



TN-SFP-xxx
SFP Transceiver Modules
User Guide

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<http://www.lantronix.com/support/warranty>.

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Revision History

Date	Rev	Comments
9/30/13	A	Initial release.
4/27/16	B	Revised operating temperatures, updated contact information and format.
11/22/16	C	Update MTBF and contact information.
6/5/17	D	Added TN-SFP-GE-100FX information.
11/27/17	E	Added TN-SFP-LX8-CxxT (Temperature Hardened CWDM SFP)...
6/12/19	F	Add UL information.
2/8/22	G	Initial Lantronix re-brand.

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Product Description

The Lantronix TN-SFP-xxx series small form factor pluggable (SFP) transceiver modules are designed to install in any SFP slot and connect multimode 1000Base-SX or single mode 1000Base-LX fiber-optic cable to the network through the SFP connector. The TN-SFPxxx transceivers are designed for bi-directional, serial-optical data communications such as Gigabit Ethernet and fiber channel at speeds up to 4.25 Gbps.

All Lantronix SFPs and XFPs are compliant with the Multi-Sourcing Agreement (MSA) ensuring interoperability with all other MSA compliant networking devices.

Ordering Information

Simplex LC SFPs	Duplex LC SFPs
100BASE-FX/OC-3	100BASE-FX/OC-3
OC-12/STM-4	OC-12/STM-4
1000BASE-BX	1000BASE-SX
1000BASE-SX	1000BASE-LX
1000BASE-LX	OC-48/STM-16/ Fibre Channel 1x/2x/4x/1000BASE-X
100/1000Base-LX dual speed	Fibre Channel 1x/2x/4x/1000BASE-X Copper SFP

Features

- Hot-Pluggable SFP LC Optical Transceivers
- Digital Diagnostic Function
- Class 1 Laser International Safety Standard IEC-60825 Compliant
- Compatible with Small Form Factor Pluggable Multi-Sourcing Agreement (MSA)

Specifications

The TN-SFP-xxx was designed to meet these standards and specifications:

Standards	IEEE 802.3 2003; ANSI X3.297-1997
Compliance	IEC-60825; FDA 21; CFR 1040.10 and 1040.11
Dimensions	Width: 0.52" [13 mm] x Depth: 2.18" [55 mm] x Height: 0.33" [8 mm]
Power	3.3V
Power Consumption	0.66 watts
Environment	0°C to 70°C
Shipping Weight	1 lb. (454 g) approximately
Voltage	3.3 volts
Operating Temp	-10°C – 85°C: TN-SFP-SX, TN-SFP-SXD, TN-SFP-LX1, TN-SFP-ESX5, TN-SFP-OC3S3, TN-SFP-ESX6, TN-SFP-FC2XM, TN-SFP-FC2XS2.
Operating Temp	0°C – 70°C: TN-SFP-ELX1, TN-SFP-LX3, TN-SFP-LX5, TN-SFP-LX8, TN-SFP-LX12, TN-SFP-Ocx, TN-SFP-LX16, TN-SFP-LXBxx, TN-SFP-FC4Xxx, TN-SFP-FC2XS40, TN-SFP-FC2XS15, TN-SFP-TX, TN-SFP-T-MG, TN-SFP-GE-100FX.
Operating Temp	-20°C to + 85°C: TN-SFP-STM1E.
Operating Temp	-40°C to + 85°C: TN-SFP-LX1T, TN-SFP-LX3T, TN-SFP-LXB11T, TN-SFP-LXB12T, TN-SFP-LXB21T, TN-SFP-LXB22T.
Storage Temp	-40°C to +85°C (-40° to +185°F)
MTBF	At Ambient Temp. 85 °C: 600,000 Hrs. At Ambient Temp. 80 °C: 730,964 Hrs.
Warranty	Lifetime

