

# User Guide

## TN-SFP-xxx



### Transceiver Modules

- 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)

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## Introduction

The Transition Networks 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.

## Description

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

<b>Simplex LC SFPs</b>	<b>Duplex LC SFPs</b>
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

## Specifications and Standards

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

<b>Standards</b>	IEEE 802.3 2003; ANSI X3.297-1997
<b>Compliance</b>	IEC-60825; FDA 21; CFR 1040.10 and 1040.11
<b>Dimensions</b>	Width: 0.52" [13 mm] x Depth: 2.18" [55 mm] x Height: 0.33" [8 mm]
<b>Power</b>	3.3V
<b>Power Consumption</b>	0.66 watts
<b>Environment</b>	0°C to 70°C
<b>Shipping Weight</b>	1 lb. (454 g) approximately
<b>Voltage</b>	3.3 volts
<b>Operating Temp</b>	-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.
<b>Operating Temp</b>	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.
<b>Operating Temp</b>	-20°C to + 85°C: TN-SFP-STM1E.
<b>Operating Temp</b>	-40°C to + 85°C: TN-SFP-LX1T, TN-SFP-LX3T, TN-SFP-LXB11T, TN-SFP-LXB12T, TN-SFP-LXB21T, TN-SFP-LXB22T.
<b>Storage Temp</b>	-40°C to +85°C (-40° to +185°F)
<b>MTBF</b>	At Ambient Temp. 85 °C: 600,000 Hrs. At Ambient Temp. 80 °C: 730,964 Hrs.
<b>Warranty</b>	Lifetime

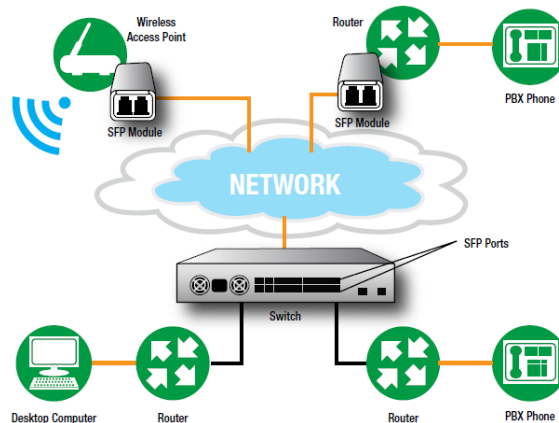
Transition Networks' SFP modules fully comply with Multi-Sourcing Agreement (MSA). This compliance allows our SFP modules to be used in other MSA compliant SFP platforms without any problems.

## Optical Specifications

Optical specs for all Transition Networks' SFPs are at <https://www.transition.com/lines/optical-devices/>.

## Application: Fiber Connections with SFPs

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



## 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***

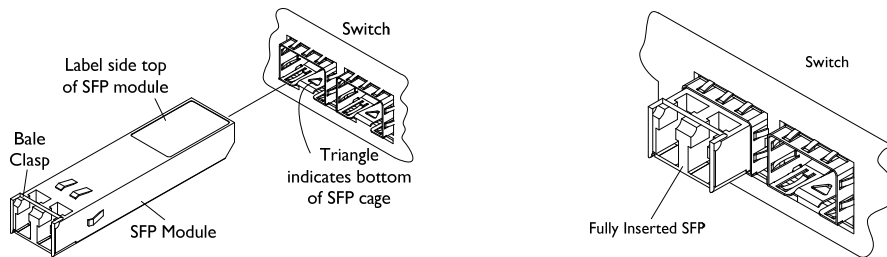
- The SFP transceiver module is keyed to only be installed one way. However, if forced the wrong way, damage may occur.
- The SFP transceiver module may be damaged if directly connected with short fiber cable without an attenuator.
- Avoid getting dust or other contaminants into the fiber bore of the 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](http://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 Transition Networks' 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.

