

# **TN-4900 Series Quick Installation Guide**

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**Moxa ToughNet Router**

**Version 1.2, January 2024**

**Technical Support Contact Information**  
**[www.moxa.com/support](http://www.moxa.com/support)**

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**P/N: 1802049080020**



## Overview

The ToughNet TN-4900 Series is designed for rolling stock Ethernet networks. These routers feature M12 interfaces to ensure tight, robust connections, and guarantee reliable operation in industrial environments where vibration and shock are commonplace. The TN-4900 Series routers are equipped with 8 Gigabit ports and up to 4 bypass relay ports. In addition, the PoE models in this Series have 4 IEEE 802.3at/af PoE Gigabit ports while the 16-port models have 8 PoE-capable Fast Ethernet ports.

These routers also feature firewall, ETBN, routing functionality, and a broad power input range of 24 to 110 VDC to facilitate different applications across networks. The -40 to 70°C wide temperature range allows the TN-4900 Series to operate in demanding environmental conditions for extended periods of time. Furthermore, these routers are compliant with the mandatory requirements of EN 50155, making them suitable for a variety of industrial applications.

## Package Checklist

Your ToughNet TN-4900 Series router is shipped with the following items. If any of these items are missing or damaged, please contact your customer service representative for assistance.

- TN-4900 Series router
- Protective metal caps (male) for the M12 console port (x 1) and USB storage port (x 1), for the M12 Ethernet ports (TN-4908 models: x 4, TN-4916 models: x 8), pre-installed on the device
- Wall-mounting kit (including 4 screws)
- Quick installation guide (printed)
- Warranty card

### **Isolated Power Inputs**

- Supports 24 to 110 VDC (continuous voltage input from 16.8 to 137.5 VDC as stated by EN 50155)

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



### **ATTENTION**

The equipment is intended to be supplied by an external power source (UL listed/IEC 60950-1/IEC 62368-1). TN-4900 Series require an output rating of 24 to 110 VDC at an ambient temperature of min. 70°C.

The minimum current rating varies depending on the TN-4900 Series model:

- 0.65 A (min.) for TN-4908 non-PoE models
- 3.6 A (min.) for TN-4908 PoE models
- 1.1 A (min.) for TN-4916 non-PoE models
- 5.9 A (min.) for TN-4916 PoE models



## ATTENTION

### Restricted Access Location

This equipment is intended to be used in restricted access locations, such as control rooms. Access should be restricted to qualified service personnel or authorized users.



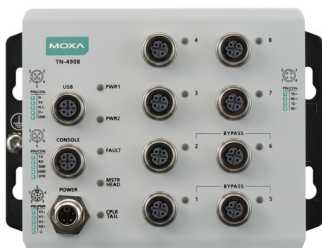
## ATTENTION (For PoE Models)

For safety reasons, it is not recommended to connect the device to a network with routing to external networks.

## Function Ports and Indicators

The TN-4900 Series features physical indicators for the Gigabit Ethernet, PoE, and bypass functions ports. The indicators are located on the front panel of the device, as shown in the graph below.

Ports are always numbered from bottom to top, left to right. Refer to the example below.



For models with mixed port types, Gigabit Ethernet ports and bypass function ports are always located in the bottom-right quadrant. Refer to the examples below.



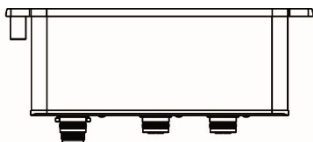
Refer to the following tables for an overview the port numbering and port types for each model.

