

# TN-4500A Series

EN 50155 12+4G/24+4G-port Gigabit Ethernet switches with up to 20 PoE ports



## Features and Benefits

- 2 to 4 Gigabit ports with bypass relay function on the bypass models
- 2 Gigabit fiber ports with embedded multi-mode Q-ODC® interface on fiber models
- Up to 4 Gigabit ports with PoE function
- Up to 20 IEEE 802.3at/af compliant combo PoE and Ethernet ports
- Supports regular and push-pull M12 connectors
- Turbo Ring and Turbo Chain (recovery time < 20 ms @ 250 switches)<sup>1</sup>, and STP/RSTP/MSTP for network redundancy
- Complies with all EN 50155 mandatory test items<sup>2</sup>
- Isolated power with 24 to 110 VDC power supply range
- -40 to 70°C system operating temperature range

## Certifications



EN 50155



EN 50121-4



## Introduction

The ToughNet TN-4500A Series M12 managed Ethernet switches are designed for railway applications, including rolling stock and wayside installations. The switches use M12 and other circular connectors to ensure tight, robust connections, and guarantee reliable operation in industrial environments where vibration and shock are commonplace. The TN-4500A Series Ethernet switches provide 12 or 24 fast Ethernet M12 ports with or without IEEE 802.3at/af compliant PoE functionality, and the Gigabit models have 4 Gigabit Ethernet interfaces with PoE and optional bypass relay functionality. In addition, the fiber models provide 2 Gigabit fiber interface ports with an embedded 2 km multimode fiber transceiver. The PoE switches are classified as power source equipment (PSE).

The switches provide up to 30 watts of power per port, and can be used to power IEEE 802.3at/af compliant powered devices (PDs), such as IP cameras, wireless access points, and IP phones. The 24 to 110 VDC wide power input range and isolated dual power inputs not only allow you to use the same type of power source at different sites around the globe, but also increase the reliability of your communications system. Furthermore, the -40 to 70°C operating temperature range of the switches ensures they can withstand deployment in harsh environments. TN-4500A Series Ethernet switches are compliant with the mandatory sections of EN 50155, covering operating temperature, power input voltage, surge, ESD, and vibration, as well as conformal coating and power insulation, making the switches suitable for a variety of industrial applications.

## Additional Features and Benefits

- Provides up to 30 watts per PoE port with a total power budget of 120 watts per switch
- DHCP Option 82 for IP address assignment with different policies
- IGMP snooping and GMRP for filtering multicast traffic
- Port-based VLAN, IEEE 802.1Q VLAN, and GVRP to ease network planning
- QoS (IEEE 802.1p/1Q and ToS/DiffServ) allows real-time traffic classification and prioritization
- IEEE 802.3ad, LACP for optimum bandwidth utilization
- SNMPv1/v2c/v3 for different levels of network management
- TACACS+, SNMPv3, IEEE 802.1X, HTTPS, and SSH to enhance network security
- RMON for proactive and efficient network monitoring
- Bandwidth management to prevent unpredictable network status
- Lock port allows access by only authorized MAC addresses
- Port mirroring for online debugging
- Automatic warning by exception through email and relay output
- Line-swap fast recovery
- LLDP for automatic topology discovery in network management software
- Configurable by web browser, Telnet/serial console, CLI, and Windows utility
- Loop protection to prevent network loops
- Wall mounting installation capability

1. If the port link speed is 1 Gigabit or higher, the recovery time is < 50 ms.

2. This product is suitable for rolling stock railway applications, as defined by the EN 50155 standard. For a more detailed statement, click here: [www.moxa.com/doc/specs/EN\\_50155\\_Combpliance.pdf](http://www.moxa.com/doc/specs/EN_50155_Combpliance.pdf)

## Specifications

### 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
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### 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	802.1Q VLAN GMRP GVRP IGMP Snooping v1/v2/v3 IGMP Querier Port-based VLAN Static Multicast
Management	Back Pressure Flow Control Flow control DHCP Client (options 1/3/50/51/53/54/55/57/66/67) DHCP Server (options 1/3/12/15/42/50/55) DHCP option 82 (relay agent) Port-based DHCP Server HTTP IPv4/IPv6 LLDP Port Mirror QoS/CoS/ToS RARP

	RMON SMTP SNMP Inform SNMP Trap SNMPv1/v2c/v3 Syslog Telnet Account Management DNS Server Loop Protection
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	LACP Static Port Trunk MSTP RSTP STP Turbo Chain Turbo Ring v2 Turbo Ring with DRC
Security	Access control list Trust access control Broadcast storm protection TACACS+ RADIUS HTTPS/SSL SSH Rate Limit
Time Management	NTP Server/Client SNTP Server/Client

### Switch Properties

IGMP Groups	256
Max. No. of VLANs	64
VLAN ID Range	VID 1 to 4094
Jumbo Frame Size	9.712 KB