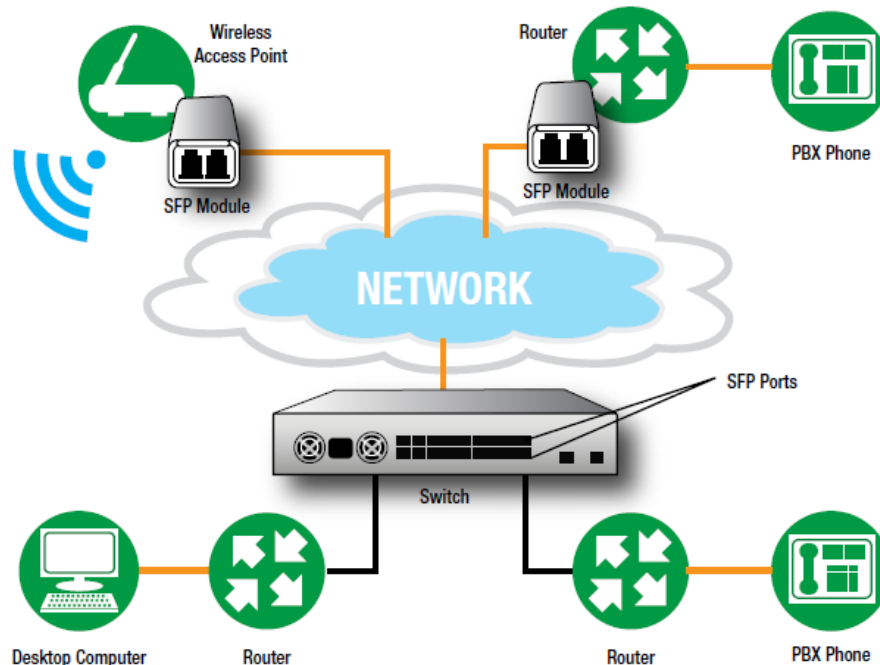
Lantronix SFP modules fully comply with Multi-Sourcing Agreement (MSA). This compliance allows our SFP modules to be used in other MSA compliant SFP platforms without any problems.

Optical Specifications

The Optical Spec for all Lantronix SFPs are listed and maintained in a separate [document](#).

Application: Fiber Connections with SFPs

SFPs are used with Gigabit Ethernet Switches and Routers, Fibre Channel Switch Infrastructure, xDSL applications, Metro Edge Switching, etc.



Safety Instructions

When a connector is removed during installation, testing, or servicing, or when an energized fiber is broken, a risk of ocular exposure to optical energy that may be potentially hazardous occurs, depending on the laser output power. The primary hazards of exposure to laser radiation from an optical-fiber system are:

- Damage to the eye by accidental exposure to a beam emitted by a laser source.
- Damage to the eye from viewing a connector attached to a broken fiber or an energized fiber.

Danger: Never attempt to view optical connectors that might be emitting laser energy.

Do not power up the laser product without connecting the laser to the optical fiber and putting the cover in position, as laser outputs will emit infrared laser light at this point.

See the Lantronix [SFP page](#) for our full line of SFP transceivers. See the [FOA webpage](#) for additional information.

High Risk Activities Disclaimer

Components, units, or third-party products used in the product described herein are NOT fault-tolerant and are NOT designed, manufactured, or intended for use as on-line control equipment in the following hazardous environments requiring fail-safe controls: the operation of Nuclear Facilities, Aircraft Navigation or Aircraft Communication Systems, Air Traffic Control, Life Support, or Weapons Systems ("High Risk Activities"). Lantronix and its supplier(s) specifically disclaim any expressed or implied warranty of fitness for such High Risk Activities.

SFP Unpacking

Before you start installing the TN-SFP-xxx, verify that the package contains the following items:

- One TN-SFP-xxx
- One protective foam piece
- One Documentation Postcard

Notify your sales representative immediately if any of the aforementioned items is missing or damaged. Save the packaging for possible future use.



