User Guide

TN-SFP-GE-x, TN-GLC-xx-xx, TN-CWDM-SFP-1xx0, TN-CWDM-100LX-1xx0 Series Cisco compatible Small Form Factor Pluggable (SFP)

Transceiver Modules

- Course Wavelength Division Multiplexing (CWDM) ITU Grid Compliant Wavelengths
- Hot-Pluggable SFP Optical Transceiver With Duplex LC Connector
- DMI (Digital Diagnostic Function) and DDMI (Digital Diagnostics Monitoring Interface)
- Class 1 Laser International Safety Standard IEC-60825 Compliant
- Compatible with SFP Multi-Sourcing Agreement (MSA)

Contents

Introduction

Transition Networks TN-SFP-GE-x, TN-GLC-xx-xx, TN-CWDM-SFP-1xx0, and TNCWDM-100LX-1xx0 series small form factor pluggable (SFP) transceiver modules are designed to install in any SFP port. These TN-SFP modules allow a 1000Base-T, 1000Base-SX or LX interface to the network through the SFP connector. TN-SFP transceivers are designed for bi-directional, serial-optical data communications: Gigabit Ethernet or fiber channel at speeds up to 2.125 Gbps.

TN-GLC-SX-MM

TN-CWDM-SFP-1xx0

TN-GLC-BX-x-x0

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.

All Transition Networks' SFP modules fully comply with the Multi-Sourcing Agreement (MSA). This compliance allows our SFP modules to be used in other MSA compliant SFP platforms. In addition, the SFP modules referenced in this manual (TN-SFP-GE-x, TN-GLC-xx-xx, TN-CWDM-SFP-1xx0, and TNCWDM-XL100-1xx0) are also compatible with all Cisco SFP-based equipment supporting similar Cisco model SFPs, as well as its IOS software and SMARTnet. TN SFP modules ARE NOT Cisco OEM brand modules.

Specifications and Standards

The TN-GLC and TN-CWDM series SFPs was designed to meet these standards and specifications:

Standards	Compliant with IEEE 802.3z 1000BASE-LX/ZX
Compliance	IEC-60825; FDA 21; CFR 1040.10 and 1040.11. Compliant with Fiber Channel 1x SM-LC-L FC-PI. RoHS Compliant.
Dimensions	0.52 x 2.18 x 0.33 in (13.4 x 55.5 x 8.5 mm, Fiber)
	0.95 x 2.8 x 0.54 in (14-0 x 71.1 13.7 mm, Copper)
Weight	1 oz. (28 g) approximately
Voltage	3.3V, Fiber 0.66 W; Copper 1.0 W
Wavelength	-6.0 < λc < +7.5 nm (*TN-CWDM-xx-1xx0 only*)
Operating Temp	TN-GLC-xx-xx, TN-CWDM-xx-1xx0: 0°C to 70°C (32°F to 158° F).
	TN-SFP-GE-x: -40°C to 85°C (-40° to 185°F).
Storage Temp	-40°C to 85°C (-40° to 185°F)
Humidity	5% to 95%, non-condensing
MTBF	MTBF for TN-GLC-LX-SM-RGD is 477,008 hours.
Warranty	Lifetime

Optic Specifications

xx = center wavelength (λc)

27 =1270nm	39 = 1390nm	53 = 1530nm	29 = 1290nm	41 = 1410nm
55 = 1550nm	31 = 1310nm	43 = 1430nm	57 = 1570nm	33 = 1330nm
47 = 1470nm	59 = 1590nm	35 = 1350nm	49 = 1490nm	61 = 1610nm
37 = 1370nm	51 = 1510nm			