### 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 M12 K-coded connector (optional)
Operating Voltage	16.8 to 137.5 VDC
Overload Current Protection	Supported
Reverse Polarity Protection	Supported
Total PoE Power Budget	TN-4500A PoE Models: 120 W

#### Physical Characteristics

Dimensions	TN-4516A Models: 229.6 x 132 x 122.3 mm (9.04 x 5.20 x 4.81 in) TN-4524A/4528A Models: 347.8 x 132 x 122.3 mm (13.70 x 5.20 x 4.81 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

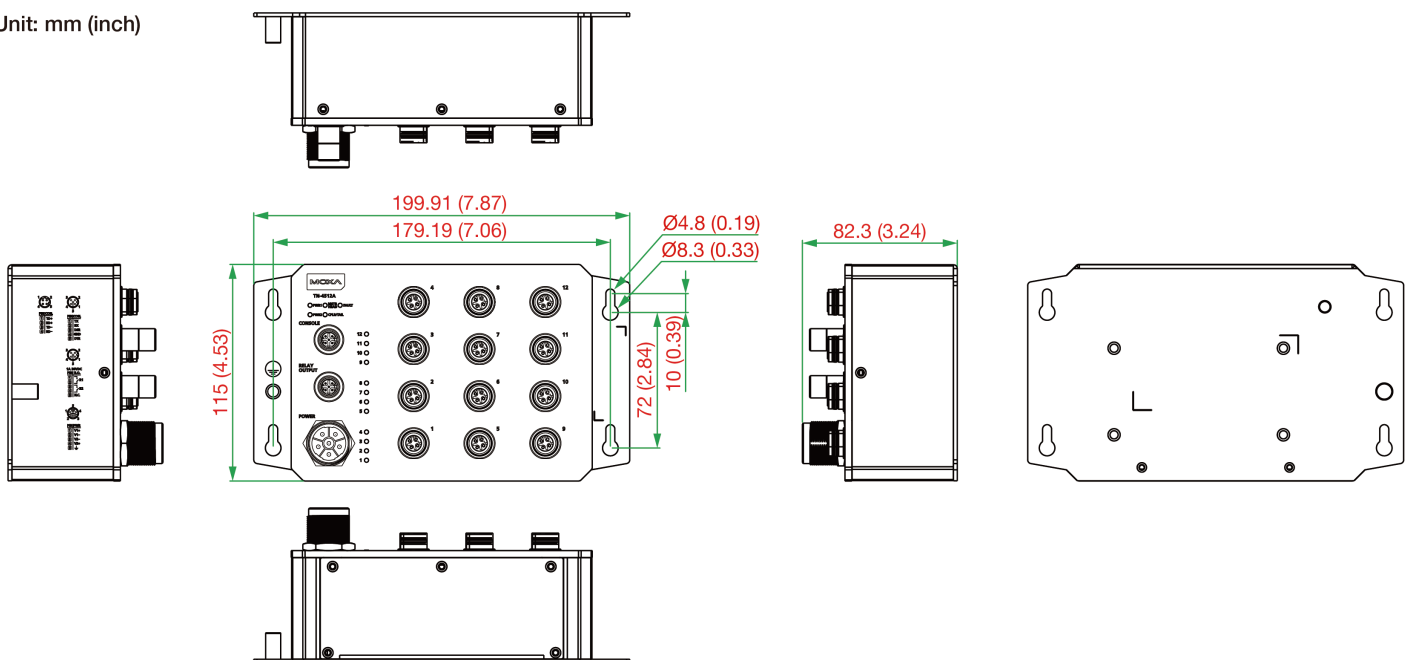
EMC	EN 55032/35
EMS	IEC 61000-4-2 ESD: Contact: 6 kV; Air: 8 kV IEC 61000-4-3 RS: 80 MHz to 1 GHz: 20 V/m IEC 61000-4-4 EFT: Power: 2 kV; Signal: 2 kV IEC 61000-4-5 Surge: Power: 2 kV; Signal: 2 kV IEC 61000-4-6 CS: 10 V IEC 61000-4-8 PFMF
Freefall	IEC 60068-2-31
Radio Frequency	FCC
Railway	EN 50121-4 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
<b>Declaration</b>	
Green Product	RoHS, CRoHS, WEEE
<b>MTBF</b>	
Time	TN-4516A-4GTX Models: 701,644 hrs TN-4516A-4GTXBP Models: 676,157 hrs TN-4516A-12PoE-4GPoE Models: 459,971 hrs TN-4516A-12PoE-2GPoE-2GTXBP Models: 427,322 hrs TN-4516A-12PoE-2GPoE-2GODC Models: 421,432 hrs TN-4524A-16PoE Models: 429,402 hrs TN-4528A-16PoE-4GPoE Models: 393,894 hrs TN-4528A-16PoE-2GPoE-2GTXBP Models: 392,746 hrs TN-4528A-16PoE-2GPoE-2GODC Models: 387,767 hrs
Standards	Telcordia SR332
<b>Warranty</b>	
Warranty Period	5 years
Details	See <a href="http://www.moxa.com/warranty">www.moxa.com/warranty</a>
<b>Package Contents</b>	
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

