x 133 mm (11.02 x 4.53 x 5.24 in)<br>TN-4524B models: 313 x 115 x 133 mm (12.32 x 4.53 x 5.24 in)<br>TN-4528B models: 348 x 115 x 133 mm (13.70 x 4.53 x 5.24 in) |
| IP Rating    | IP42                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Weight       | TN-4508B models: 1,002 g (2.21 lb)<br>TN-4512B non-PoE models: 1,123 g (2.48 lb)<br>TN-4512B PoE models: 1,459 g (3.22 lb)<br>TN-4516B non-PoE models: 1,500 g (3.31 lb)<br>TN-4516B PoE models: 2,310 g (5.10 lb)<br>TN-4520B models: 2,419 g (5.33 lb)<br>TN-4524B models: 2,651 g (5.84 lb)<br>TN-4528B models: 2,802 g (6.18 lb)                                                                                                                                                                                                             |
| Installation | Wall mounting                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Protection   | 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<br>IEC 61000-4-3 RS: 80 MHz to 1 GHz: 20 V/m<br>IEC 61000-4-4 EFT: Power: 2 kV; Signal: 2 kV<br>IEC 61000-4-5 Surge: Power: 2 kV; Signal: 2 kV<br>IEC 61000-4-6 CS: 10 V<br>IEC 61000-4-8 PFMF |

|                         |                                                                                                                                         |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| Radio Frequency         | FCC                                                                                                                                     |
| Railway                 | IEC 60068-2-1, EN 50155<br>IEC 60068-2-2, EN 50155<br>IEC 60068-2-30, EN 50155<br>IEC 60068-2-78<br>EN 50121-4<br>EN 50155<br>IEC 60571 |
| Railway Fire Protection | EN 45545-2                                                                                                                              |
| Safety                  | UL 62368-1<br>IEC 62368-1<br>EN 62368-1<br>BSMI                                                                                         |
| Salt Spray Test         | EN 50155                                                                                                                                |
| Shock                   | IEC 60068-2-27, IEC 61373, EN 50155                                                                                                     |
| Vibration               | IEC 60068-2-64, IEC 61373, EN 50155                                                                                                     |
| Package Vibration Test  | ISTA 1A                                                                                                                                 |
| Package Drop Test       | ISTA 1A                                                                                                                                 |

#### Declaration

|               |                   |
|---------------|-------------------|
| Green Product | RoHS, CRoHS, WEEE |
|---------------|-------------------|

#### MTBF

|           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Time      | TN-4508B-CT-T: 1,964,461 hrs<br>TN-4512B-CT-T: 1,447,268 hrs<br>TN-4512B-8P-4G-CT-T: 1,033,581 hrs<br>TN-4516B-CT-T: 1,346,637 hrs<br>TN-4516B-8G-CT-T: 1,148,405 hrs<br>TN-4516B-8P-4G-4GP-CT-T: 881,578 hrs<br>TN-4516B-8P-4GP-4GBP-CT-T: 852,972 hrs<br>TN-4520B-12P-4G-4GP-CT-T: 851,025 hrs<br>TN-4520B-12P-4GP-4GBP-CT-T: 824,348 hrs<br>TN-4524B-16P-4GP-4G-CT-T: 772,151 hrs<br>TN-4524B-16P-4GP-4GBP-CT-T: 747,294 hrs<br>TN-4528B-20P-4G-4GP-CT-T: 693,572 hrs<br>TN-4528B-20P-4GP-4GBP-CT-T: 581,667 hrs |
| Standards | Telcordia SR332 Issue 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