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

SKUs

#	SKU	Description
1	TN-CWDM-SFP-1270	1000Base-LX/ZX Fibre Channel (LC) single mode 1270nm [80 km/49.7 mi.] Link Budget: 24.0 dB
2	TN-CWDM-SFP-1290	1000Base-LX/ZX Fibre Channel (LC) single mode 1290nm [80 km/49.7 mi.] Link Budget: 24.0 dB
3	TN-CWDM-SFP-1310	1000Base-LX/ZX Fibre Channel (LC) single mode 1310nm [80 km/49.7 mi.] Link Budget: 24.0 dB
4	TN-CWDM-SFP-1330	1000Base-LX/ZX Fibre Channel (LC) single mode 1330nm [80 km/49.7 mi.] Link Budget: 24.0 dB
5	TN-CWDM-SFP-1350	1000Base-LX/ZX Fibre Channel (LC) single mode 1350nm [80 km/49.7 mi.] Link Budget: 24.0 dB
6	TN-CWDM-SFP-1370	1000Base-LX/ZX Fibre Channel (LC) single mode 1370nm [80 km/49.7 mi.] Link Budget: 24.0 dB
7	TN-CWDM-SFP-1390	1000Base-LX/ZX Fibre Channel (LC) single mode 1390nm [80 km/49.7 mi.] Link Budget: 24.0 dB
8	TN-CWDM-SFP-1410	1000Base-LX/ZX Fibre Channel (LC) single mode 1410nm [80 km/49.7 mi.] Link Budget: 24.0 dB
9	TN-CWDM-SFP-1430	1000Base-LX/ZX Fibre Channel (LC) single mode 1430nm [80 km/49.7 mi.] Link Budget: 24.0 dB
10	TN-CWDM-SFP-1450	1000Base-LX/ZX Fibre Channel (LC) single mode 1450nm [80 km/49.7 mi.] Link Budget: 24.0 dB
11	TN-CWDM-SFP-1470	1000Base-LX/ZX Fibre Channel (LC) single mode 1470nm [80 km/49.7 mi.] Link Budget: 24.0 dB
12	TN-CWDM-SFP-1490	1000Base-LX/ZX Fibre Channel (LC) single mode 1490nm [80 km/49.7 mi.] Link Budget: 24.0 dB
13	TN-CWDM-SFP-1510	1000Base-LX/ZX Fibre Channel (LC) single mode 1510nm [80 km/49.7 mi.] Link Budget: 24.0 dB
14	TN-CWDM-SFP-1530	1000Base-LX/ZX Fibre Channel (LC) single mode 1530nm [80 km/49.7 mi.] Link Budget: 24.0 dB
15	TN-CWDM-SFP-1550	1000Base-LX/ZX Fibre Channel (LC) single mode 1550nm [80 km/49.7 mi.] Link Budget: 24.0 dB
16	TN-CWDM-SFP-1570	1000Base-LX/ZX Fibre Channel (LC) single mode 1570nm [80 km/49.7 mi.] Link Budget: 24.0 dB
17	TN-CWDM-SFP-1590	1000Base-LX/ZX Fibre Channel (LC) single mode 1590nm [80 km/49.7 mi.] Link Budget: 24.0 dB
18	TN-CWDM-SFP-1610	1000Base-LX/ZX Fibre Channel (LC) single mode 1610nm [80 km/49.7 mi.] Link Budget: 24.0 dB

Conformal Coated SFPs (TN-SFP-GE-x-C)