## Dimensions

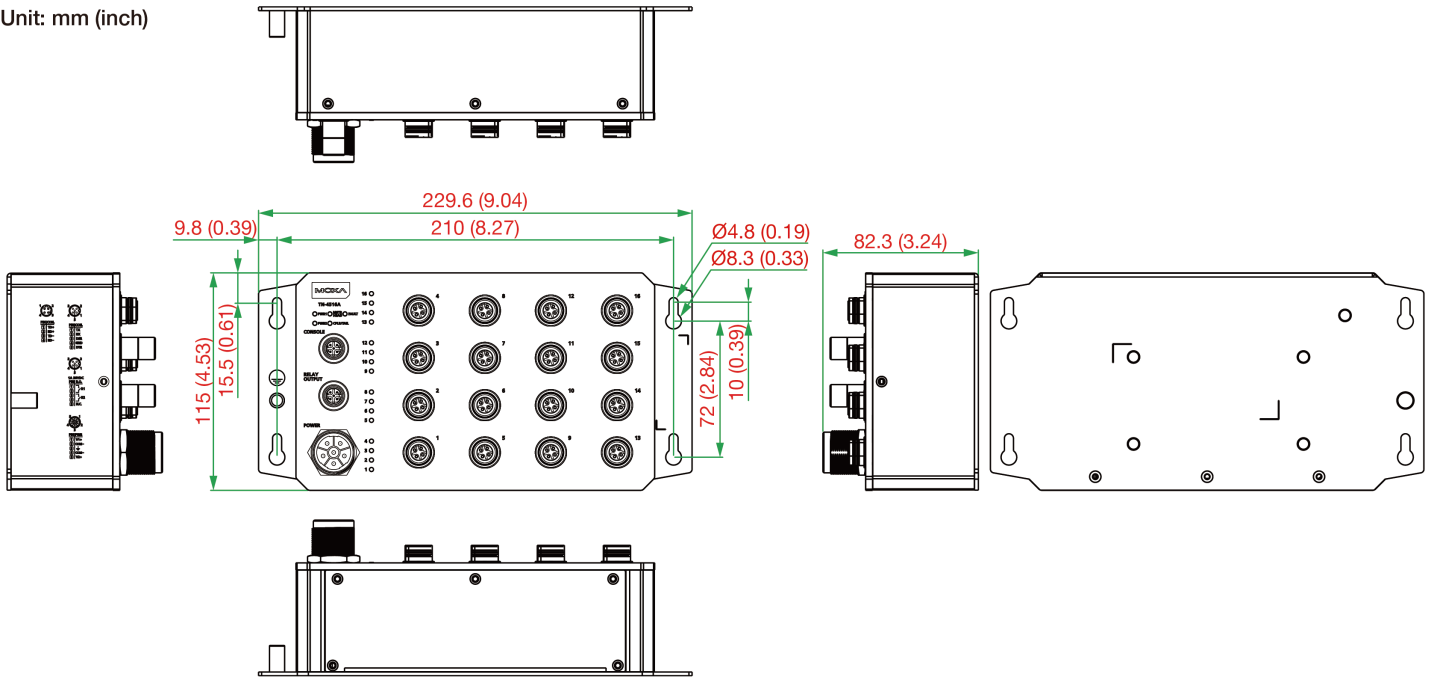
### TN-4512A Models

Unit: mm (inch)