#### Warranty

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

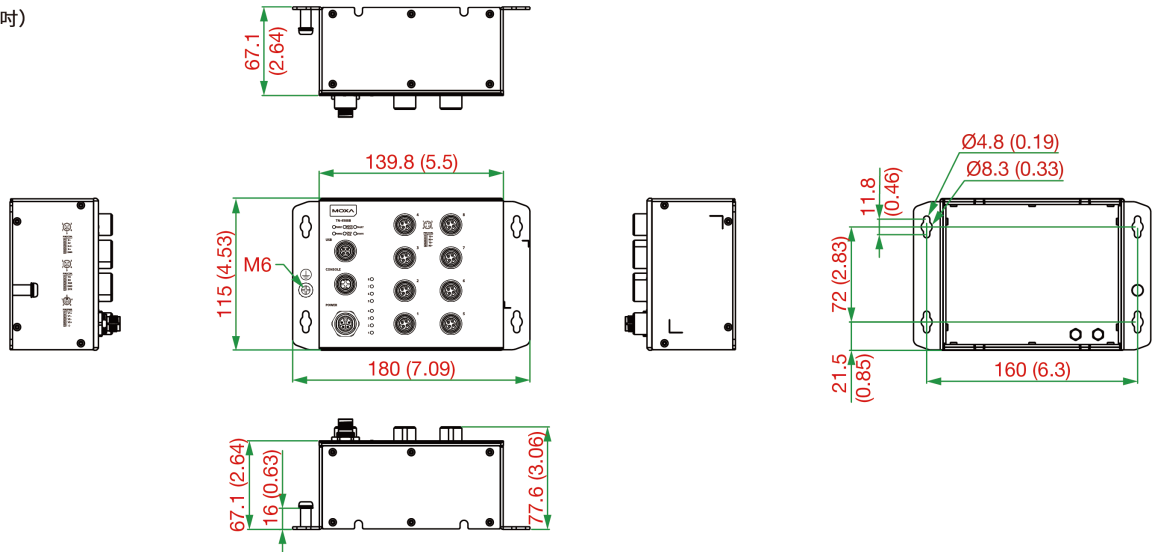
#### Package Contents

|                  |                                                                                                                                                                                                                          |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Device           | 1 x TN-4500B Series switch                                                                                                                                                                                               |
| Installation Kit | 1 x wall-mounting kit<br>2 x cap, male, metal, for M12 ports (console and USB storage ports, pre-installed on the switch)<br>4/6/8/10/14 x cap, male, metal, for M12 ports (Ethernet ports, pre-installed on the switch) |
| Documentation    | 1 x quick installation guide<br>1 x warranty card                                                                                                                                                                        |