- TN-SFP-GE-S-C
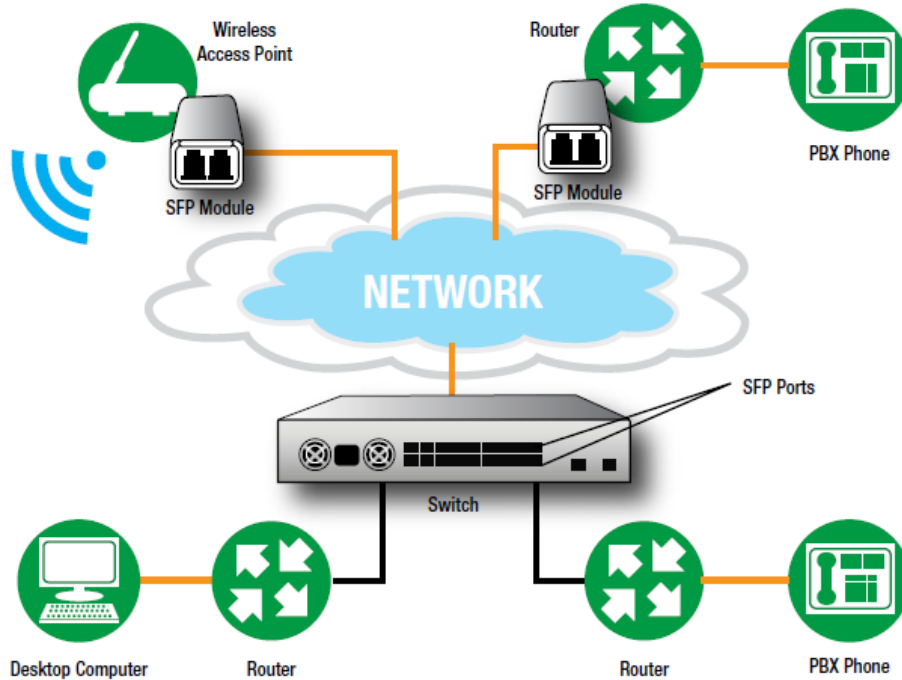- TN-SFP-GE-L-C
- TN-SFP-GE-Z-C

Features:

- Extended operating temperature -40°C ~ +85°C
- Compliant with IEEE802.3z Gigabit Ethernet Standard
- SFF-8472 Digital Diagnostic Function (DMI)
- Conformal Coating (polyurethane coating Dymax 9482) for PCBs
- Comply to EIA-364-65B Class IIIA

SKU	Data Rate (Mbps)	Media	Wavelength (nM)	Transmission Distance (Km)	Temp. Range (°C)
TN-SFP-GE-S-C	1250	Multi mode fiber	850	550	-40~85
TN-SFP-GE-L-C	1250	Single mode fiber	1310	10	-40~85
TN-SFP-GE-Z-C	1250	Single mode fiber	1550	80	-40~85

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:

- o   One TN-10G-SFP-xxx
- o   Two protective foam pieces
- o   One Documentation Postcard

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

SFP Installation

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

The Fiber Optic Association, Inc. provides a Technical Bulletin on "*Guidelines for Testing and Troubleshooting Fiber Optic Installations*" at http://www.thefoa.org/tech/guides/TT3.pdf.
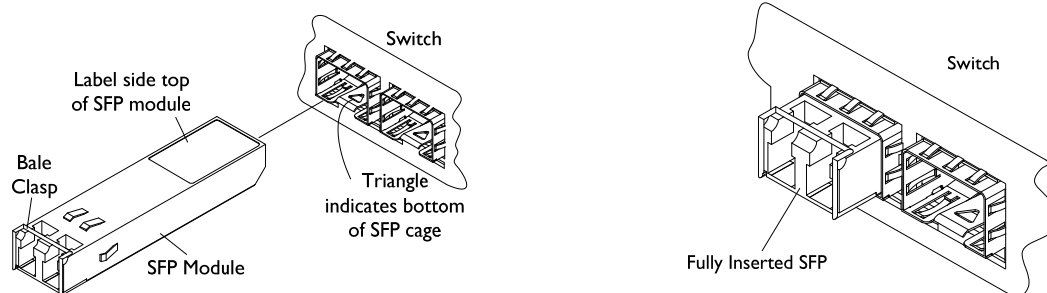There are other FOA Technical Bulletins that should be used as references for the design and planning of the network. These documents can be downloaded from the FOA Tech Topics website.
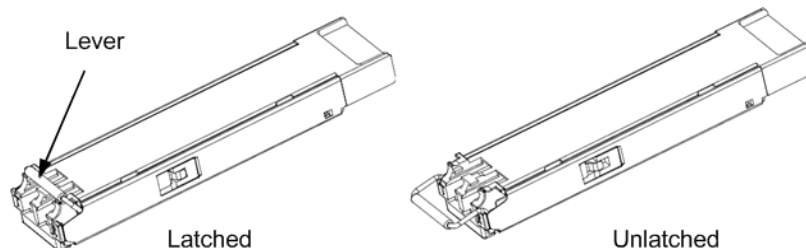
Cautions

- The SFP tranceiver module is keyed to only be installed one way. However, if forced the wrong way, damage may occur.
- 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 surfacees of the optical fiber before you plug them back in to the optical bores of another SFP tranceiver module.
- 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.

