I/O Modules Overview (TPS TXE Devices)

Use these instructions to set up the I/O modules supported in your TrendAI™ TippingPoint™ TPS TXE security devices.

Before You Begin

- Review the release notes for your product for any late-breaking changes to the installation instructions.
- Read and follow all safety information listed in documentation that shipped with your product.
- Complete the installation of your TippingPoint security device.

ESD Requirements

Damage from Electromagnetic Static Discharge (ESD) can occur when electronic components are improperly handled. Improper handling can result in complete or intermittent system failures. Proper ESD protection is required whenever you handle equipment. The following general grounding guidelines apply:

- Always use an ESD wrist strap when adding or removing components from the chassis.
- Avoid touching the circuit boards or connectors on all cards and modules.
- Avoid contact between the printed circuit boards and clothing. The wrist strap only protects components from ESD voltages on the body. ESD voltages on clothing can still cause damage.

Place a removed component board-side-up on an antistatic surface or in a static-shielding container that is also grounded to the same point as the device. If you plan to return the component to the factory, immediately place it in a static-shielding container.

I/O Module Options

TPS TXE devices support both standard I/O modules and bypass I/O modules (refer to the following table) for fiber and copper components.

All TXE I/O modules support full-duplex operation only. Half-duplex is not offered on any TXE I/O module, including the copper Gig-T bypass module.

Important: Only transceiver modules available from TrendAI™ have been validated to achieve optimal performance with TippingPoint products. Other vendor devices are not supported and could be detrimental to proper operation of the TippingPoint system.

Bypass I/O modules are zero-power high-availability (ZPHA) modules that permit network traffic and services while bypassing the device entirely when the device loses power.

Note: For the 6-Segment SFP28 IOM, all ports are configured to 25GbE by default. To operate the ports at 1GbE or 10GbE, the correct SFP or SFP+ transceiver must be plugged in and the ports must be configured to 1GbE or 10GbE manually via the SMS or CLI.

For the 4-Segment QSFP28 IOM, all ports are configured to 100GbE by default. To operate the ports at 40GbE, the correct QSFP+ transceiver must be plugged in and the ports must be configured to 40GbE manually via the SMS or CLI.

Note: TXE I/O modules do not automatically detect the speed of an inserted transceiver. Port speed must be manually configured via the SMS or CLI to match the installed transceiver. The 6-Segment Gig-T Bypass module (TPNN0414) is the only TXE I/O module that supports user-configurable auto-negotiation; its speed is fixed at 1 GbE.

All standard I/O modules and all bypass I/O modules are hot-swappable.

Table 1: Standard I/O Modules

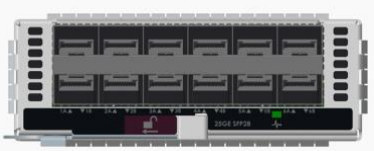
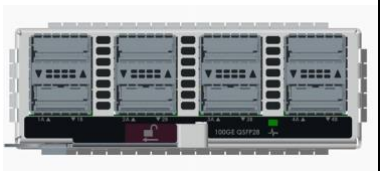
Module Part Number	Module Description	Transceiver Part Number	Transceiver Description
TPNN0370 	6-Segment 25/10/1 GbE SFP28	TPNN0384	TippingPoint 25 GbE SFP28 SR Transceiver
		TPNN0385	TippingPoint 25 GbE SFP28 LR Transceiver
		TPNN0057	TippingPoint 10 GbE SFP+ SR Transceiver
		TPNN0058	TippingPoint 10 GbE SFP+ LR Transceiver
		TPNN0054	TippingPoint 1 GbE SFP RJ45 Transceiver (Copper)
		TPNN0055	TippingPoint 1 GbE SFP SX Transceiver
		TPNN0056	TippingPoint 1 GbE SFP LX Transceiver
TPNN0371 	4-Segment 100/40 GbE QSFP28	TPNN0382	TippingPoint 100 GbE QSFP28 SR4 Transceiver
		TPNN0383	TippingPoint 100 GbE QSFP28 LR4 Transceiver
		TPNN0067	TippingPoint 40 GbE QSFP+ SR4 Transceiver
		TPNN0327	TippingPoint 40 GbE QSFP+ LR4 Transceiver