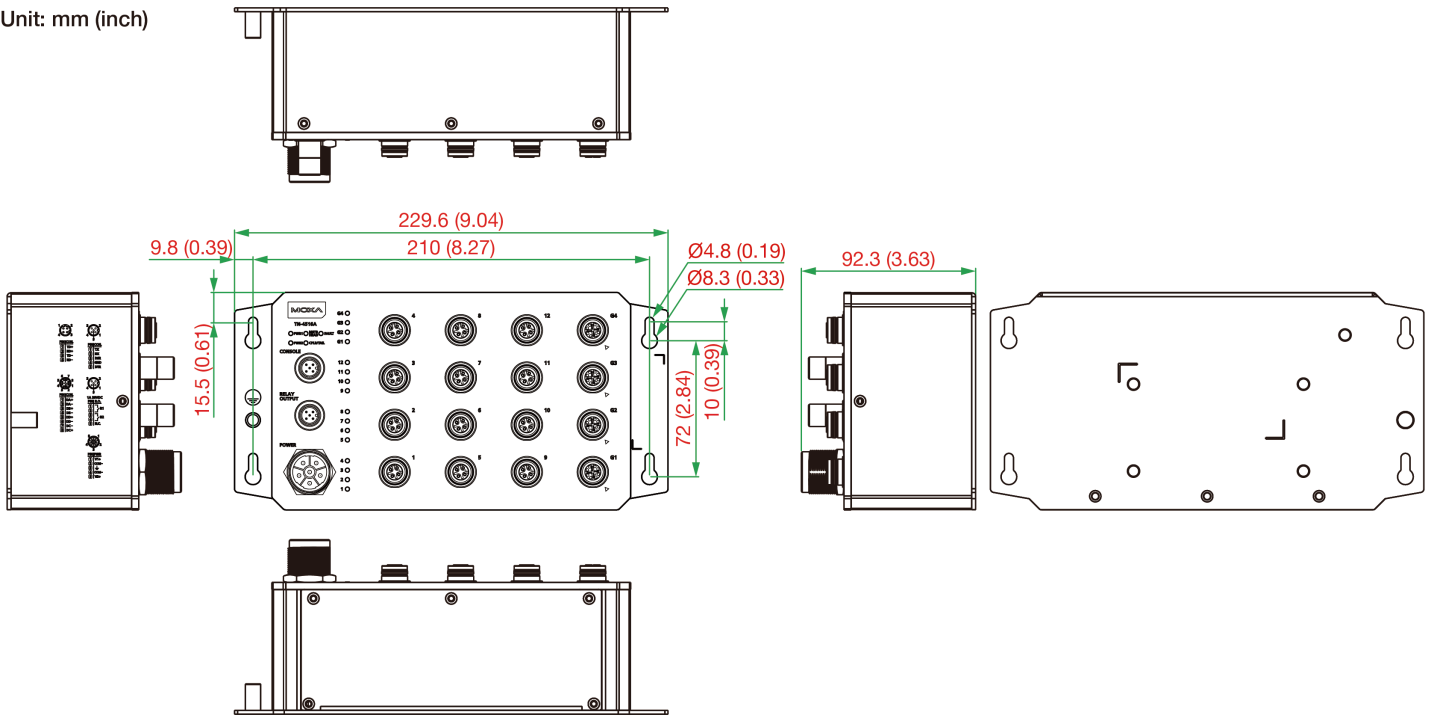
## TN-4516A Non-PoE Models

Unit: mm (inch)