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 <u>not</u> be removed, it is installed and seated properly. If the SFP <u>can</u> 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

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
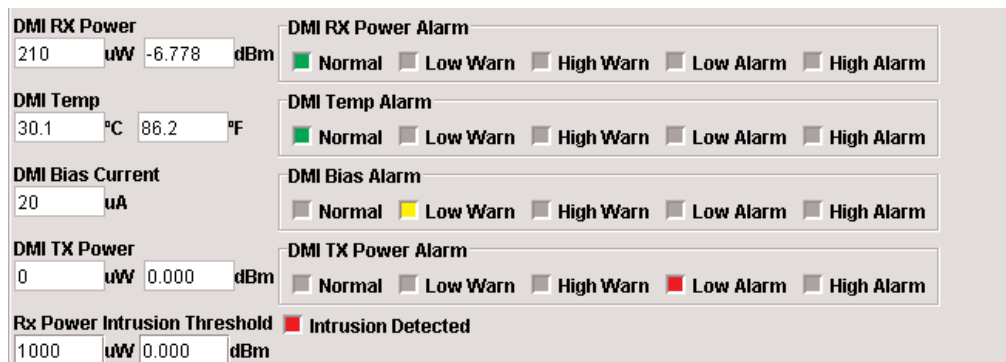
clasp latch. Grasp the SFP transceiver module between your thumb and index finger, and carefully remove it from the socket.

4. Replace the Dust Plug.

5. Place the removed SFP/SFP+ transceiver module in an antistatic bag or other protective package.

DMI (Diagnostic Monitoring Interface)

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 more information.

DMI Parameter	Description
DMI Rx Power	Measured receive optical power in microwatts and in decibels relative to 1mW.
DMI Rx Power Alarm	Alarm status of measured receive optical power.
DMI Temp	Internally measured temperature of transceiver in degrees Celsius and degrees Farenheit.
DMI Temp Alarm	Alarm status for internally measured temperature of the transceiver.
DMI Bias Current	Measured transmit bias current in microamperes.
DMI Bias Alarm	Alarm status for measured transmit bias current for the interface.
DMI Tx Power	Measured transmit power in microwatts and in decibels relative to 1mW.
DMI Tx Power Alarm	Alarm status of measured transmit power.
Rx Power Intrusion Threshold	Tells the converter to stop passing traffic when the receive power drops below the new threshold. This feature is sometimes referred to as 'Intrusion Detection,' since tapping into a fiber to intercept traffic leads to a reduction in receive power. This value can be entered in microwatts or in decibels relative to 1mW.