# 尺寸

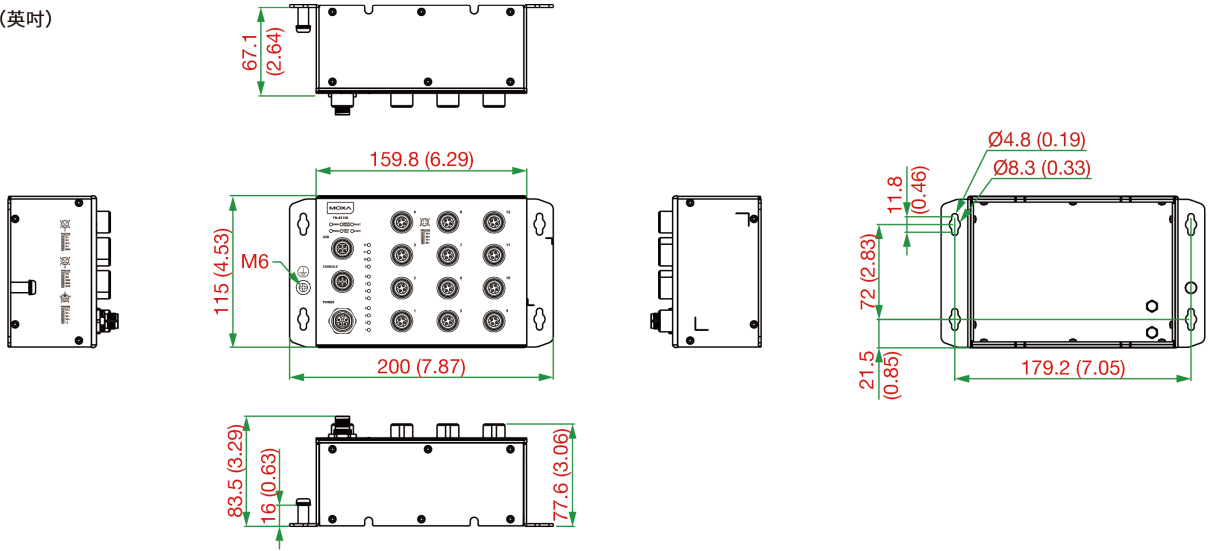
## TN-4508B 型號

單位：公釐（英吋）



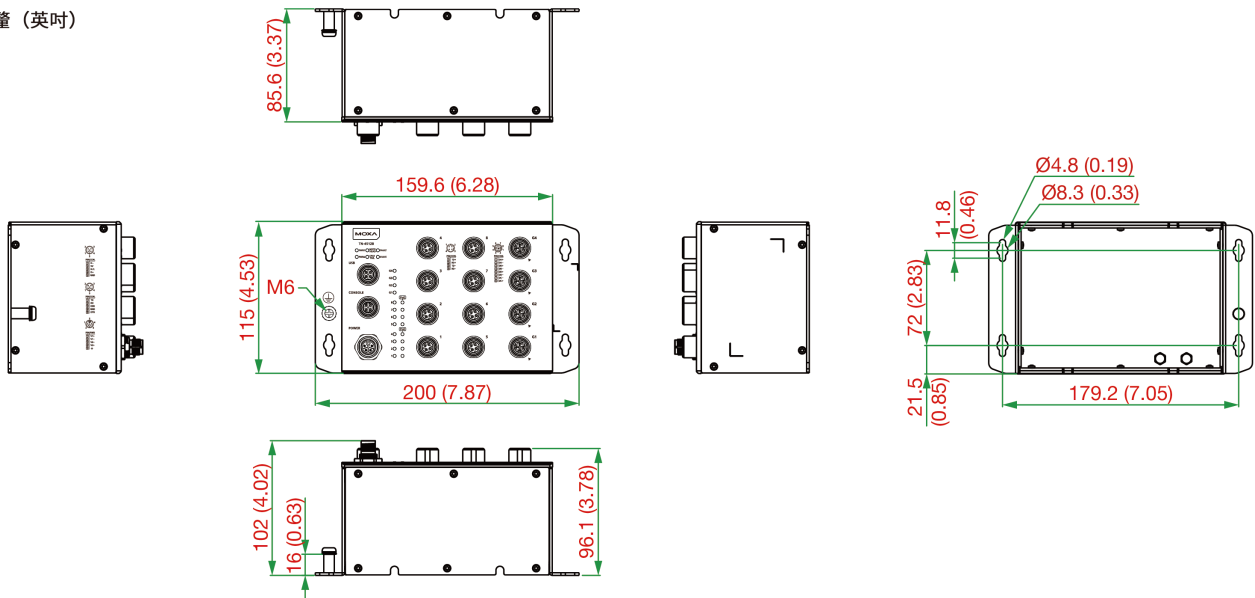
## TN-4512B 非 PoE 型號

單位：公釐（英吋）



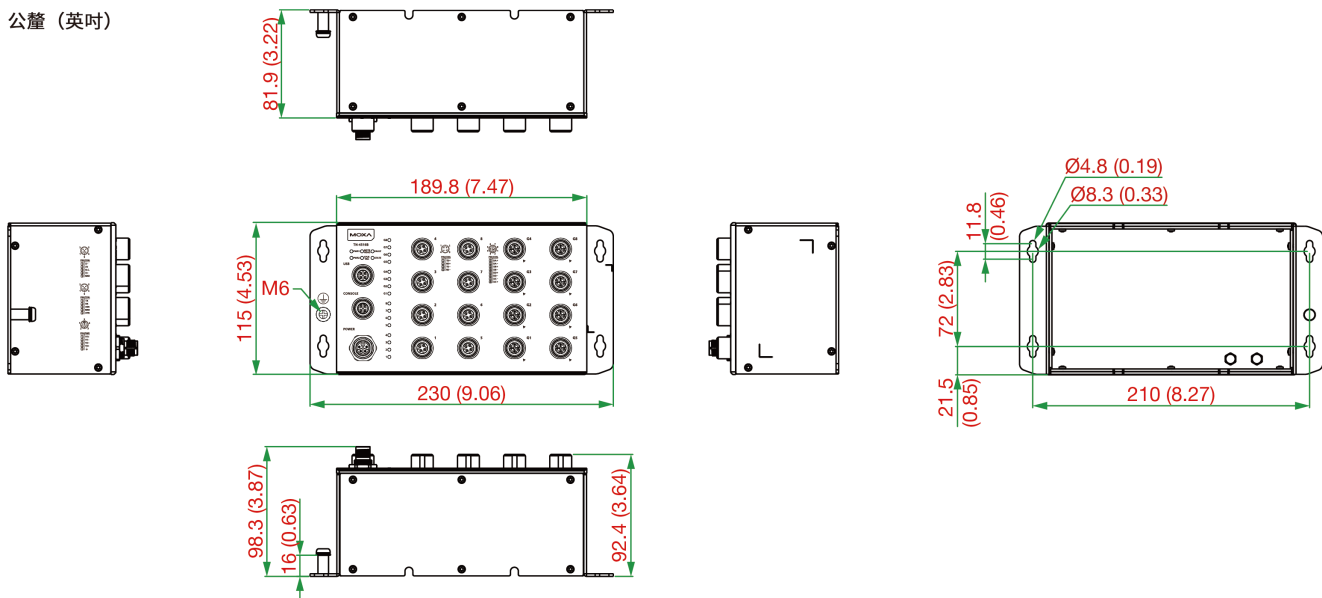
**TN-4512B PoE 型號**

單位：公釐（英吋）



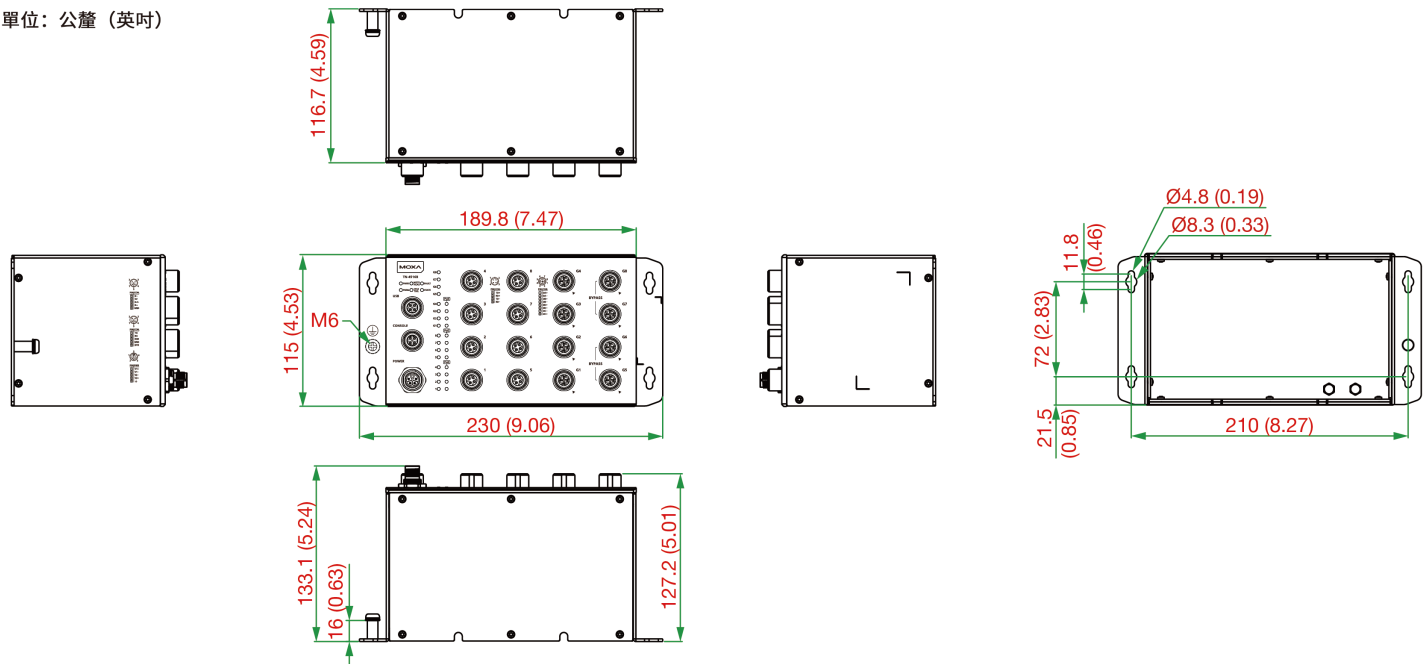
**TN-4516B 非 PoE 型號**

單位：公釐（英吋）



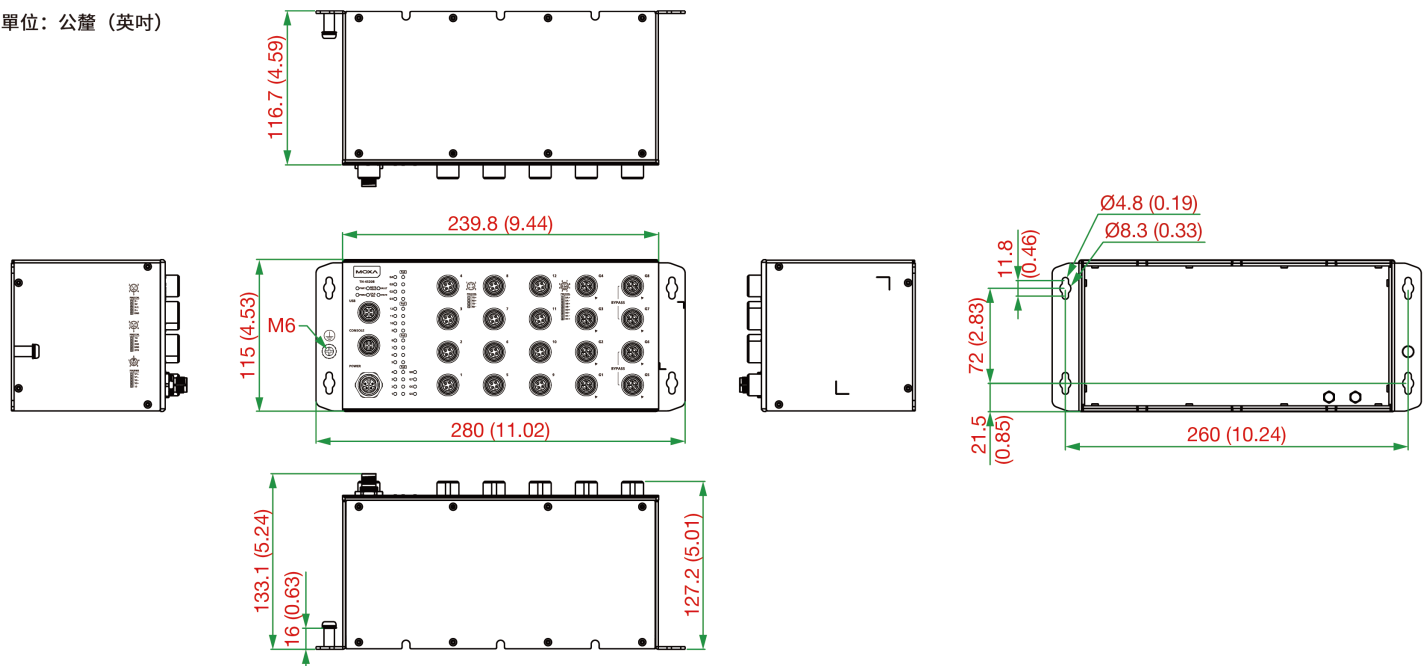
**TN-4516B PoE 型號**

單位：公釐（英吋）



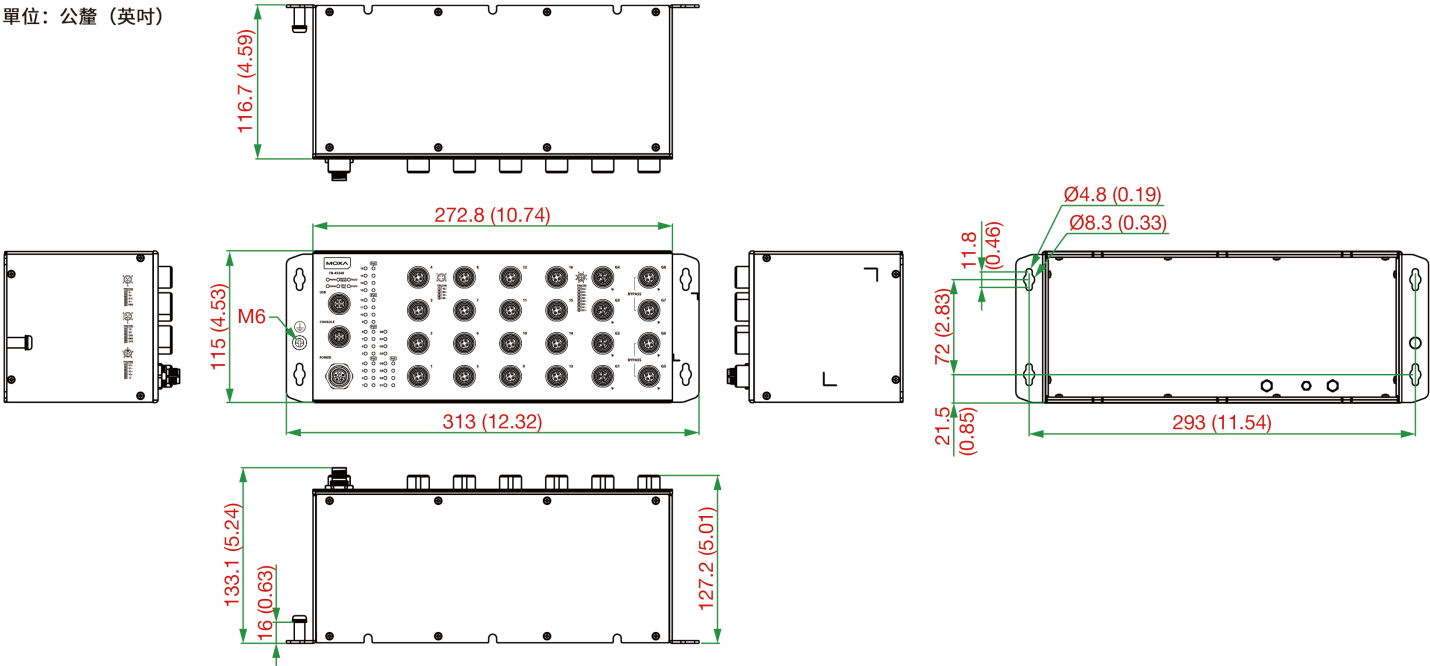
**TN-4520B 型號**

單位：公釐（英吋）



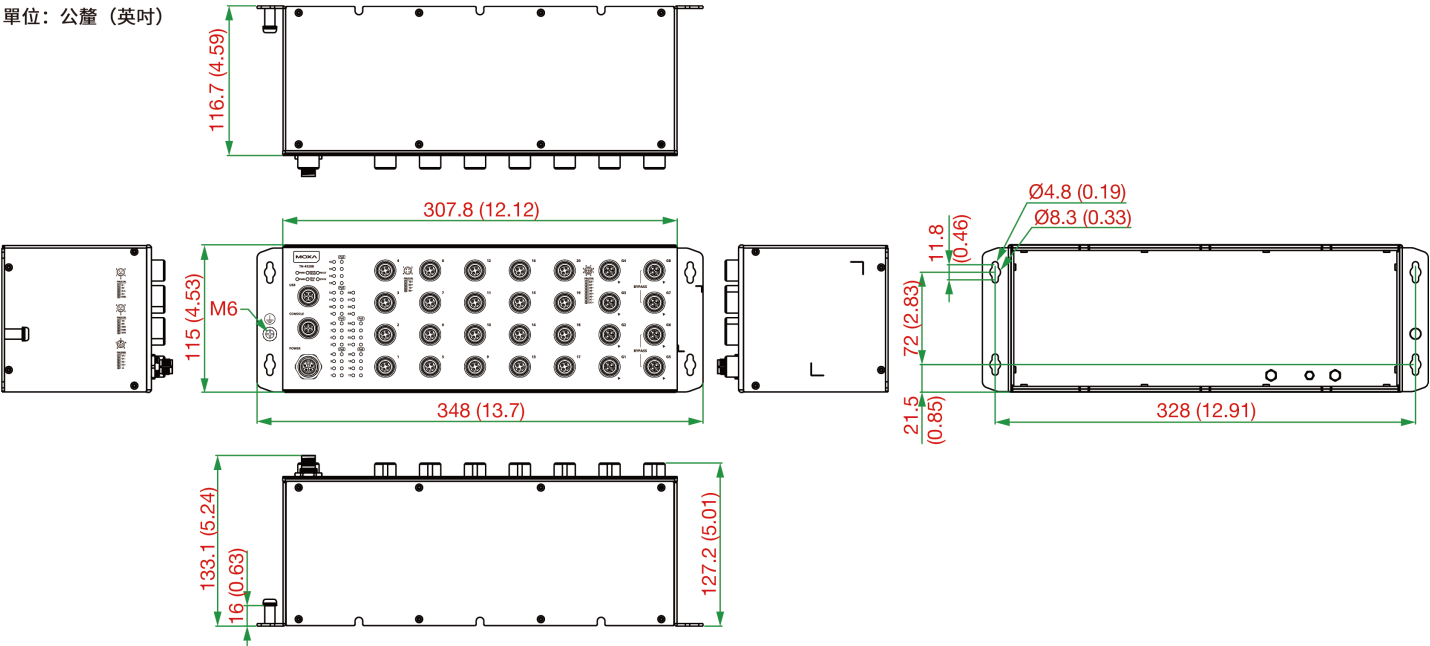
TN-4524B 型號

單位：公釐（英吋）



TN-4528B 型號

單位：公釐（英吋）



訂購資訊

| Model Name          | 10/100/1000BaseT(X) Ports, M12 X-coded 8-pin Female Connector | 10/100/1000BaseT(X) PoE 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 | 10/100BaseT(X) PoE PoE Ports, M12 D-coded 4-pin Female Connector | PoE Power Budget |
|---------------------|---------------------------------------------------------------|-------------------------------------------------------------------|---------------------------------------------------------------------------------|----------------------------------------------------------|------------------------------------------------------------------|------------------|
| TN-4508B-CT-T       | -                                                             | -                                                                 | -                                                                               | 8                                                        | -                                                                | -                |
| TN-4512B-CT-T       | -                                                             | -                                                                 | -                                                                               | 12                                                       | -                                                                | -                |
| TN-4512B-8P-4G-CT-T | 4                                                             | -                                                                 | -                                                                               | -                                                        | 8                                                                | 80 W             |
| TN-4516B-CT-T       | -                                                             | -                                                                 | -                                                                               | 16                                                       | -                                                                | -                |
| TN-4516B-8G-CT-T    | 8                                                             | -                                                                 | -                                                                               | 8                                                        | -                                                                | -                |

