TN-4500A Series

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

Features and Benefits

- Up to 4 Gigabit ports with PoE function
- Isolated power with 24 to 110 VDC power supply range
- 2 Gigabit fiber ports with embedded multi-mode Q-ODCR interface on fiber models
- 2 Gigabit ports with bypass relay function on bypass models
- Complies with all EN 50155 mandatory test items[1]
- -40 to 75°C operating temperature range
- Turbo Ring and Turbo Chain (recovery time < 20 ms @ 250 switches), and STP/RSTP/MSTP for network redundancy
- Up to 20 IEEE 802.3at/af compliant combo PoE and Ethernet ports
- Provides up to 30 W per PoE port

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 while the Gigabit models have 4 Gigabit Ethernet interfaces with PoE and optional bypass relay functionality. 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 75°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
- IPv6 Ready logo awarded (IPv6 Logo Committee certified)
- Switches are compliant with the mandatory test items of the EN 50155 standard to ensure suitability for rolling stock applications
- DHCP Option 82 for IP address assignment with different policies
- Turbo Ring and Turbo Chain (recovery time < 20 ms @ 250 switches), and STP/RSTP/MSTP for network redundancy
- 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
- Panel mounting installation capability

1. 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_Compliance.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

Ethernet Interface

10/100/1000BaseT(X) Ports (M12 X-coded 8-pin female connector)	TN-4516A-4GTX-WV-T: 4 TN-4516A-4GTX-WV-CT-T: 4
10/100BaseT(X) Ports (M12 D-coded 4-pin female connector)	TN-4516A non-PoE 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-4524A/4528A models: 16
PoE Ports (10/100/1000BaseT(X), M12 X-coded 8-pin female connector)	PoE models: 4 PoE Fiber or Bypass models: 2
10/100/1000BaseT(X) Ports (M12 X-coded 8-pin female connector with bypass relay)	TN-4516 A-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: TN-4500A Series PoE models IEEE 802.3u for 100BaseT(X) and 100BaseFX IEEE 802.3x for flow control

Ethernet Software Features

Broadcast Forwarding	Broadcast forwarding
Configuration Options	Command Line Interface (CLI), Command Line Interface (CLI) through Serial/Telnet/SSH, Web Console (HTTP/HTTPS), Windows Utility
Filter	802.1Q, GMRP, GVRP, IGMP Snooping v1/v2/v3, IGMP Querier, Port-based VLAN, Static Multicast
Management	Back Pressure Flow Control, DHCP Client (Option 1/3/50/51/53/54/55/57/66/67/255), DHCP Server (Option 1/3/12/15/42/50/55), Flow control, 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	Broadcast storm protection, HTTPS/SSL, Local Account Accessibility, TACACS+, Port Lock, RADIUS, Rate Limit, SSH
Time Management	NTP Server/Client, SNTP

Switch Properties

IGMP Groups	256
Max. No. of VLANs	64
VLAN ID Range	VID 1 to 4094

LED Interface

LED Indicators	PWR1, PWR2, FAULT, Ethernet, PoE

Serial Interface

Console Port	M12 A-coded male connector

Power Parameters

Input Current	TN-4516A non-PoE models: Max. 0.7 A @ 24 VDC TN-4516A PoE models: Max. 7.0 A @ 24 VDC TN-4524A models: Max. 6.5 A @ 24 VDC TN-4528A models: Max. 7.2 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	PoE models: 120 W

Physical Characteristics

Housing	Metal
IP Rating	IP42
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)
Weight	TN-4516A non-PoE models: 1,965 g (4.32 lb) TN-4516A PoE models: 2,607 g (5.74 lb) TN-4516A fiber models: 2,705 g (5.96 lb) TN-4524A models: 3,063 g (6.74 lb) TN-4528A non-fiber models: 3,304 g (7.27 lb) TN-4528A fiber models: 3,375 g (7.44 lb)
Installation	Wall mounting, DIN-rail mounting (optional)
Protection	-CT models: PCB conformal coating

Environmental Limits

Operating Temperature	-40 to 75°C (-40 to 167°F)
Storage Temperature (package included)	-40 to 85°C (-40 to 185°F)
Ambient Relative Humidity	5 to 95% (non-condensing)
Altitude	2000 m