TN-SFP distances, TX power, RX power, and link budgets can be found on Transition Networks website, document 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.
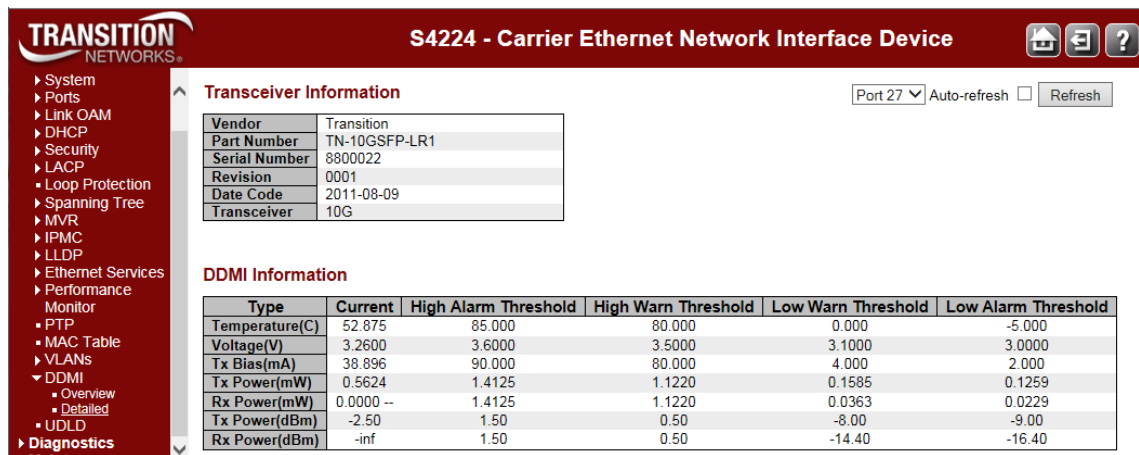
IMPORTANT: Copper based media ports such as Twisted Pair (TP) Ethernet, USB, RS232, RS422, RS485, DS1, DS3, Video Coax, etc., are intended to be connected to intra-building (inside plant) link segments that are not subject to lightening transients or power faults. Copper-based media ports such as Twisted 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 lightening transients or power faults.

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 DMI 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 Transceiver Information and DDMI Information sections are described below.

DDMI Parameter	Description
DMI	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 (e.g., *Transition*).
Part Number	The SFP vendor Part number provided by the SFP vendor (*TN-10GSFP-SR*).
Serial Number	The SFP Vendor Serial number provided by the SFP vendor (e.g., *8672105*).
Revision	The SFP vendor Revision level for part number provided by the SFP vendor.
Date Code	The vendor's manufacturing date code (e.g., *2011-08-09*).
Transeiver	The Transceiver compatibility (e.g., *1000BASE_SX* or *10G*).
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.

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 | techsupport@transition.com | 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.	**Advarsel** Laserprodukt av klasse I.
Waarschuwing Klasse-I laser produkt.	**Aviso** Produto laser de classe I.
Varoitus Luokan I lasertuote.	**¡Advertencia!** Producto láser Clase I.
Attention Produit laser de classe I	**Varning!** Laserprodukt av klass I.
Warnung Laserprodukt der Klasse I.	**Aviso** Produto a laser de classe I.
Avvertenza Prodotto laser di 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 Fäll is der Benutzer für Gegenmaßnahmen verantwortlich.

Attention !

Ceci est un produit de Classe A. Dans un environement domestique, ce produit risque de créer des interférences radioélectriques, il appartiendra alors à l'utilsateur de prende les measures 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 öffentlickes Telekommunikationsnetz in den EGMitgliedstaaten verstösst gegen die jeweligen 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 öffentlickes Telekommunikationsnetz in den EGMitgliedstaaten verstösst gegen die jeweligen 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

Declaration of Conformity

Declaration of Conformity

Transition Networks, Inc.
Manufacture's Name

10900 Red Circle Drive, Minnetonka, Minnesota 55343 U.S.A.
Manufacture's Address

Declares that the products:
TN-SFP-GE-L

Conform to the following Product Regulations:
FCC Part 15 Class A, EN 55022:2010, EN 55024:2010
Directive 2004/108/EC
Low-Voltage Directive 2006/95/EC
IEC/EN 60950-1

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s) and Standard(s).

Minnetonka, Minnesota   *April 1, 2014*
Place   Date   Signature

Stephen Anderson   *Vice President of Engineering*
Full Name   Position   28141B

Record of Revisions

Rev	Date	Notes
A	9/30/13	Initial release.
B	11/22/16	Update DoC, MTBF, and contact information and change format.
C	6/12/19	Add UL and Conformal Coated SFP information.

Trademarks: All trademarks and registered trademarks are the property of their respective owners.