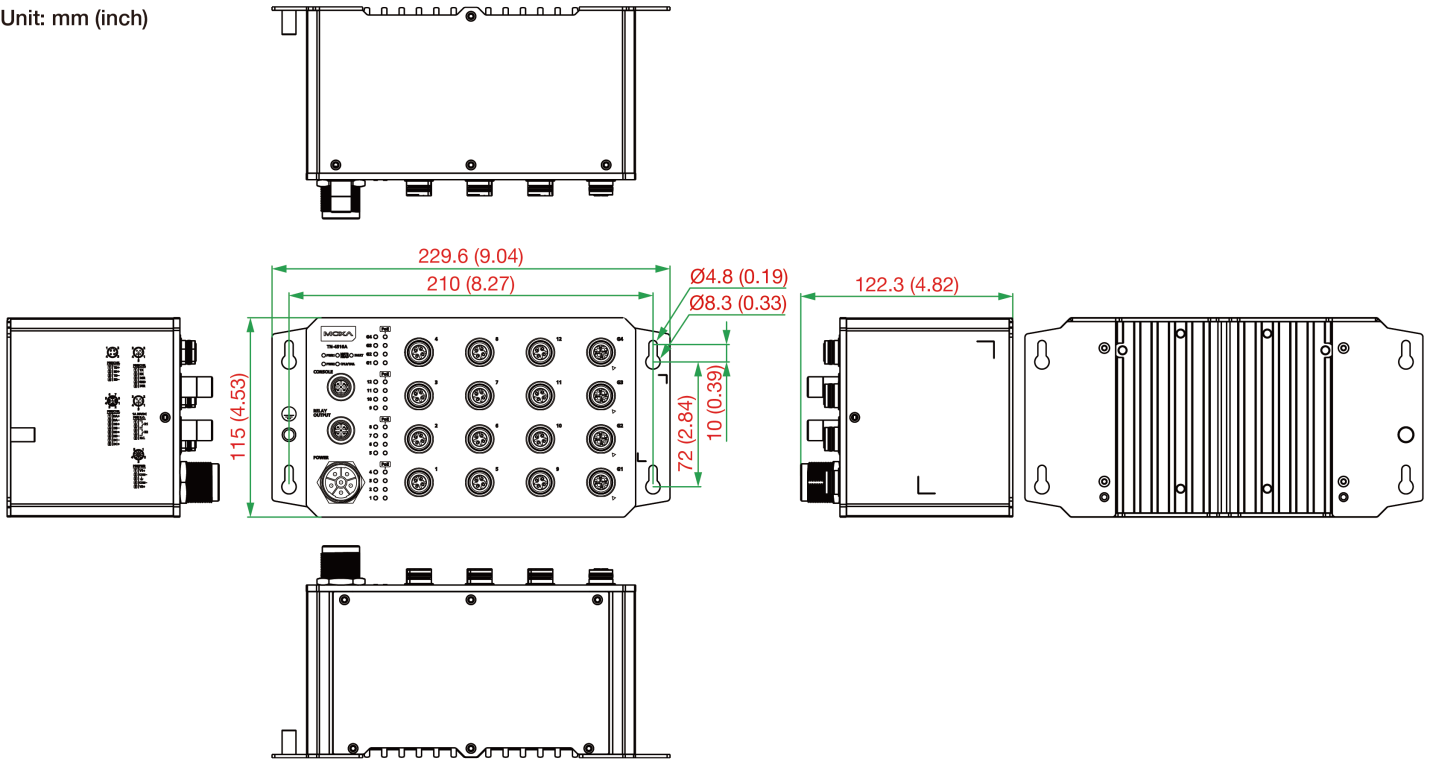
## TN-4516A Non-PoE 4GTX/4GTXBP Models

Unit: mm (inch)



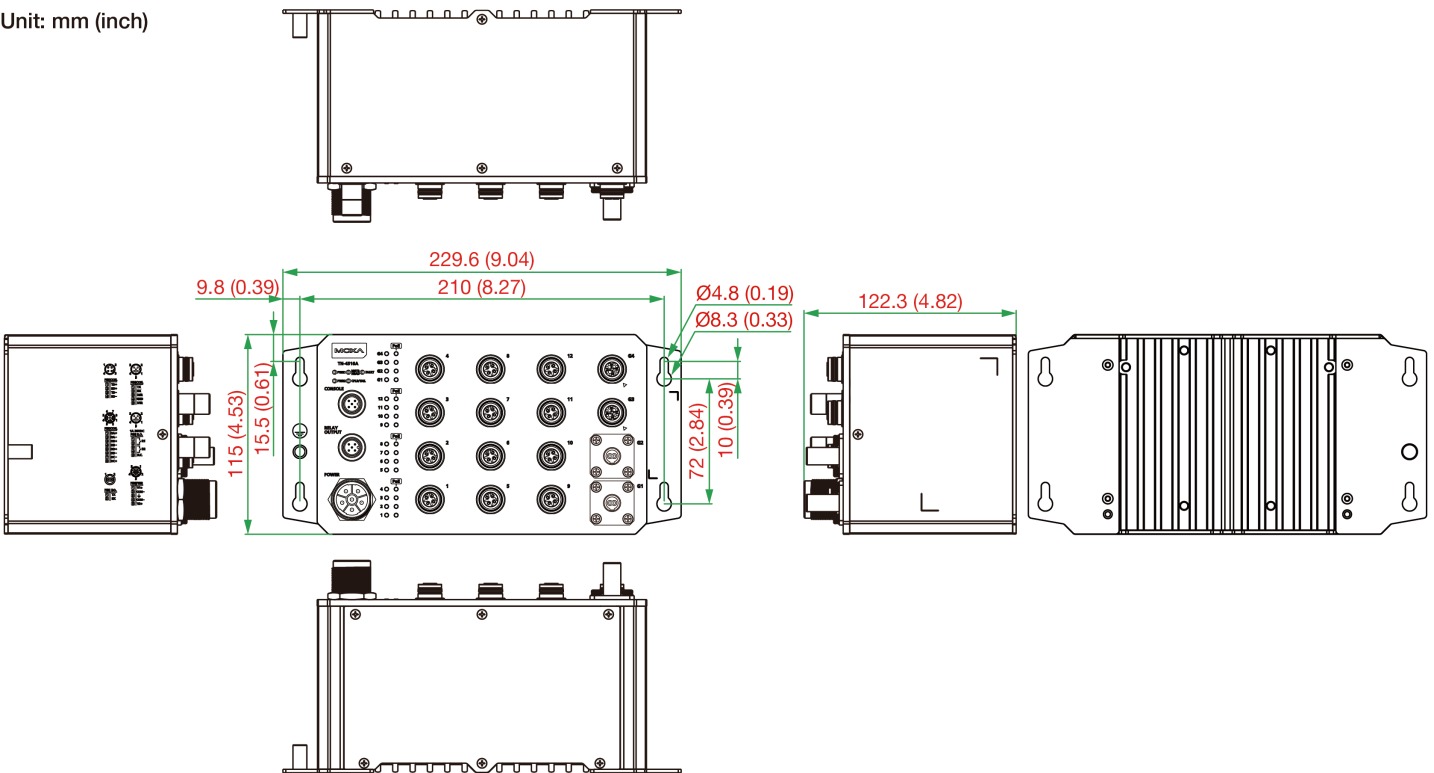
## TN-4516A PoE Models

Unit: mm (inch)