<b>TN-4908 Models</b>	<b>Port No.</b>	<b>PoE Ports</b>	<b>Bypass Ports</b>
TN-4908-WV-CT-T	1~8	N/A	N/A
TN-4908-ETBN-4TXBP-WV-CT-T TN-4908-ETBN-F-4TXBP-WV-CT-T	1~8	N/A	1, 5 (set 1) 2, 6 (set 2)
TN-4908-4GTX-WV-CT-T	1~4, G1~G4	N/A	N/A
TN-4908-ETBN-4GTXBP-WV-CT-T TN-4908-ETBN-F-4GTXBP-WV-CT-T	1~4, G1~G4	N/A	G1, G3 (set 1) G2, G4 (set 2)
TN-4908-8GTX-WV-CT-T	G1~G8	N/A	N/A
TN-4908-ETBN-4GTX-4GTXBP-WV-CT-T TN-4908-ETBN-F-4GTX-4GTXBP-WV-CT-T	G1~G8	N/A	G1, G5 (set 1) G2, G6 (set 2)
TN-4908-4GPoE-4GTX-WV-CT-T	G1~G8	G3, G4, G7, G8	N/A
TN-4908-ETBN-4GPoE-4GTXBP-WV-CT-T TN-4908-ETBN-F-4GPoE-4GTXBP-WV-CT-T	G1~G8	G3, G4, G7, G8	G1, G5 (set 1) G2, G6 (set 2)

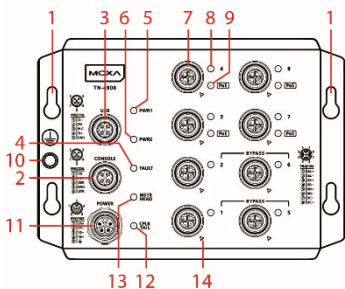
<b>TN-4916 Models</b>	<b>Port No.</b>	<b>PoE Ports</b>	<b>Bypass Ports</b>
TN-4916-8PoE-4GPoE-4GTX-WV-CT-T	1~8, G1~G8	1~8, G3, G4, G7, G8	N/A
TN-4916-ETBN-8PoE-4GPoE-4GTXBP-WV-CT-T TN-4916-ETBN-F-8PoE-4GPoE-4GTXBP-WV-CT-T	1~8, G1~G8	1~8, G3, G4, G7, G8	G1, G5 (set 1) G2, G6 (set 2)
TN-4916-4GTX-WV-CT-T	1~12, G1~G4	N/A	N/A
TN-4916-ETBN-4GTXBP-WV-CT-T TN-4916-ETBN-F-4GTXBP-WV-CT-T	1~12, G1~G4	N/A	G1, G3 (set 1) G2, G4 (set 2)
TN-4916-12PoE-4GTX-WV-CT-T	1~12, G1~G4	1~12	N/A
TN-4916-ETBN-12PoE-4GTXBP-WV-CT-T TN-4916-ETBN-F-12PoE-4GTXBP-WV-CT-T	1~12, G1~G4	1~12	G1, G3 (set 1) G2, G4 (set 2)

# Panel Layouts

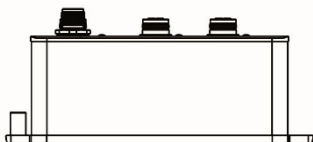
## TN-4908 Models



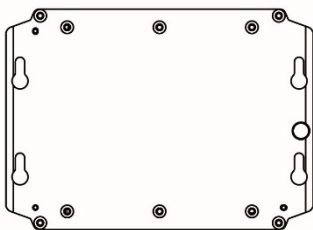
Top View



Front View



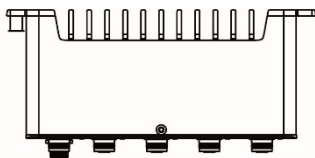
Bottom View



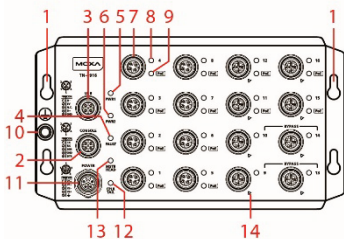
Rear View

1. Screw holes for panel mounting kit
2. Serial console port (M12 B-coded 5-pin female connector)
3. USB storage port (M12 A-coded 5-pin female connector)
4. FAULT LED
5. PWR1 LED:  
for power input 1
6. PWR2 LED:  
for power input 2
7. Ethernet port (M12 D-coded 4-pin female connectors for 10/100BaseT(X) Fast Ethernet, M12 X-coded 8-pin female connectors for 10/100/1000BaseT(X) Gigabit Ethernet)
8. Ethernet port LED
9. PoE LED  
(PoE models only)
10. Grounding screw
11. Power input port (M12 K-coded 5-pin male connector)
12. CPLR/TAIL LED: for ring coupler or chain tail
13. MSTR/HEAD LED: for ring master or chain head
14. Alignment mark for X-coded connector