Standards and Certifications

EMC	EN 55032/24
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	IEC 60950-1, UL 61010-2-201
Shock	IEC 60068-2-27, IEC 61373, EN 50155
Vibration	IEC 60068-2-64, IEC 61373, EN 50155

Declaration

Green Product	RoHS, CRoHS, WEEE

MTBF

Standards	Telcordia SR332
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

Warranty

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

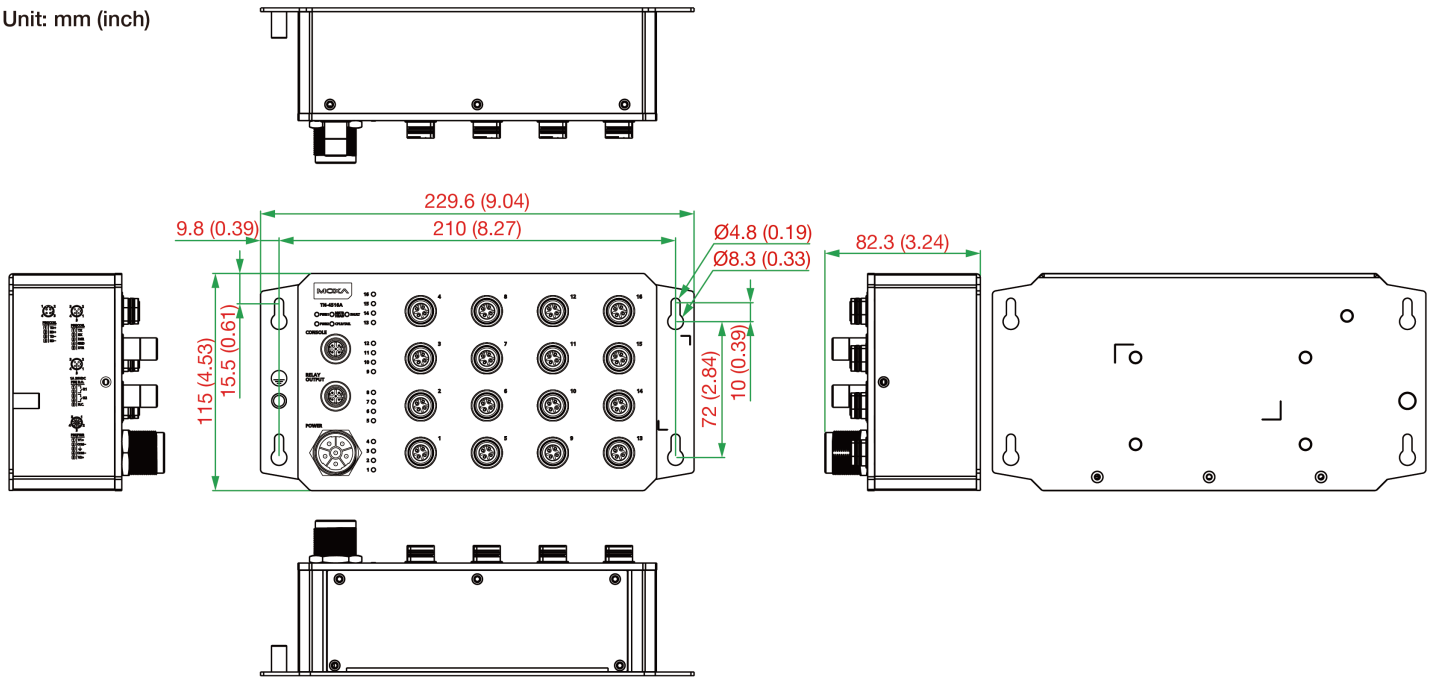
Package Contents

Device	1 x TN-4500A Series switch
Cable	1 x M12-to-DB9 console port cable
Installation Kit	2 x cap, female, metal, for M12 port 1 x wall-mounting kit
Documentation	1 x quick installation guide 1 x warranty card 1 x document and software CD