| Model Name                 | 10/100/<br>1000BaseT(X)<br>Ports, M12 X-<br>coded 8-pin<br>Female Connector | 10/100/<br>1000BaseT(X) PoE<br>Ports, M12 X-<br>coded 8-pin<br>Female Connector | 10/100/<br>1000BaseT(X)<br>Ports, M12 X-<br>coded 8-pin<br>Female Connector<br>With Bypass Relay | 10/100BaseT(X)<br>Ports, M12 D-<br>coded 4-pin<br>Female Connector | 10/100BaseT(X)<br>PoE PoE Ports,<br>M12 D-coded 4-<br>pin Female<br>Connector | PoE Power Budget |
|----------------------------|-----------------------------------------------------------------------------|---------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|-------------------------------------------------------------------------------|------------------|
| TN-4516B-8P-4G-4GP-CT-T    | 4                                                                           | 4                                                                               | –                                                                                                | –                                                                  | 8                                                                             | 150 W            |
| TN-4516B-8P-4GP-4GBP-CT-T  | –                                                                           | 4                                                                               | 4                                                                                                | –                                                                  | 8                                                                             | 150 W            |
| TN-4520B-12P-4G-4GP-CT-T   | 4                                                                           | 4                                                                               | –                                                                                                | –                                                                  | 12                                                                            | 150 W            |
| TN-4520B-12P-4GP-4GBP-CT-T | –                                                                           | 4                                                                               | 4                                                                                                | –                                                                  | 12                                                                            | 150 W            |
| TN-4524B-16P-4G-4GP-CT-T   | 4                                                                           | 4                                                                               | –                                                                                                | –                                                                  | 16                                                                            | 150 W            |
| TN-4524B-16P-4GP-4GBP-CT-T | –                                                                           | 4                                                                               | 4                                                                                                | –                                                                  | 16                                                                            | 150 W            |
| TN-4528B-20P-4G-4GP-CT-T   | 4                                                                           | 4                                                                               | –                                                                                                | –                                                                  | 20                                                                            | 150 W            |
| TN-4528B-20P-4GP-4GBP-CT-T | –                                                                           | 4                                                                               | 4                                                                                                | –                                                                  | 20                                                                            | 150 W            |

## 配件（選購）

### M12 Connector Caps

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

### Connectors

|                    |                                                             |
|--------------------|-------------------------------------------------------------|
| M12X-8PMM-IP67-HTG | Crimp type M12 connector, male 8-pin, X-coded, IP67-rated   |
| M12K-5PFF-IP65-PxC | Crimp type M12 connector, female 5-pin, K-coded, IP65-rated |
| 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  |

### Cables

|                              |                                                                              |
|------------------------------|------------------------------------------------------------------------------|
| 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             |
| CBL-M12XMM8P-Y-100-IP67      | X-coded male M12-to-8-pin open wire cable, yellow, IP67-rated, 1 m           |
| CBL-M12BMM5PF9-BK-150-IP68   | B-coded male M12-to-5-pin DB9 console cable, black, IP68-rated, 1.5 m        |
| CBL-M12KFF5POPEN-O-150-IP67  | K-coded female M12-to-5-pin open wire power cable, orange, IP67-rated, 1.5 m |
| CBL-M12D(MM4P)/RJ45-100 IP67 | D-coded male M12-to-RJ45 Ethernet cable, black, IP67-rated, 1 m              |

### Storage Kits

|                       |                                                                                                                                                                                                                       |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ABC-02-P-USB-M12-CT-T | USB-based 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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