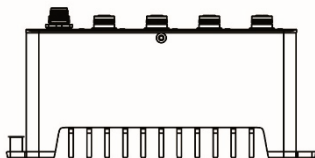
## TN-4916 Models



Top View



Front View



Bottom View



Rear View

1. Screw holes for panel mounting kit
2. Serial console port (M12 B-coded 5-pin female connector)
3. USB storage port (M12 A-coded 5-pin female connector)
4. FAULT LED
5. PWR1 LED:  
for power input 1
6. PWR2 LED:  
for power input 2
7. Ethernet port (M12 D-coded 4-pin female connectors for 10/100BaseT(X) Fast Ethernet, M12 X-coded 8-pin female connectors for 10/100/1000BaseT(X) Gigabit Ethernet)
8. Ethernet port LED
9. PoE LED (PoE models only)
10. Grounding screw
11. Power input port (M12 K-coded 5-pin male connector)
12. CPLR/TAIL LED: for ring coupler or chain tail
13. MSTR/HEAD LED: for ring master or chain head
14. Alignment mark for X-coded connector



### ATTENTION

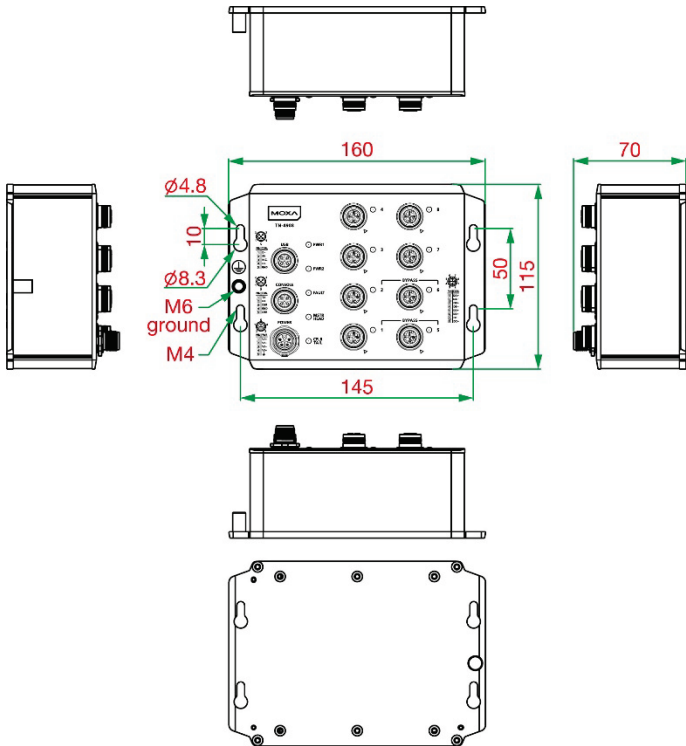
Exposed connectors when not in use must be tightly covered with protective caps (an optional accessory) to ensure IP67-rated protection.