Dimensions

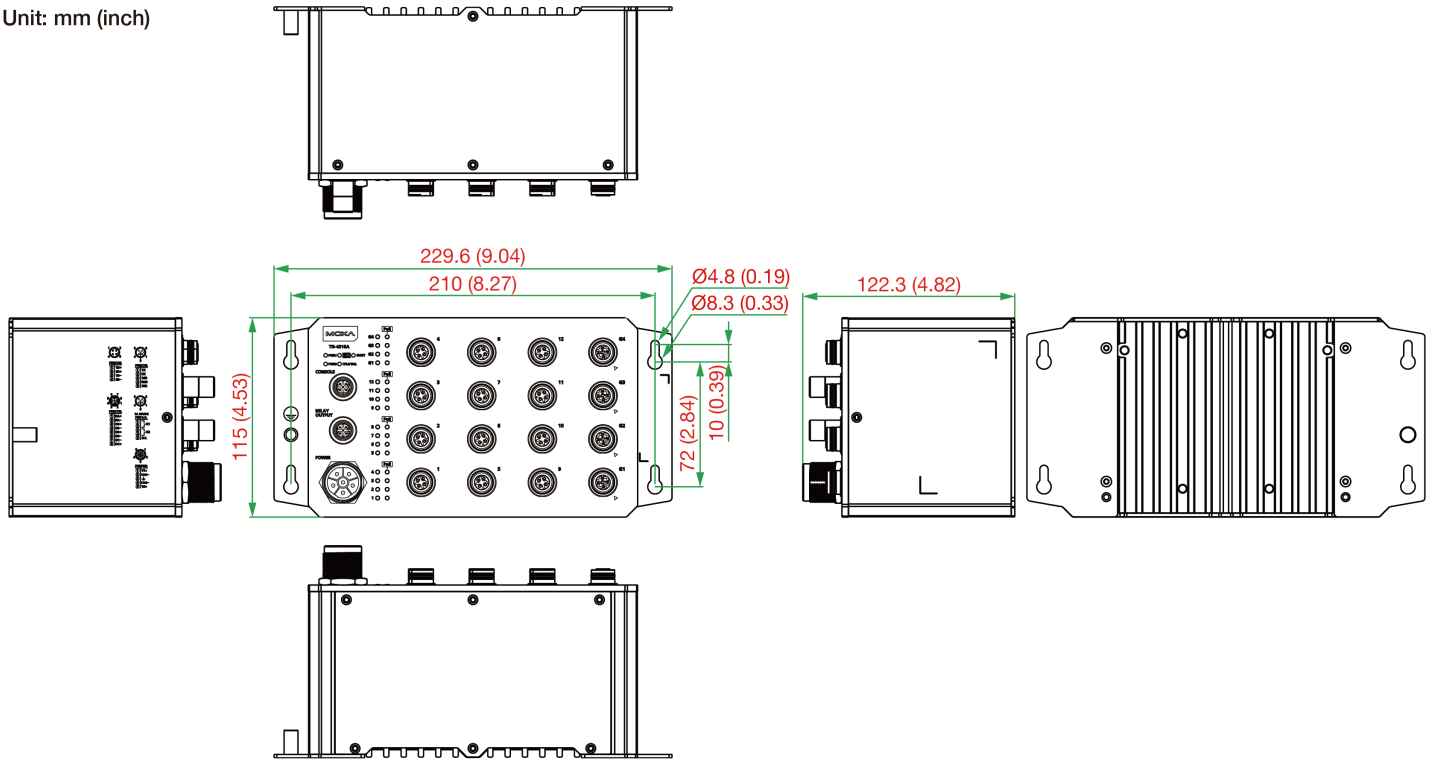
TN-4516A non-PoE Models

Unit: mm (inch)