SFP Installation

Cautions

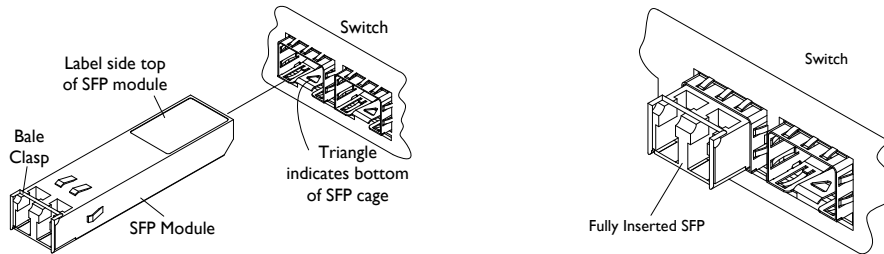
- The SFP transceiver module is keyed to only be installed one way. However, if forced the wrong way, damage may occur.
- The SFP transceiver module may be damaged if directly connected with short fiber cable without an attenuator.
- Avoid getting dust or other contaminants into the fiber bore of the SFP transceiver module, as this will cause the optics to not operate properly.
- Clean the optic surfaces of the optical fiber before you plug them back in to the optical bores of another SFP transceiver module. See the Fiber Optic Association, Inc. Cleaning Fiber Optic Connections page on the FOA website at www.thefoa.org/tech/ref/termination/cleaning.html for more information.
- Each port must match the wavelength specifications on the other end of the cable, and the cable must not exceed the specified cable length for reliable communications.

Note that the NM2-FXS-2230-SFP-01 SFP transceiver is sold separately and also as a part of Lantronix NM2-FXS-2230-SFP-01 M.2 100-Base-FX Ethernet Fiber NIC. See the NM2-FXS-2230-SFP-01 manual for more information on the SFP bundled with the M.2 NIC.

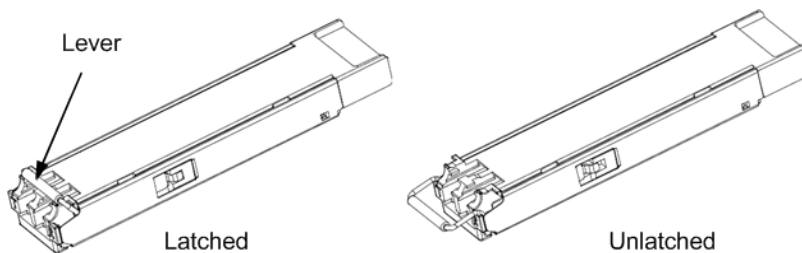
See the Optical Power Budget calculator at <https://www.transition.com/support/library/calculators/>.

Installing an SFP Module

1. Attach an ESD-preventive wrist strap to your wrist and to the ESD ground connector or a bare metal surface on your chassis.
2. Remove the SFP transceiver module from its protective packaging. Note: Do not remove the optical bore dust plugs until directed to do so in a later procedure.
3. Check the slot orientation. Note that for some devices (e.g., S4224) some slots are “upside down” compared to other slots.
4. Position the SFP device at the desired installation slot, with the label facing correctly.
5. Carefully slide the SFP device into the slot, aligning it with the internal installation guides.



6. Ensure that the SFP device is firmly seated against the internal mating connector. To verify that the SFP is seated and latched properly:
 - a) Grasp the SFP by the sides and try to remove it without releasing the latch.
 - b) If the SFP can not be removed, it is installed and seated properly. If the SFP can be removed, reinsert it and press harder with your thumb; repeat if necessary until it is latched securely into the socket.



7. Connect the fiber cable to the fiber port connector of the SFP device. Make sure the SFP release latch is in the up (closed) position when you insert the cable connector into the SFP.
8. Remove the dust plug from the connector. Save the dust plug for future use.
9. Attach an appropriate cable into the SFP module port.
10. Attach the other end of the cable into the other device.
11. Observe the status LED(s). See the related manual for details.