Table 2: Bypass I/O Modules

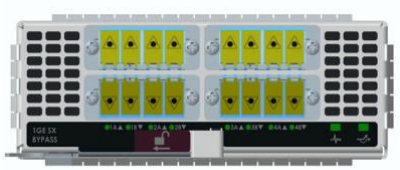
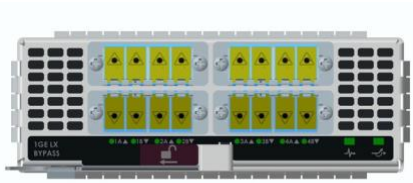
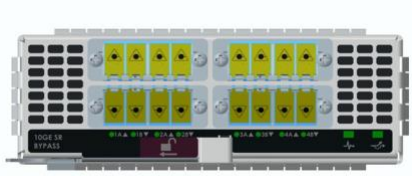
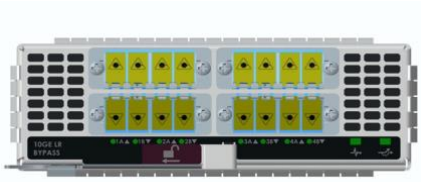
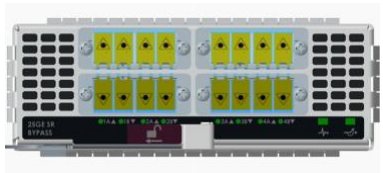
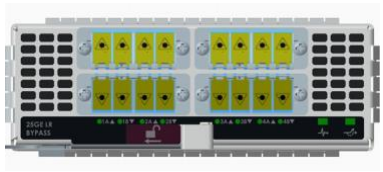
Module Part Number	Module Description
TPNN0412 	4-Segment 1 GbE SX Bypass
TPNN0413 	4-Segment 1 GbE LX Bypass
TPNN0410 	4-Segment 10 GbE SR Bypass
TPNN0411 	4-Segment 10 GbE LR Bypass
TPNN0374 	4-Segment 25 GbE SR Bypass
TPNN0375 	4-Segment 25 GbE LR Bypass

Table 2: Bypass I/O Modules (continued)

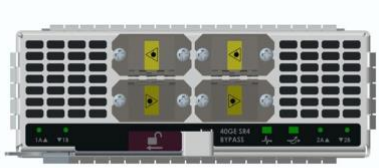
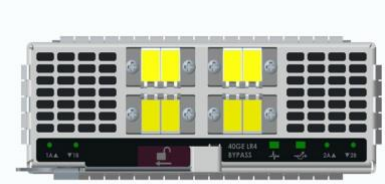
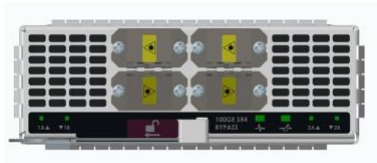
Module Part Number	Module Description
TPNN0408 	2-Segment 40GbE SR4 Bypass
TPNN0409 	2-Segment 40GbE LR4 Bypass
TPNN0372 	2-Segment 100 GbE SR4 Bypass
TPNN0373	2-Segment 100 GbE LR4 Bypass
TPNN0414	6-Segment Gig-T Bypass

Table 3: I/O Module Port Configuration Specifications

The following table lists the supported port speeds, auto-negotiation support, and forward error correction (FEC) support for each TXE I/O module.

Module Part Number	Module Description	Supported Speeds	Auto-Negotiation	FEC	Notes
TPNN0370	6-Segment 25/10/1 GbE SFP28	1 GbE, 10 GbE, or 25 GbE (selectable per port; 25 GbE default)	No	Yes (25 GbE ports only)	Speed must be set via SMS/CLI to match the installed SFP, SFP+, or SFP28 transceiver.
TPNN0371	4-Segment 100/40 GbE QSFP28	40 GbE or 100 GbE (selectable per port; 100 GbE default)	No	Yes (100 GbE ports only)	Speed must be set via SMS/CLI to match the installed QSFP+ (40 GbE) or QSFP28 (100 GbE) transceiver.
TPNN0412	4-Segment 1 GbE SX Bypass	1 GbE (fixed)	No	No	Embedded SX fiber transceiver.
TPNN0413	4-Segment 1 GbE LX Bypass	1 GbE (fixed)	No	No	Embedded LX fiber transceiver.
TPNN0410	4-Segment 10 GbE SR Bypass	1 GbE or 10 GbE	No	No	Embedded SR fiber transceiver.
TPNN0411	4-Segment 10 GbE LR Bypass	1 GbE or 10 GbE	No	No	Embedded LR fiber transceiver.
TPNN0374	4-Segment 25 GbE SR Bypass	25 GbE (fixed)	No	Yes	Embedded SFP28 SR transceiver.
TPNN0375	4-Segment 25 GbE LR Bypass	25 GbE (fixed)	No	Yes	Embedded SFP28 LR transceiver.
TPNN0408	2-Segment 40GbE SR4 Bypass	40 GbE (fixed)	No	No	Embedded QSFP+ SR4 transceiver.
TPNN0409	2-Segment 40GbE LR4 Bypass	40 GbE (fixed)	No	No	Embedded QSFP+ LR4 transceiver.
TPNN0372	2-Segment 100 GbE SR4 Bypass	100 GbE (fixed)	No	Yes	Embedded QSFP28 SR4 transceiver.
TPNN0373	2-Segment 100 GbE LR4 Bypass	100 GbE (fixed)	No	Yes	Embedded QSFP28 LR4 transceiver.
TPNN0414	6-Segment Gig-T Bypass	1 GbE (fixed)	Yes	No	Speed is fixed at 1 GbE with auto-negotiation. The only TXE I/O module with auto-negotiation.