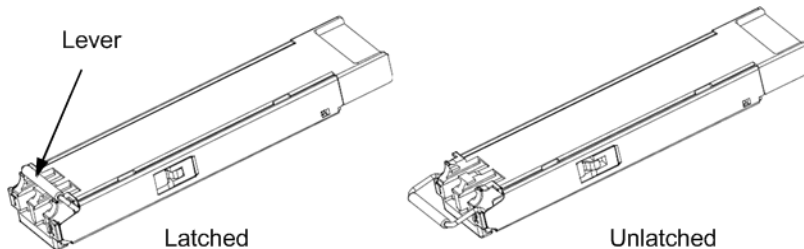
See the Optical Power Budget calculator at <https://www.transition.com/support/library/calculators/>.

## 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  $\mu\text{m}$
- Multimode fiber (recommended): 62.5/125  $\mu\text{m}$
- Multimode fiber (optional): 100/140, 85/140, 50/125  $\mu\text{m}$
- 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.



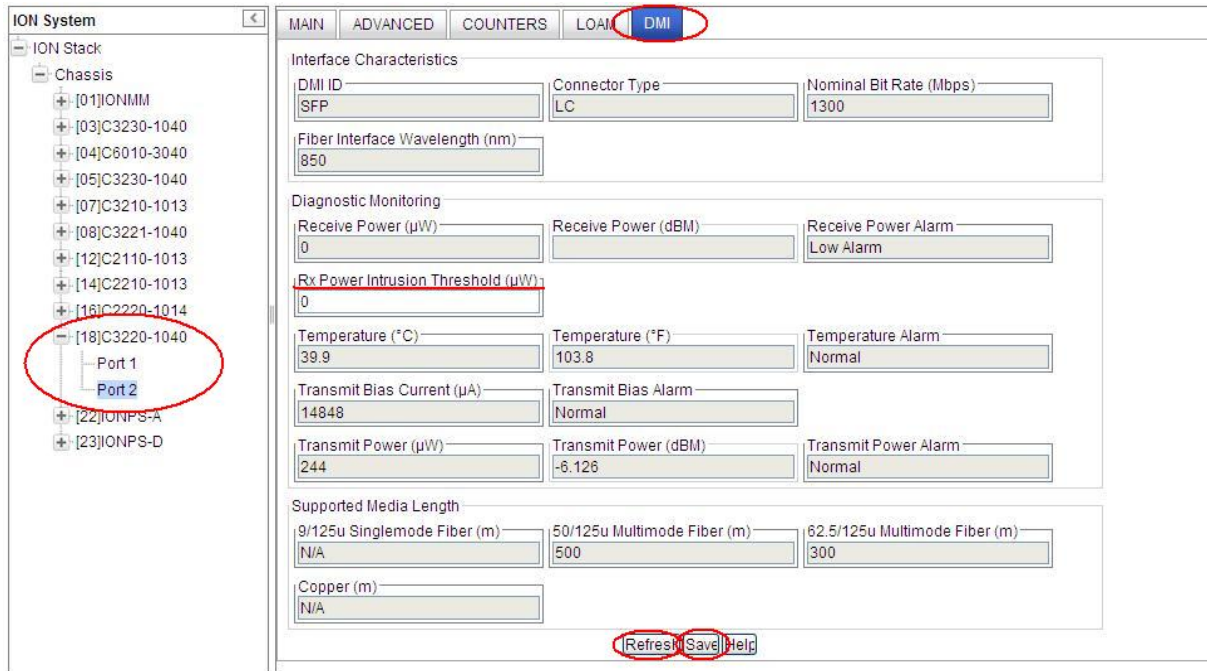
## Removing an SFP Module

**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.

## Diagnostic Monitoring Interface (DMI)

The following DMI port screen and explanation table contains brief definitions of the DMI support offered on some SFP Transceiver Modules. For further information, see the help option on the CPSMM-xxx, SNMP agent, or Transition Networks Focal Point or ION System GUI. **Note:** This feature is not available on all devices and may vary between products. See the related manual for specific information.



TN-SFP distances, TX power, RX power, and link budgets can be found on Transition Networks website, document “SFP/XFP Fiber and Copper Connectors at <https://www.transition.com/lines/optical-devices/>.

The fiber optic transmitters on this device meet Class I Laser safety requirements per IEC-825/CDRH standards and comply with 21 CFR1040.10 and 21CFR1040.11.