Fiber Cable Physical Characteristics

The fiber cable physical characteristics must meet or exceed IEEE 802.3ae specifications:

- Single mode fiber (recommended): 9 μm
- Multimode fiber (recommended): 62.5/125 μm
- Multimode fiber (optional): 100/140, 85/140, 50/125 μm
- MMF Media TN-SFP-GE-100FX: 1310 nm

Warning: Visible and invisible laser radiation when open. DO NOT stare into laser beam or view directly with optical instruments. Failure to observe this warning could result in damage to your eyes or blindness.

Connecting Fiber Cables

To install the fiber cable, do the following:

1. Locate the appropriate fiber cable.
2. Install the cable as shown below.



Removing an SFP Module

Caution: Be careful when removing the SFP or SFP+ from a device. Some SFP transceiver module temperatures may exceed 160°F (70°C) and be too hot to touch with bare hands. **Note:** Do not remove and replace the SFP modules more often than necessary; excessive SFP removing and replacing can shorten the SFPs useful life.

1. Attach an ESD-preventive wrist strap to your wrist and to the ESD ground connector or a bare metal surface on your chassis.
2. For future reattachment of fiber-optic cables, note which connector plug is send (TX) and which is receive (RX).
3. Remove the SFP transceiver module:
 - a. If the SFP transceiver module has an **actuator button latch**, gently press the actuator button on the front of the SFP transceiver module until it clicks and the latch mechanism releases the SFP transceiver module from the socket connector. Grasp the actuator button between your thumb and index finger, and carefully pull the SFP transceiver module straight out of the module slot.
 - b. If the SFP transceiver module has a **bail clasp latch**, pull the latch out and down to eject the SFP transceiver module from the socket connector. If the bail clasp latch is obstructed and you cannot use your index finger to open it, use a small, flat-blade screwdriver or other long, narrow instrument to open the bail clasp latch. Grasp the SFP transceiver module between your thumb and index finger, and carefully remove it from the socket.
4. Replace the Dust Plug.
5. Place the removed SFP/SFP+ transceiver module in an antistatic bag or other protective package.

DDMI (Digital Diagnostics Monitoring Interface)

DDMI (Digital Diagnostics Monitoring Interface) provides enhanced digital DMI for optical transceivers which allows real time access to device operating parameters.

The following DDMI port screen and explanation table contains brief definitions of the DDMI support offered on some Small Form Factor Pluggable (SFP) Transceiver Modules. For further information, see the help option or User Guide for the S3290, S4140, S4212, and S4224. **Note:** This feature is not available on all devices and may vary between products. See the related manual for more information.

The screenshot shows a web interface for a network device. On the left is a navigation menu with categories like System, Ports, Link OAM, DHCP, Security, LACP, Loop Protection, Spanning Tree, MVR, IPMC, LLDIP, Ethernet Services, Performance Monitor, PTP, MAC Table, VLANs, and DDMI (with sub-items Overview, Detailed, and UOLD). The main content area is titled 'Transceiver Information' and includes a dropdown for 'Port 27', an 'Auto-refresh' checkbox, and a 'Refresh' button. Below this is a table of transceiver details:

Vendor	Transion
Part Number	TN-10GSFP-LR1
Serial Number	8800022
Revision	0001
Date Code	2011-08-09
Transceiver	10G

Below the transceiver info is the 'DDMI Information' section, which is a table with the following data:

Type	Current	High Alarm Threshold	High Warn Threshold	Low Warn Threshold	Low Alarm Threshold
Temperature(C)	52.875	85.000	80.000	0.000	-5.000
Voltage(V)	3.2600	3.6000	3.5000	3.1000	3.0000
Tx Bias(mA)	38.896	90.000	80.000	4.000	2.000
Tx Power(mW)	0.5624	1.4125	1.1220	0.1585	0.1259
Rx Power(mW)	0.0000 --	1.4125	1.1220	0.0363	0.0229
Tx Power(dBm)	-2.50	1.50	0.50	-8.00	-9.00
Rx Power(dBm)	-inf	1.50	0.50	-14.40	-16.40

The Transceiver Information and DDMI Information sections are described below.