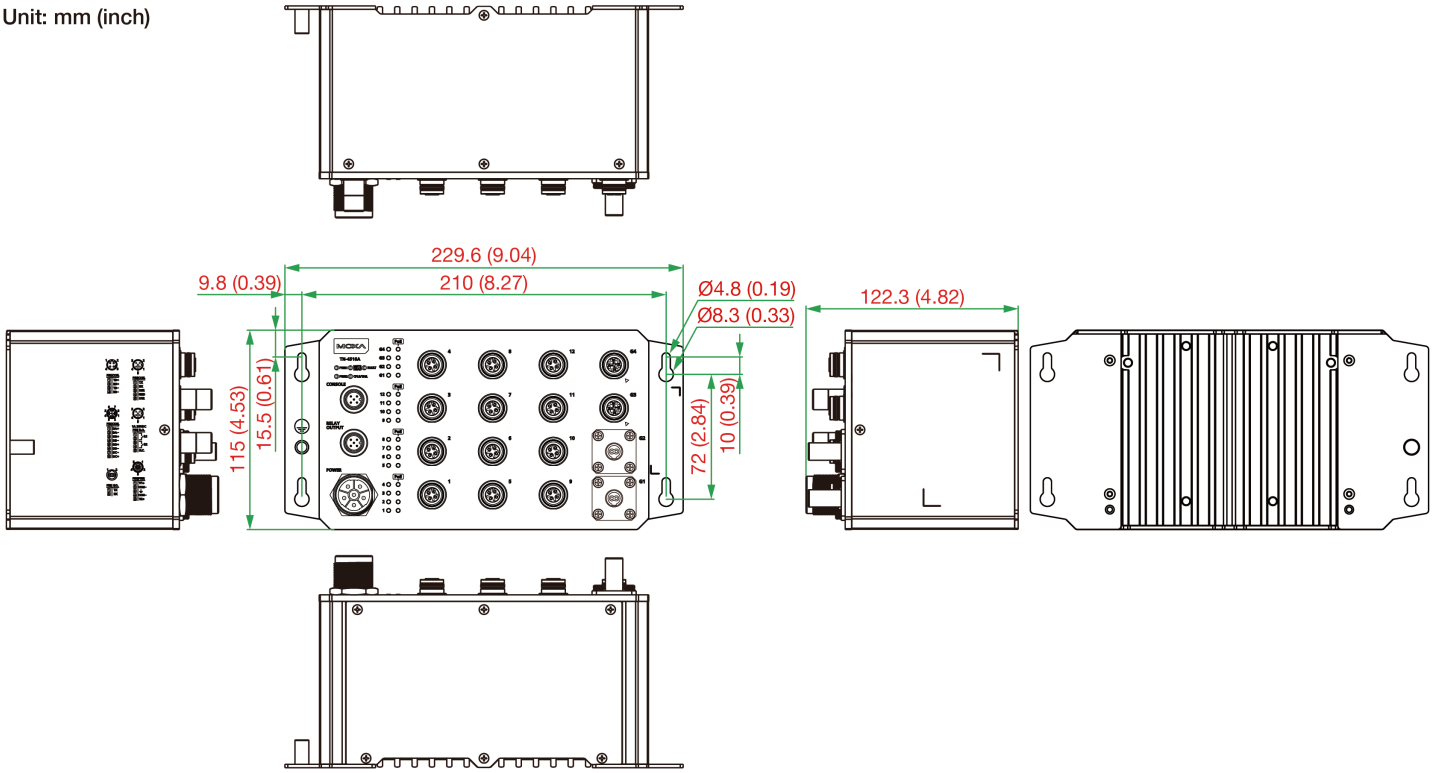
TN-4516A PoE Models

Unit: mm (inch)