We recommend the following connector caps:

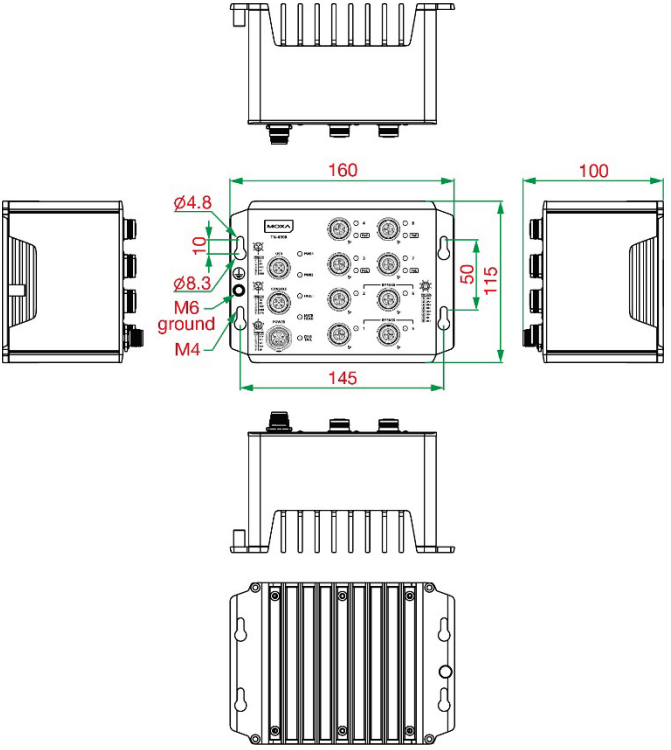
- For female connectors: A-CAP-M12F-M-PP connector caps.

# Mounting Dimensions (unit = mm)

## TN-4908 Non-PoE Models

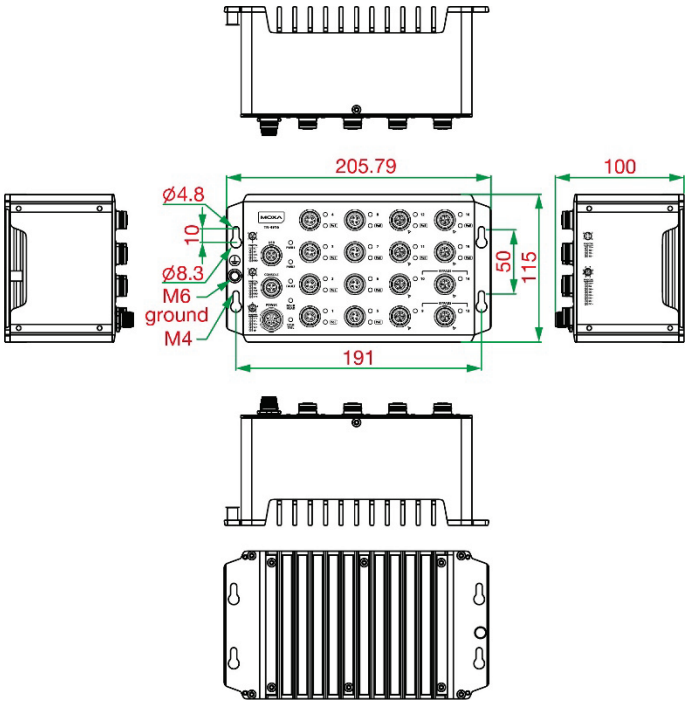


**TN-4908 PoE Models**





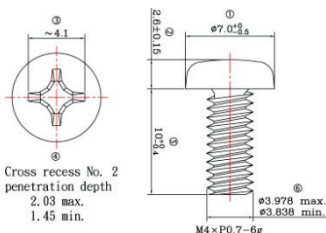
## TN-4916 Models



## Wall Mounting

**STEP 1:** Mounting the TN-4900 to a wall requires 4 screws. Use the ToughNet router as a guide to mark the correct positions of the 4 screws.

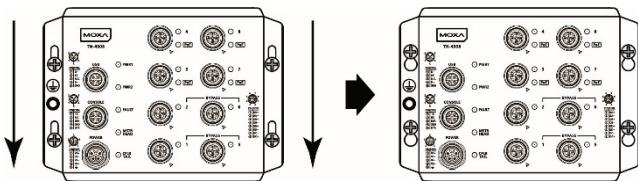
**STEP 2:** Use the 4 screws in the wall mounting kit. If you would like to use your own screws, make sure the screw head is **between 6.0 mm and 7.0 mm** in diameter and the shaft is less than **4.0 mm** in diameter, as shown at the right. The torque value of the mounting screws is 4.5 kgf-cm.