Note: FEC and auto-negotiation are mutually exclusive. FEC is configurable only on ports operating at 25 GbE or 100 GbE line speeds that do not support auto-negotiation.

Important: Handle all I/O modules with care. The bypass modules contain mechanical switches that are very delicate and can cause network disruption if handled improperly.

Add I/O Modules

TippingPoint devices come with blank modules inserted into module slots.

Figure 1. Blank Module

Warning: Do not leave slots empty for an extended period of time. Insertion of a blank module or I/O module ensures that the device is correctly cooled.

To remove the blank module, use your thumb and finger in each pocket to pinch the release mechanism, and gently pull the module out of its chamber.

To insert an I/O module:

1. Unlock the locking lever that is attached to the faceplate at the bottom of the I/O module by pulling it open from the lever's right side.

   CAUTION: The locking lever must be fully opened before inserting a module. Inserting a module without opening the locking lever can cause the module to become stuck in the slot and prevent its removal.

2. To insert the I/O module, slide the module into the empty module slot. When the module is in the correct position, manually close the locking lever to complete the insertion and lock the module in its slot.

Module LEDs

The following table describes the module LEDs.

Feature	LED	Color	Description
Data port	Link	Green	Link is active.
	Activity	Blinking green	Data traffic passing.

Feature	LED	Color	Description
Module Health	Status	Green	The module is configured, in service, and in good health.
		Blinking amber	The module has been inserted and powered up, but is not yet recognized by the software.
		Solid amber	The module is experiencing a fault.
Bypass	Status	Off	Module in bypass.
		Green	Module in normal mode (not in bypass).

Note: Ensure that your device has been upgraded to the minimum TOS version required by your module:

- The 100 GbE and 25 GbE I/O modules and bypass I/O modules require TOS v6.0.0 or later.
- The 40 GbE, 10 GbE, and 1 GbE bypass I/O modules require TOS v6.1.0 or later.
- The 6-Segment Gig-T bypass I/O module requires TOS v6.3.0 or later.

When you insert a bypass I/O module into a TXE-Series TPS device without the minimum TOS version that supports the module, the module health status LED indicates that the module has experienced a fault (solid amber). To recover from this state:

1. Upgrade the device to the supported TOS version.
2. After the upgrade, perform a full reboot of the device.
3. Disable bypass on all BIOMs by selecting the normal option:
   - **SMS:** From the Device menu, click the device and select **Device Configuration -> HA (High Availability) -> Zero Power HA**.
   - CLI: `high-availability zero-power (slot|all) (bypass-ips|normal)`

Hot-Swapping I/O Modules

I/O modules can be installed or removed while the device is in the normal operating state.

When you hot swap an I/O module, keep the following points in mind:

- Hot-swapping I/O modules during system initialization is not supported.
- The module port configuration is always reset when the I/O module is replaced by another type of module. If you replace it with the same I/O module type, any configuration changes you previously made are retained. This also is true when replacing modules with the power turned off.
- The module segment configuration, including link-down synchronization, Intrinsic HA, and inspection bypass, is always preserved. If you swap the module with a different type of module, be sure to verify that your segment configuration settings have persisted.

When you insert a bypass I/O module, the bypass I/O module always starts up in bypass mode. A bypass I/O module remains in bypass mode until you remove it from bypass mode through the CLI or SMS. For information about how to use normal mode instead of bypass mode, refer to the SMS or CLI documentation.

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The following link outlines the types of data that the Security Management System collects and provides detailed instructions on how to disable the specific features that feedback the information.

https://success.trendmicro.com/data-collection-disclosure

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