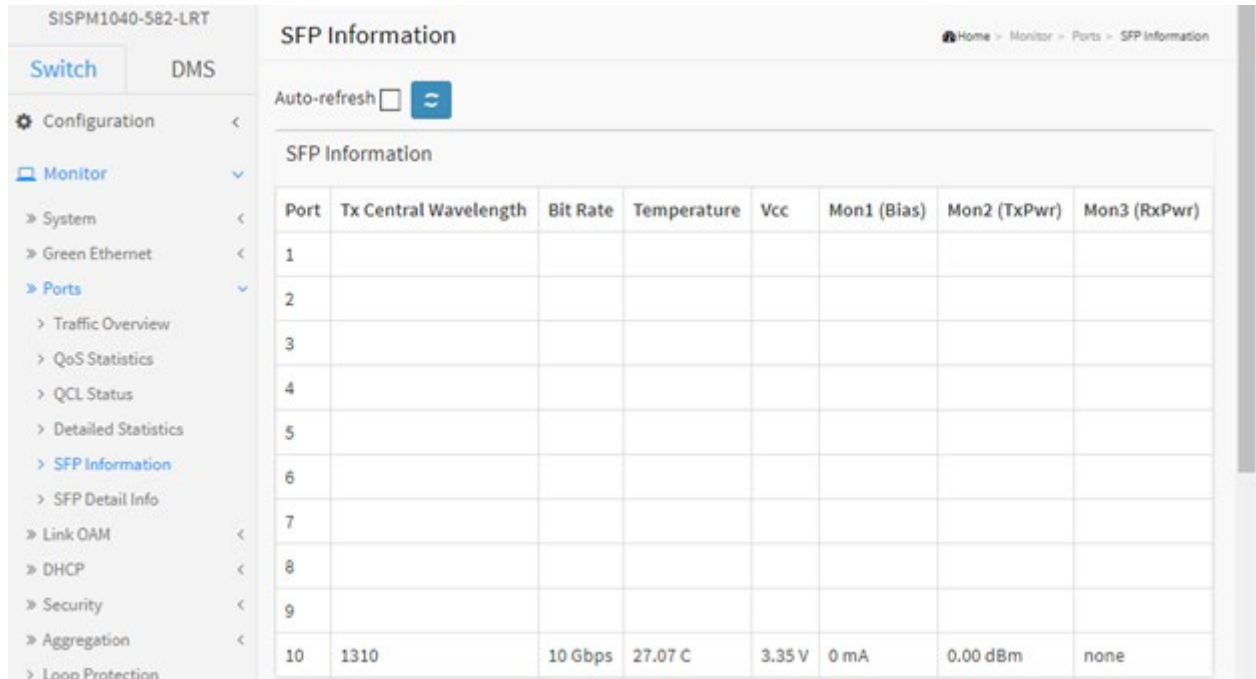
DDMI Parameter	Description
DDMI	Rx Power (uW) Intrusion Threshold; a level for Rx Power on the Fiber port. If the DMI read value falls below the preset value, an intrusion is detected, and a trap is generated. The default is 0 uW. The range is 0 - 65,535 uW.
Port	The device's port number.
Vendor	The SFP vendor's name.
Part Number	The SFP vendor Part number provided by the SFP vendor (<i>TN-10GSFP-SR</i>).
Serial Number	The SFP Vendor Serial number provided by the SFP vendor (e.g., <i>8672105</i>).
Revision	The SFP vendor Revision level for part number provided by the SFP vendor.
Date Code	The vendor's manufacturing date code (e.g., <i>2011-08-09</i>).
Transceiver	The Transceiver compatibility (e.g., <i>1000BASE_SX</i> or <i>10G</i>).
Current	The current value of temperature, voltage, TX bias, TX power, and RX power.
High Alarm Threshold	The high alarm threshold value of temperature, voltage, TX bias, TX power, and RX power.
High Warn Threshold	The high warn threshold value of temperature, voltage, TX bias, TX power, and RX power.
Low Warn Threshold	The low warn threshold value of temperature, voltage, TX bias, TX power, and RX power.
Low Alarm Threshold	The low alarm threshold value of temperature, voltage, TX bias, TX power, and RX power.