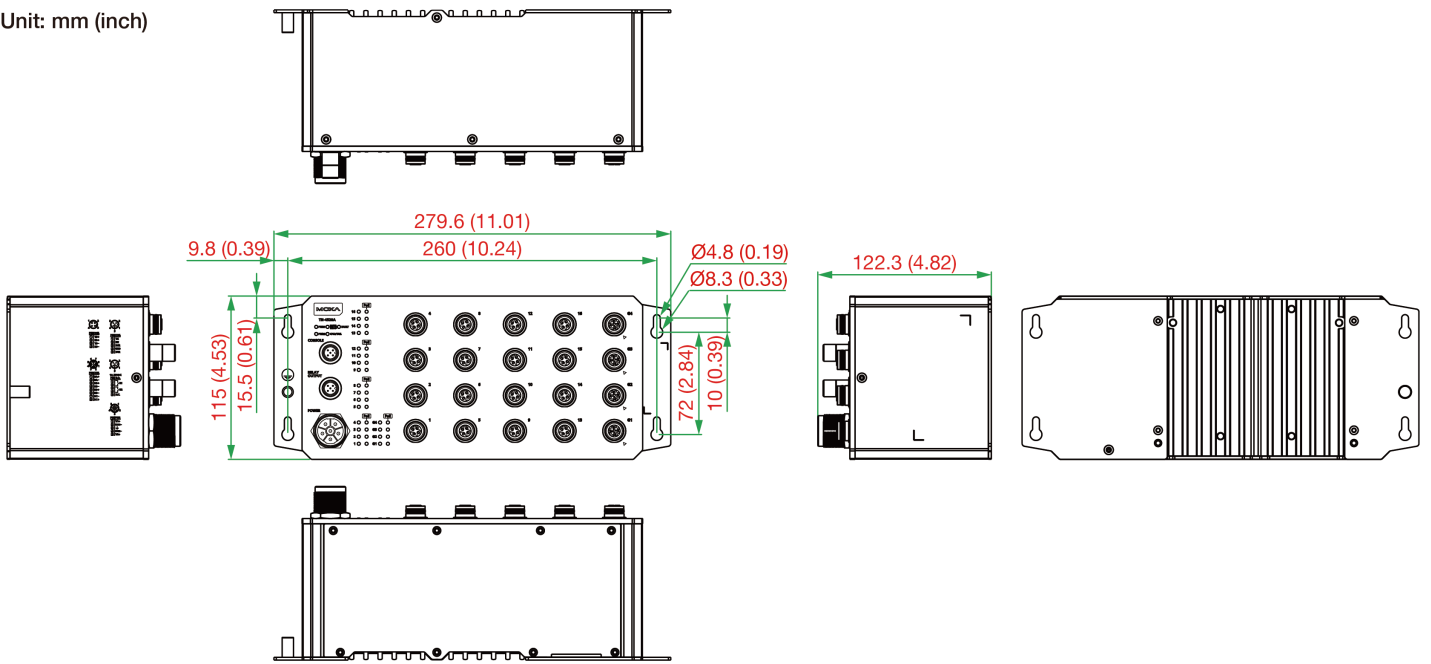
## TN-4516A PoE Fiber (ODC) Models

Unit: mm (inch)