Do not screw the screws in all the way—leave a space of about 2 mm to allow room for sliding the ToughNet router between the wall and the screws.

**NOTE** Before tightening the screws into the wall, make sure the screw head and shaft size are suitable by inserting the screw through one of the keyhole-shaped apertures of the ToughNet router.

**STEP 3:** Once the screws are fixed in the wall, hang the ToughNet router on the 4 screws through the large opening of the keyhole-shaped apertures, and then slide the router downwards. Tighten the four screws for added stability.



**NOTE** To provide greater protection from vibration and shock, use screws with shaft diameter between 6.0 mm and 7.0 mm, and fix the ToughNet router onto the wall directly through the large opening of the keyhole-shaped apertures.

## Wiring Requirements



### WARNING

Turn the power off before disconnecting modules or wires. The correct power supply voltage is listed on the product label. Check the voltage of your power source to make sure you are using the correct voltage. Do NOT use a voltage greater than what is specified on the product label.



## ATTENTION

### Safety First!

Observe all electrical codes dictating the maximum current allowable for each wire size. If the current goes above the maximum ratings, the wiring could overheat, causing serious damage to your equipment.

### Please read and follow these guidelines:

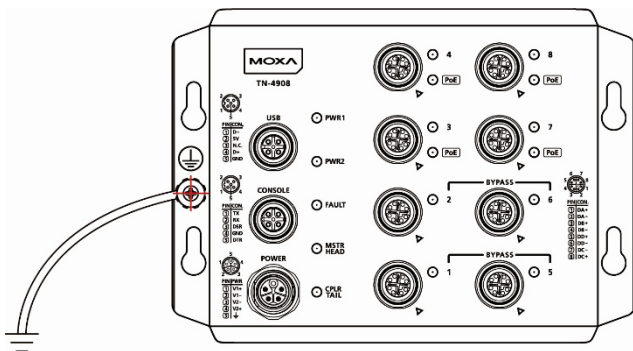
- Use separate paths to route wiring for power and devices. If power wiring and device wiring paths must cross, make sure the wires are perpendicular at the intersection point.

**NOTE:** Do not run signal or communications wiring and power wiring through the same wire conduit. To avoid interference, wires with different signal characteristics should be routed separately.

- You can use the type of signal transmitted through a wire to determine which wires should be kept separate. The rule of thumb is that wiring that shares similar electrical characteristics can be bundled together.
- Keep input wiring and output wiring separated.
- It is strongly advised that you label wiring for all devices in the system when necessary.

## Grounding the ToughNet Router

Grounding and wire routing help limit the effects of noise due to electromagnetic interference (EMI). Run the ground connection from the grounding screw to the grounding surface prior to connecting devices.



## ATTENTION

To ground this product to earth, use a green and yellow AWG 18 or higher grounding cable.



## ATTENTION

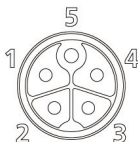
This product is intended to be mounted to a well-grounded mounting surface such as a metal panel.

## Connecting the Power Supplies

The ToughNet TN-4900 Series routers support dual power inputs—power input 1 and power input 2. The M12 K-coded 5-pin male connector on the TN-4900 Series routers' front panel is used for the dual power inputs.

### Pinouts for the power input port

PIN	PWR
1	V1+
2	V1-
3	V2-
4	V2+
5	GND



Pin	Description	Usage
1	PWR1 / DC +	Connect "PWR1 Live / DC +" to the positive (+) terminal when using a DC power source.
2	PWR1 / DC -	Connect "PWR1 Neutral / DC -" to the negative (-) terminal when using a DC power source.
3	PWR2 / DC -	Connect "PWR2 Neutral / DC -" to the negative (-) terminal when using a DC power source.
4	PWR2 / DC +	Connect "PWR2 Live / DC +" to the positive (+) terminal when using a DC power source.
5	Chassis Ground	Connect the "Chassis Ground" to the equipment ground bus for DC inputs.