SFP Information and SFP Detail Info

Note: This feature is not available on all devices and may vary between products. See the related manual for more information.

SFP Information

This page displays general SFP information and monitoring information as shown and described below.



Parameter descriptions:

Parameter	Description
Port	The logical port for the settings contained in the same row.
Tx Central Wavelength	Displays the nominal transmitter output wavelength in nm.
Bit rate	Displays the nominal bit rate of the transceiver.
Temperature	Displays the internally measured transceiver temperature. Temperature accuracy is vendor specific but must be better than 3 degrees Celsius over specified operating temperature and voltage.
Vcc	Displays the internally measured transceiver supply voltage. Accuracy is vendor specific but must be better than 3 percent of the manufacturer's nominal value over specified operating temperature and voltage. Note that in some transceivers, transmitter supply voltage and receiver supply voltage are isolated. In that case, only one supply is monitored. Refer to the device specification for more detail.
Mon1 (Bias)	Displays the measured TX bias current in uA. Accuracy is vendor specific but must be better than 10 percent of the manufacturer's nominal value over specified operating temperature and voltage.
Mon2 (TX PWR)	Displays the measured coupled TX output power in mW. Accuracy is vendor specific but must be better than 3dB over specified operating temperature and voltage. Data is

	assumed to be based on measurement of a laser monitor photodiode current. Data is not valid when the transmitter is disabled.
Mon3 (RX PWR)	Displays the measured received optical power in mW. Absolute accuracy is dependent upon the exact optical wavelength. For the vendor specified wavelength, accuracy should be better than 3dB over specified temperature and voltage. This accuracy should be maintained for input power levels up to the lesser of maximum transmitted or maximum received optical power per the appropriate standard. It should be maintained down to the minimum transmitted power minus cable plant loss (insertion loss or passive loss) per the appropriate standard. Absolute accuracy beyond this minimum required received input optical power range is vendor specific.

SFP Detail Info

This page displays detailed SFP information and monitoring information as shown and described below.

The screenshot shows the 'SFP Information for Port 10' page. The interface includes a navigation menu on the left with options like Configuration, Monitor, System, Green Ethernet, Ports, Traffic Overview, QoS Statistics, QCL Status, Detailed Statistics, SFP Information, SFP Detail Info, Link OAM, DHCP, Security, Aggregation, Loop Protection, Spanning Tree, MVR, and IPMC. The main content area displays a table of SFP parameters for Port 10, with an 'Auto-refresh' checkbox and a refresh button. The table lists the following parameters and values:

Parameter	Value
Connector Type	SFP or SFP Plus - LC
Fiber Type	Reserved
Tx Central Wavelength	1310
Bit Rate	10 Gbps
Vendor OUI	00-c0-f2
Vendor Name	Transition
Vendor P/N	TN-SFP-25G-ER
Vendor Revision	1.0
Vendor Serial Number	TLSPH007
Date Code	200820
Temperature	27.07 C
Vcc	3.35 V
Mon1 (Bias)	0 mA
Mon2 (TX PWR)	0.00 dBm
Mon3 (RX PWR)	none

Parameter descriptions:

Parameter	Description
Connector Type	Displays the external optical or electrical cable connector provided as the media interface.
Fiber Type	Displays the fiber channel transmission media.
Tx Central Wavelength	Displays the nominal transmitter output wavelength in nm.
Bit rate	Displays the nominal bit rate of the transceiver.
Vendor OUI	Displays the vendor IEEE company ID (Organizationally Unique Identifier).
Vendor Name	Displays the vendor name (e.g., TN-SFP-25G-ER).
Vendor P/N	Displays the vendor part number or product name.
Vendor Revision	Displays the vendor product revision.
Vendor Serial Number	Displays the vendor serial number for the transceiver.
Date Code :	Displays the vendor's manufacturing date code.
Temperature	Displays the internally measured transceiver temperature. Temperature accuracy is vendor specific but must be better than 3 degrees Celsius over specified operating temperature and voltage.