**WARNING:** Visible and invisible laser radiation when open. Do not stare into the beam or view the beam directly with optical instruments. Failure to observe this warning could result in an eye injury or blindness.

**IMPORTANT:** Copper based media ports such as Twisted Pair (TP) Ethernet, USB, RS232, RS422, RS485, DS1, DS3, Video Coax, etc., are intended to be connected to intra-building (inside plant) link segments that are not subject to lightning transients or power faults. Copper-based media ports such as Twisted Pair (TP) Ethernet, USB, RS232, RS422, RS485, DS1, DS3, Video Coax, etc., are NOT to be connected to inter-building (outside plant) link segments that are subject to lightning transients or power faults.

The transceiver must be operated within the specified temperature and voltage limits. The optical ports of the module must be terminated with an optical connector or with a dust plug.

## 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 the web interface for a Transition Networks S4224 Carrier Ethernet Network Interface Device. The interface includes a navigation menu on the left with options like System, Ports, Link OAM, DHCP, Security, LACP, Loop Protection, Spanning Tree, MVR, IPMC, LLDP, Ethernet Services, Performance Monitor, PTP, MAC Table, VLANs, DDMI (Overview, Detailed), and UDLD. The main content area is divided into two sections: 'Transceiver Information' and 'DDMI Information'. The 'Transceiver Information' section displays a table with fields: Vendor (Transition), Part Number (TN-10GSFP-LR1), Serial Number (8800022), Revision (0001), Date Code (2011-08-09), and Transceiver (10G). The 'DDMI Information' section displays a table with columns: Type, Current, High Alarm Threshold, High Warn Threshold, Low Warn Threshold, and Low Alarm Threshold. The rows include Temperature(C), Voltage(V), Tx Bias(mA), Tx Power(mW), Rx Power(mW), Tx Power(dBm), and Rx Power(dBm).

The Transceiver Information and DDMI Information sections are described below.

DDMI Parameter	Description
<b>DMI</b>	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.
<b>Port</b>	The device's port number.
<b>Vendor</b>	The SFP vendor's name (e.g., <i>Transition</i> ).
<b>Part Number</b>	The SFP vendor Part number provided by the SFP vendor ( <i>TN-10GSFP-SR</i> ).
<b>Serial Number</b>	The SFP Vendor Serial number provided by the SFP vendor (e.g., <i>8672105</i> ).
<b>Revision</b>	The SFP vendor Revision level for part number provided by the SFP vendor.
<b>Date Code</b>	The vendor's manufacturing date code (e.g., <i>2011-08-09</i> ).
<b>Transeiver</b>	The Transceiver compatibility (e.g., <i>1000BASE_SX</i> or <i>10G</i> ).
<b>Current</b>	The current value of temperature, voltage, TX bias, TX power, and RX power.
<b>High Alarm Threshold</b>	The high alarm threshold value of temperature, voltage, TX bias, TX power, and RX power.
<b>High Warn Threshold</b>	The high warn threshold value of temperature, voltage, TX bias, TX power, and RX power.
<b>Low Warn Threshold</b>	The low warn threshold value of temperature, voltage, TX bias, TX power, and RX power.
<b>Low Alarm Threshold</b>	The low alarm threshold value of temperature, voltage, TX bias, TX power, and RX power.

## Contact Us

**Technical Support:** Technical support is available 24-hours a day. US and Canada: 1-800-260-1312  
International: 00-1-952-941-7600

### Main Office

tel: +1.952.941.7600 | toll free: 1.800.526.9267 | fax: 952.941.2322

[sales@transition.com](mailto:sales@transition.com) | [techsupport@transition.com](mailto:techsupport@transition.com) | [customerservice@transition.com](mailto:customerservice@transition.com)

### Address

Transition Networks  
10900 Red Circle Drive  
Minnetonka, MN 55343, U.S.A.

## For More Information

Technical information in this document is subject to change without notice. For more information see Transition Networks [Optical Devices](#) webpage.

## 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, Transition Networks 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

**Record of Revisions**

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

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