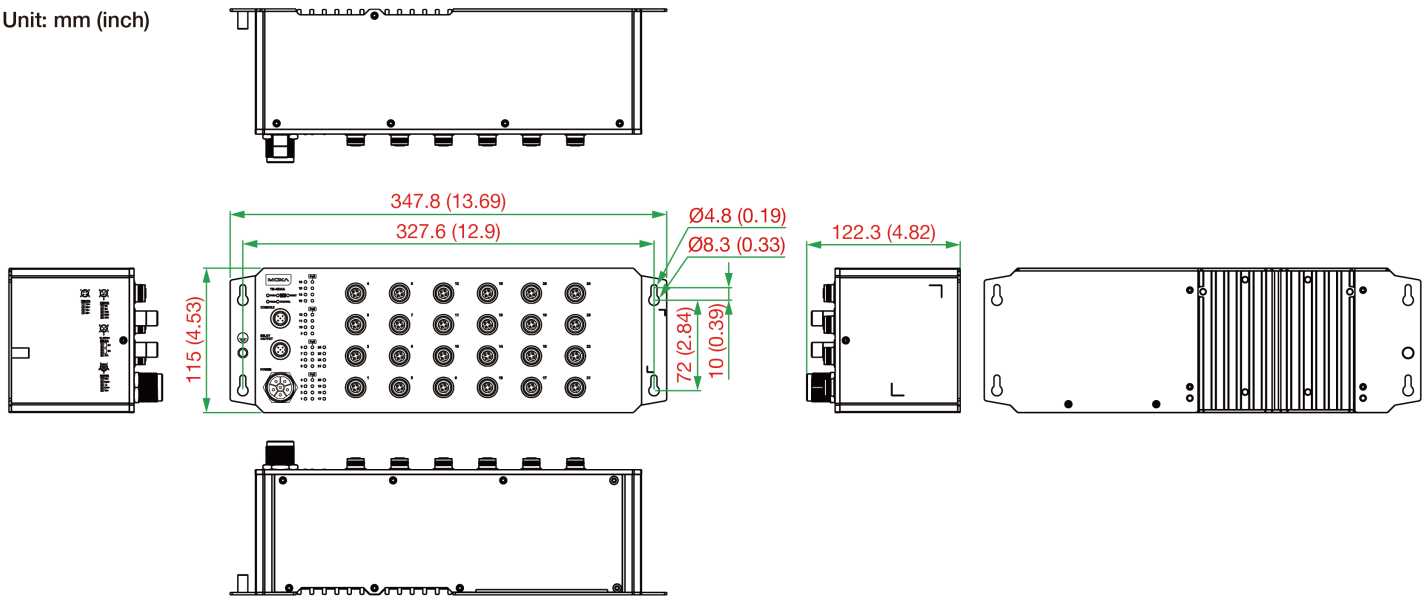
TN-4516A-12PoE-2GPoE-2ODC-WV-T Model

Unit: mm (inch)



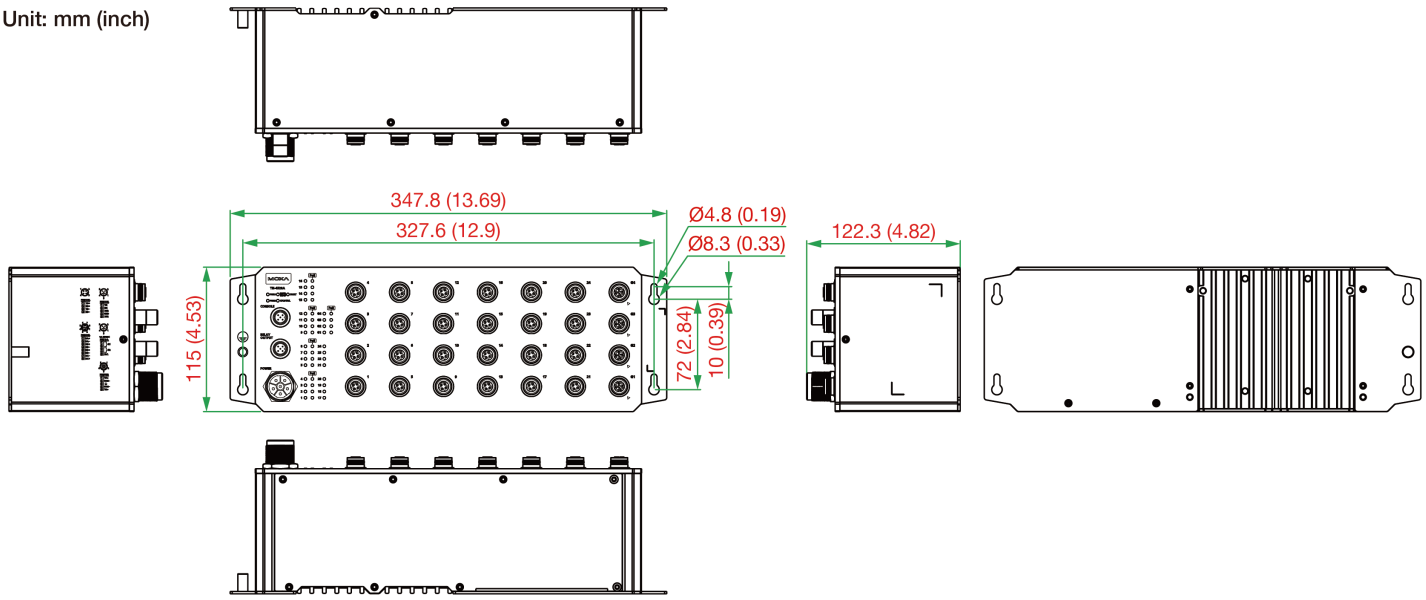
TN-4524A Models

Unit: mm (inch)