**STEP 1:** Plug your power cord connector into the power input port of the TN-4900 router.

**STEP 2:** Screw the nut on your power cord connector into the power input connector on the router to ensure a tight connection.



## ATTENTION

Before connecting the TN-4900 series to the power input, make sure the power source voltage is stable.



## ATTENTION

Do not power on the TN-4900 Series before connecting the M12 power connector.

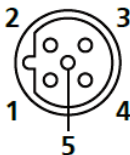
**NOTE** The suggested power cable is CBL-M12KFF5POPEN-O-150-IP67. The suggested power connector is M12K-5PFF-IP65-PxC. The power cable diameter should be AWG 14 or larger. The cable dimensions depend on the choice of pin number and type of M12 coding.

## Connecting the Serial Port

The TN-4900 Series has a M12 B-coded 5-pin female connector. Users can use an adapter to connect a management PC and control the device using commands through the CLI (Command-Line Interface).

### Pinouts for the M12-B (5-pin) Port

PIN	CON
1	TX
2	RX
3	DSR
4	GND
5	DTR

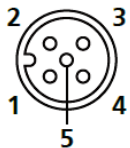


**NOTE** The suggested console cable is M12BMM5PF9-BK-150-IP68.

## Connecting the USB Storage Port

The TN-4900 Series has a M12 A-coded 5-pin female connector. Users can either use an adapter or the ABC-02-P-USB-M12 to connect to a PC or to import configuration files to the device.

PIN	CON
1	D-
2	5V
3	NC
4	D+
5	GND



## Connecting the Data Lines

### 10/100BaseT(X) Ethernet Port Connection

All TN-4916 models have 8 10/100BaseT(X) Ethernet ports (4-pin shielded M12 connector with D coding). The 10/100TX ports located on the TN-4916 front panel are used to connect to Ethernet-enabled devices. Most users configure these ports for Auto MDI/MDI-X mode, in which case the port's pinouts are adjusted automatically depending on the type of Ethernet cable used (straight-through or cross-over), and the type of device (NIC-type or HUB/Switch/Router-type) connected to the port. In what follows, we give pinouts for both MDI (NIC-type) ports and MDI-X (HUB/Switch/Router-type) ports. We also give cable wiring diagrams for straight-through and cross-over Ethernet cables.

**NOTE** The suggested cable for M12 D-coded-to-M12 D-coded connections is CBL-M12DMM4PM12DMM4P-BK-100-IP67. The suggested cable for M12 D-coded-to-RJ45 connections is CBL-M12D(MM4P)/RJ45-100 IP67. The suggested connector is M12D-4P-IP68 (solder type). The suggested connector for metal shells is M12D-4PMM-IP67 (crimp type).

### Pinouts for the 10/100BaseT(X) Ports

PIN	TX
1	TD+
2	RD+
3	TD-
4	RD-



Housing: shield

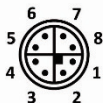
### 10/100/1000BaseT(X) Ethernet Port Connection

The TN-4900 Series has 8 10/100/1000BaseT(X) Ethernet ports (M12 X-coded 8-pin female connector). The 10/100/1000TX ports located on the front panel of the TN-4900 Series are used to connect to Ethernet-enabled devices. Most users configure these ports for Auto MDI/MDI-X mode, in which case the port's pinouts are adjusted automatically depending on the type of Ethernet cable used (straight-through or cross-over), and the type of device (NIC-type or HUB/Switch/Router-type) connected to the port.

In what follows, we give pinouts for both MDI (NIC-type) ports and MDI-X (HUB/Switch/Router-type) ports. We also give cable wiring diagrams for straight-through and cross-over Ethernet cables.