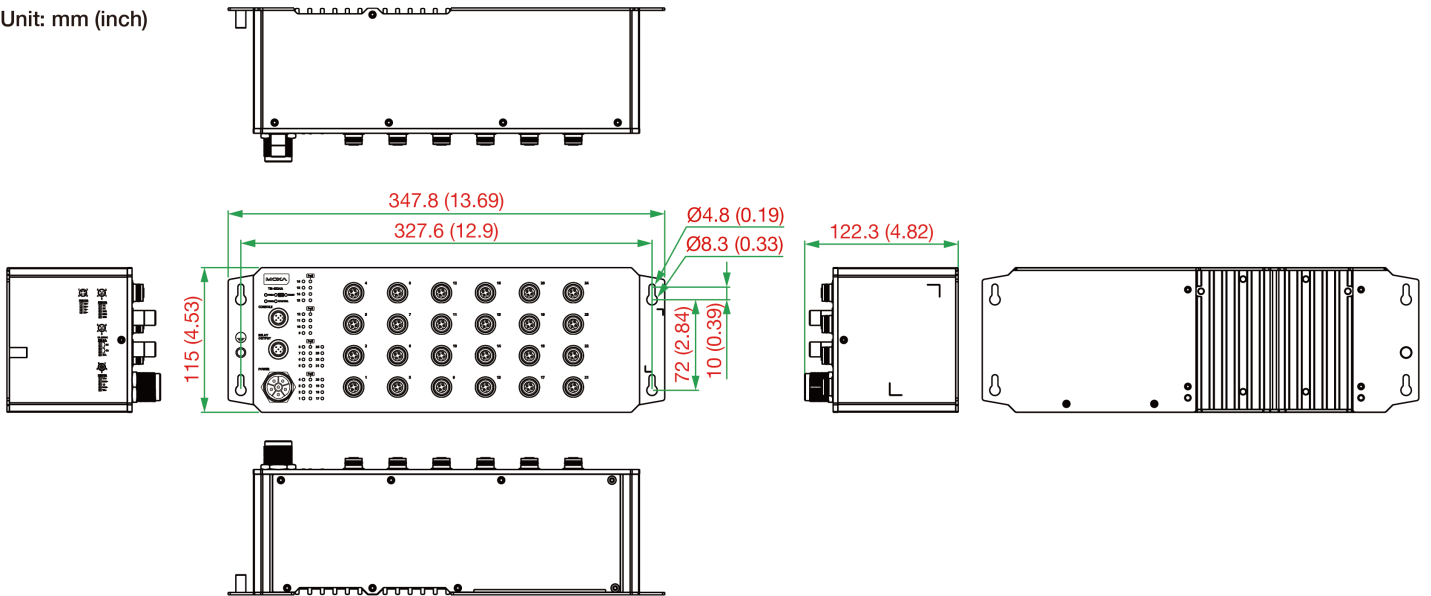
## TN-4520A Models

Unit: mm (inch)



## TN-4524A Models

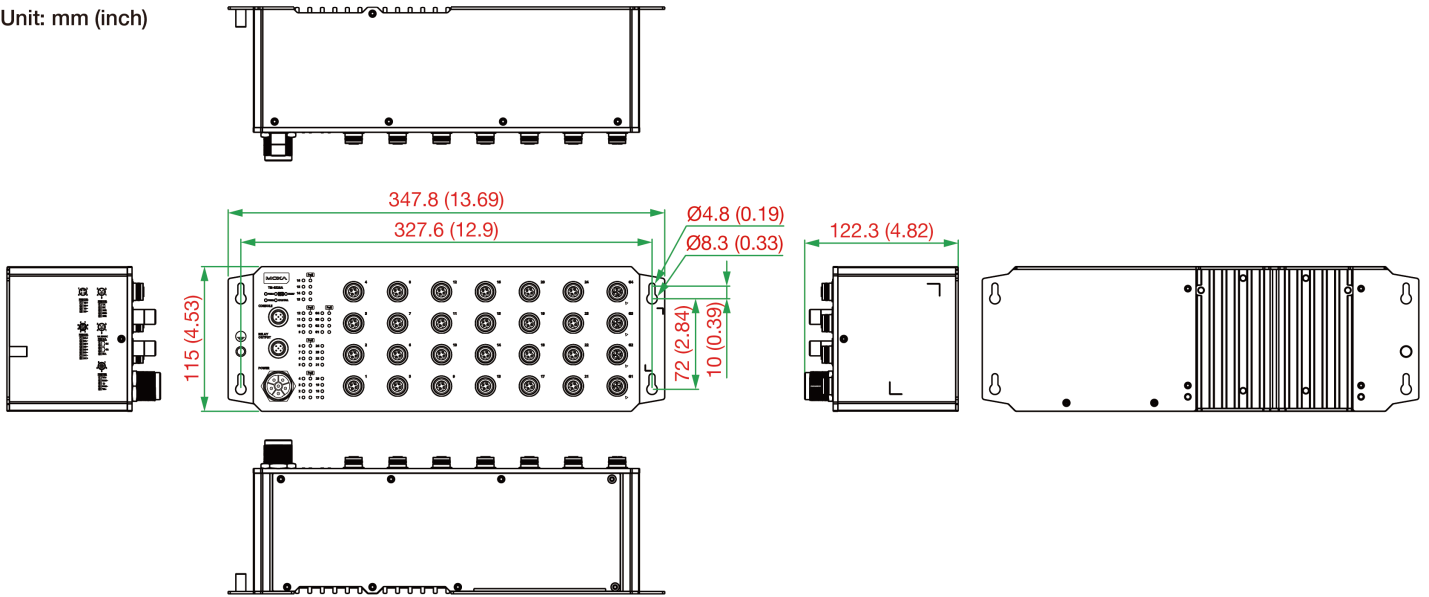
Unit: mm (inch)