Vcc	Displays the internally measured transceiver supply voltage. Accuracy is vendor specific but must be better than 3 percent of the manufacturer's nominal value over specified operating temperature and voltage. Note that in some transceivers, transmitter supply voltage and receiver supply voltage are isolated. In that case, only one supply is monitored. Refer to the device specification for more detail.
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Compliance Information

Class I Laser Compliance

This product has been tested and found to comply with the limits for FDA Class I laser for IEC60825, EN60825, and 21CFR1040 specifications.

Translated Safety Warnings

Warning Class I laser product.

Waarschuwing Klasse-I laser produkt.

Varoitus Luokan I lasertuote.

Attention Produit laser de classe I

Warnung Laserprodukt der Klasse I.

Avvertenza Prodotto laser di Classe I.

Advarsel Laserprodukt av klasse I.

Aviso Produto laser de classe I.

¡Advertencia! Producto láser Clase I.

Varning! Laserprodukt av klass I.

Aviso Produto a laser de classe I.

Advarsel Klasse I laserprodukt.

FCC Regulations

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at the user's own expense.

Canadian Regulations

This digital apparatus does not exceed the Class A limits for radio noise for digital apparatus set out on the radio interference regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la Class A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

European Regulations

Warning

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Achtung !

Dieses ist ein Gerät der Funkstörgrenzwertklasse A. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkstörungen auftreten. In diesem Fall ist der Benutzer für Gegenmaßnahmen verantwortlich.

Attention !

Ceci est un produit de Classe A. Dans un environnement domestique, ce produit risque de créer des interférences radioélectriques, il appartiendra alors à l'utilisateur de prendre les mesures spécifiques appropriées.



In accordance with European Union Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003, Lantronix will accept post usage returns of this product for proper disposal. The contact information for this activity can be found in the '[Contact Us](#)' portion of this document.

Der Anschluss dieses Gerätes an ein öffentliches Telekommunikationsnetz in den EGMitgliedstaaten verstösst gegen die jeweiligen einzelstaatlichen Gesetze zur Anwendung der Richtlinie 91/263/EWG zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über Telekommunikationsendeinrichtungen einschliesslich der gegenseitigen Anerkennung ihrer Konformität.



CAUTION: RJ connectors are NOT INTENDED FOR CONNECTION TO THE PUBLIC TELEPHONE NETWORK. Failure to observe this caution could result in damage to the public telephone network.

Der Anschluss dieses Gerätes an ein öffentliches Telekommunikationsnetz in den EGMitgliedstaaten verstösst gegen die jeweiligen einzelstaatlichen Gesetze zur Anwendung der Richtlinie 91/263/EWG zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über Telekommunikationsendeinrichtungen einschliesslich der gegenseitigen Anerkennung ihrer Konformität.

UL Recognized

TN-SFP-10G-SR	TN-GLC-SX-MM-RGD	TN-GLC-FE-100FX	TN-SFP-OC3M
TN-SFP-10G-LR	TN-GLC-BX-U	TN-GLC-BX-U-20	TN-SFP-OC3S
TN-GLC-T-MG	TN-GLC-BX-D	TN-GLC-BX-D-20	TN-SFP-SX
TN-GLC-LH-SM	TN-GLC-LHX-SM	TN-GLC-LH-SMD	TN-SFP-LX1
TN-GLC-LX-SM-RGD	TN-SFP-GE-L	TN-GLC-T	TN-SFP-LXB11
TN-GLC-SX-MM	TN-SFP-GE-S	TN-GLC-FE-100LX	TN-SFP-LXB12





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