### Pinouts for the 10/100/1000BaseT(X) M12 (8-pin) Port

PIN	Con.
1	DA +
2	DA -
3	DB +
4	DB -
5	DD +
6	DD -
7	DC -
8	DC +



PoE Pinout	D-coded	X-coded
V+	Pin 1, 3 (TD+, TD-)	Pin 1, 2 (DA+, DA-)
V-	Pin 2, 4 (RD+, RD-)	Pin 3, 4 (DB+, DB-)

### PoE Output Power

IEEE 802.3at/af compliant PoE ports

Output per port: 30 W

## Total PoE Budget

TN-4908 PoE models: 50 W

TN-4916 PoE models: 95 W



### ATTENTION (For PoE Models)

For safety reasons, it is not recommended to connect the device to a network with routing to external networks.

**NOTE** The suggested cable for M12 X-coded-to-open wires is CBL-M12XMM8P-Y-100-IP67.  
The suggested cable for M12 X-coded-to-RJ45 connections is CBL-M12XMM8PRJ45-Y-200-IP67.  
The suggested connector is M12X-8PMM-IP67-HTG.



### ATTENTION

Use a torque wrench set to a torque of 4.5 kgf-m when tightening the screws. Note that applying a larger torque may damage the protective cover.

## LED Indicators

Several LED indicators are located on the ToughNet router's front panel. The function of each LED is described in the table below.

LED	Color	State	Description
<b>System LEDs</b>			
PWR1	Amber	On	Power is being supplied to power input PWR1.
		Off	Power is not being supplied to power input PWR1
PWR2	Amber	On	Power is being supplied to power input PWR2.
		Off	Power is not being supplied to power input PWR2.
FAULT	Red	On	When a user-configured event is triggered. 1. Turbo Ring is broken 2. Port link turned on or off  <b>Note:</b> The FAULT LED will be on during the DUT boot up state and while waiting for the system to be ready. Once the system is ready, the FAULT LED will turn off.
		Off	When the corresponding PORT alarm is enabled and a user-configured event is not triggered, or when the corresponding PORT alarm is disabled.

LED	Color	State	Description
MSTR/ HEAD	Green	On	When the TN router is either the Master of this Turbo Ring, or the Head of this Turbo Chain.
		Blinking	When the TN router is Ring Master of this Turbo Ring and the Turbo Ring is broken, or it is the Chain Head of this Turbo Chain and the Turbo Chain is broken.
		Off	When the TN router is neither the Master of this Turbo Ring, nor the Head of this Turbo Chain.
CPLR/ TAIL	Green	On	When the TN router enables the coupling function to form a back-up path in this Turbo Ring, or it is the Tail of this Turbo Chain.
		Blinking	When Turbo Chain is down.
		Off	When the TN router disables the coupling function of Turbo Ring, or it is not the Tail of the Turbo Chain.
FAULT + MSTR/HEAD + CPLR/TAIL	Rotate Blinking Sequentially		When ABC-02 is importing or exporting files.

LED	Color	State	Description
<b>Port LEDs</b>			
FE Ports (10/100M for copper ports)	Amber	On	The port's 10 Mbps link is active.
		Blinking	Data is being transmitted at 10 Mbps.
		off	The port's 10 Mbps link is inactive.
	Green	On	The port's 100 Mbps link is active.
		Blinking	Data is being transmitted at 100 Mbps.
		off	The port's 100 Mbps link is inactive.
GB Ports (10/100/ 1000M, for copper ports)	Amber	On	The port's 10 or 100 Mbps link is active.
		Blinking	Data is being transmitted at 10 or 100 Mbps.
		Off	The port's 10 or 100 Mbps link is inactive.
	Green	On	The port's 1000 Mbps link is active.
		Blinking	Data is being transmitted at 1000 Mbps.
		Off	The port's 1000 Mbps link is inactive.
PoE Ports	Amber	On	Power is being supplied to a Powered Device (PD).
		Off	Power is not being supplied to a Powered Device (PD).