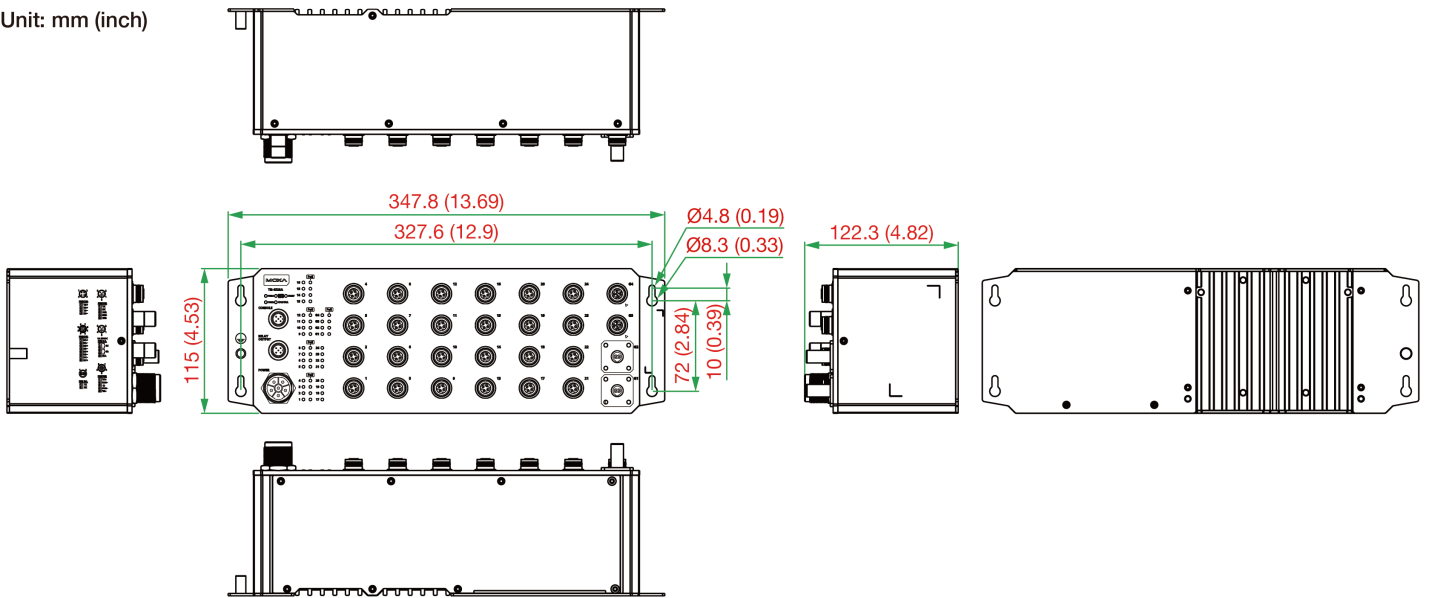
## TN-4528A Models

Unit: mm (inch)



## TN-4528A Fiber (ODC) Models

Unit: mm (inch)



## Ordering Information

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	-	-	✓

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-4516A-4GTXPB-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-2GTXPB-WV-T	-	-	2	-	12	2	-
TN-4516A-12PoE-2GPoE-2GTXPB-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	-
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-2GTXPB-WV-T	-	-	2	8	16	2	-
TN-4528A-16PoE-2GPoE-2GTXPB-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	✓

## Accessories (sold separately)

### Storage Kits

ABC-01-M12	Configuration backup and restoration tool with M12 connector for managed Ethernet switches and wireless APs/Bridges/Clients, 0 to 60°C operating temperature
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### Cables

CBL-M12D(MM4P)/RJ45-100 IP67	M12-to-RJ45 cable, IP67-rated, 1 m
CBL-M23(FF6P)/OPEN-BK-100 IP67	M23 to 6-pin power cable, IP67-rated female 6-pin M23 connector, IP67, 1 m
CBL-M12DMM4PM12DMM4P-BK-100-IP67	M12-to-M12 Cat-5E STP Ethernet cable, 4-pin D-coded M12 connector, IP67, 1 m
CBL-M12XMM8P-Y-100-IP67	M12-to-M12 Cat-5 UTP Ethernet cable, 8-pin male X-coded crimp type M12 connector, IP67, 1 m

CBL-M12XMM8P-Y-300-IP67	M12-to-M12 Cat-5 UTP Ethernet cable, 8-pin male X-coded crimp type M12 connector, IP67, 3 m
CBL-M12XMM8PRJ45-Y-200-IP67	M12-to-RJ45 Cat-5 UTP Ethernet cable, 8-pin male X-coded crimp type M12 connector, IP67, 2 m

### Connectors

M12D-4PMM-IP67	M12 D-coded connector, QUICKON type, 4-pin male, IP67
M12D-4P-IP68	D-coded screw-in sensor connector, male, IP68
A-PLG-WPM23-01-IP67	M23 cable connector, female 6-pin, crimp type, IP67
M12A-5P-IP68	A-coded screw-in sensor connector, female, IP68, 4.05 cm
M12X-8PMM-IP67-HTG	X-coded screw-in Gigabit Ethernet connector, 8-pin male M12 connector, IP67

### 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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