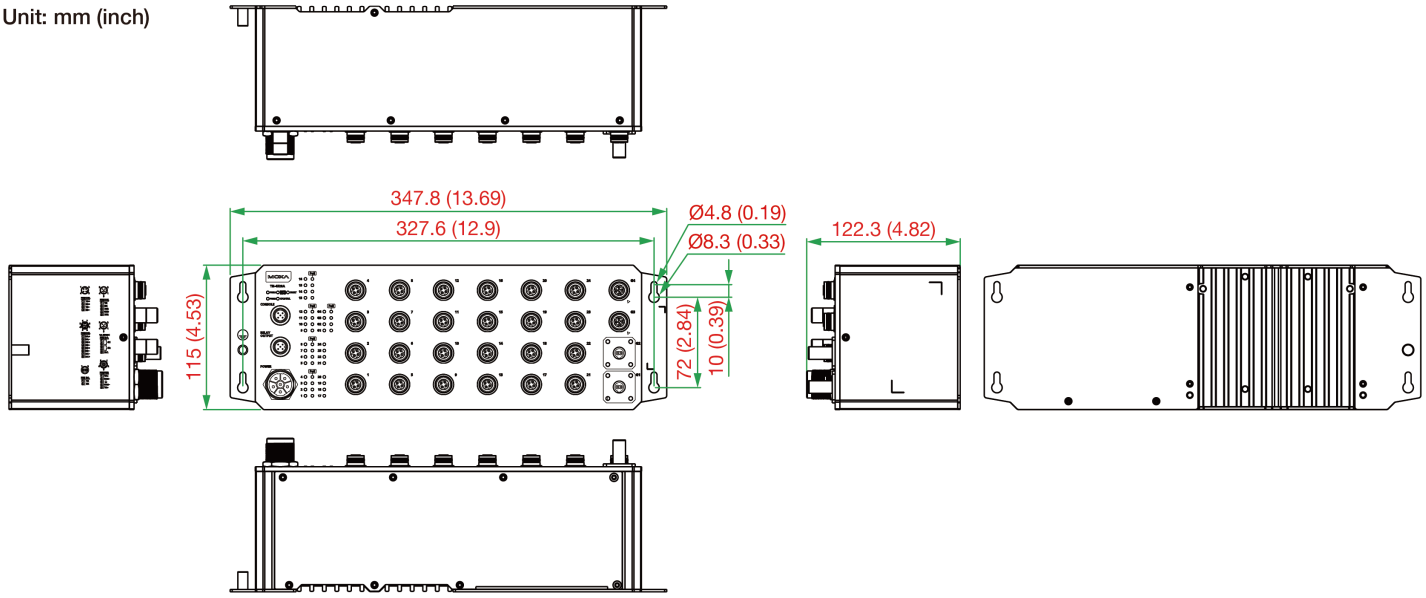
TN-4528A PoE Models

Unit: mm (inch)



TN-4528A-16PoE-2GPoE-2ODC-WV-T Model

Unit: mm (inch)



Ordering Information

Model Name	10/100/1000BaseT(X) Ports Q-ODC Fiber Connector	10/100BaseT(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	10/100BaseT(X) PoE Ports M12 D-Coded 4-pin Female Connector	10/100BaseT(X) PoE Ports M12 X-Coded 8-pin Female Connector	Conformal Coating
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-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-2GPoE-WV-CT-T	–	–	–	8	16	4	✓
TN-4528A-16PoE-2GPoE-2GTXBP-WV-T	–	–	2	8	16	2	–
TN-4528A-16PoE-4GPoE-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

Cables

CBL-M12KFF5POPEN-O-150-IP67	K-coded female M12-to-5-pin open wire M12 power cable, IP67-rated, 1.5 m
CBL-M12D(MM4P)/RJ45-100 IP67	M12-to-RJ45 cable, IP67-rated, 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
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