



User's Guide

SGFEB10xx-1xx Stand-Alone Media Converter

- Copper to Fiber
- 10/100/1000Base-TX to 1000Base-SX/LX
- Optional Tap Port

Transition Networks SGFEB10xx-1xx series media converters connect 10Base-TX, 100Base-TX, or 1000Base-TX twisted-pair copper cable to 1000Base-SX or 1000Base-LX fiber cable.

Part Number	Port 1 - Copper 10/100/1000-Base-TX	Port 2 - Duplex Fiber-Optic
SGFEB1013-100	RJ-45 100 m (328 ft)	SC, 1000Base-SX, 850 nm multimode 220 m (720 ft)
SGFEB1014-100	RJ-45 100 m (328 ft)	SC, 1000Base-LX, 1310 nm single mode, 10 km (6.2 miles)
SGFEB1015-100	RJ-45 100 m (328 ft)	SC, 1000Base-LX, 1310 nm single mode, 25 km (15.5 miles)
SGFEB1017-100	RJ-45 100 m (328 ft)	SC, 1000Base-LX, 1550 nm single mode, 65 km (40.4 miles)
SGFEB1024-100	RJ-45 100 m (328 ft)	SC, 1000Base-LX, 1300 nm multimode, 2 km (1.2 miles)**
SGFEB1035-100	RJ-45 100 m (328 ft)	SC, 1000Base-LX, 1550 nm single mode, 125 km (77.5 miles)

The distances listed are the typical maximum cable distance. Actual distance is dependent upon the physical characteristics of the network installation.

** The CGFEB1024 extends 1000Base beyond 220 m. Transition Networks cannot guarantee a full 2 km distance on every installation since the distance is largely dependent on the quality of the fiber, cable installation and splicing.

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SGFEB10xx-1xx

The SGFEB10xx-1xx single fiber-optic models are listed below:

Part Number	Port 1 - Copper 10/100/1000-Base-TX	Port 2 - Single Fiber-Optic 1000Base-SX, single mode
SGFEB1029-100	RJ-45 100 m (328 ft)	SC, 1310 nm (TX) / 1550 nm (RX) 20 km (12.4 miles)
SGFEB1029-101	RJ-45, 100 m (328 ft)	SC, 1550 nm (TX) / 1310 nm (RX) 20 km (12.4 miles)
Install SGFEB1029-100 and SGFEB1029-101 in the same network where one is the local converter and the other is the remote converter.		
SGFEB1029-102	RJ-45 100 m (328 ft)	SC, 1310 nm (TX) / 1550 nm (RX) 40 km (24.9 miles)
SGFEB1029-103	RJ-45 100 m (328 ft)	SC, 1550 nm (TX) / 1310 nm (RX) 40 km (24.9 miles)
Install SGFEB1029-102 and SGFEB1029-103 in the same network where one is the local converter and the other is the remote converter.		

The distances listed are the typical maximum cable distance. Actual distance is dependent upon the physical characteristics of the network installation.

SGFEB1040-1xx Stand-Alone Media Converter

- Copper to Fiber
- 10/100/1000Base-TX to 1000Base-SX/LX
- Small Form Fact Pluggable (SFP) Fiber Port

Transition Networks CGFEB1040-1xx series media converters connect 10Base-TX, 100Base-TX, or 1000Base-TX twisted-pair copper cable to 1000Base-SX or 1000Base-LX fiber cable.

The CGFEB1040-10x has one copper port and one SFP port.



Copper Port 1: 10/100/1000-Base-TX

RJ-45 100 m (328 ft)

The following SFP transceiver modules are compatible with the SFMFF1040-1xx converter and are available from Transition Networks (*sold separately*).

Part Number	Duplex Fiber-Optic Port 2
TN-SFP-SX	LC, 1000Base-SX, 850 nm multimode, 220-550 m (720-1804 ft)*
TN-SFP-LX1	LC, 1000Base-LX, 1310 nm single mode, 10 km (6.2 miles)*
TN-SFP-LX3	LC, 1000Base-LX, 1310 nm single mode, 30 km (18.8 miles)*
TN-SFP-LX5	LC, 1000Base-LX, 1550 nm single mode, 50 km (31.2 miles)*
TN-SFP-LX8	LC, 1000Base-LX, 1550 nm single mode, 80 km (50.0 miles)*

*Typical maximum cable distance. Actual distance is dependent upon the physical characteristics of the network.

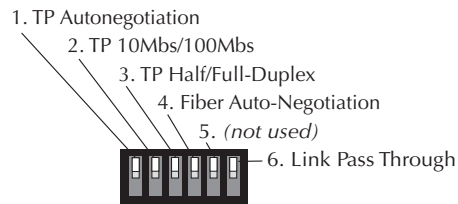
Note: Third-party Multi-Source Agreement (MSA) compliant Small Form Factor Pluggables (SFPs) can be used in the SFMFF1040-1xx fiber port.

Installation

CAUTION: Wear a grounding device and observe electrostatic discharge precautions when setting the jumpers and the six-position switch. Failure to observe this caution could result in damage to, and subsequent failure of, the media converter.

Six-Position Switch

The six-position switch is located on the side of the media converter. Use a small, flat-blade screwdriver (*or a similar device*) to set the switch according to the site requirements (*see the drawing below*).



1. Twisted-Pair Auto-Negotiation

- (up) Enable Auto-Negotiation for the copper connection (*see page 7*).
(down) Disable Auto-Negotiation for the copper connection.

Note: Switches 2 and 3 will not function when twisted-pair Auto-Negotiation is enabled (*switch 1 = up*). The media converter adopts the speed and mode settings from the device at the other end of the copper link.

2. Twisted-Pair 10Mbps/100Mbps

- (up) Set copper connection speed to 100 Mbps.
(down) Set copper connection speed to 10 Mbps.

3. Twisted-Pair Full/Half Duplex

- (up) Operate in full-duplex mode (*see page 8*).
++ Operate in half-duplex mode of the attached device.
(*The default setting is half-duplex.*)

4. Fiber Auto-Negotiation

- (up) Enable Auto-Negotiation for the fiber connection (*see page 7*).
(down) Disable Auto-Negotiation for the fiber connection.

5. (not used)

6. Link Pass-Through

- (up) Enable Link Pass-Through (*see page 7*).
(down) Disable Link Pass-Through.



Installation - Continued

Jumpers

AutoCross™ Jumper

The AutoCross feature allows either straight-through (MDI) or crossover (MDI-X) cables to be used when connecting to 10Base-T, 100Base-TX, or 1000Base-T devices, such as hubs, transceivers, or network interface cards (NICs). AutoCross determines the characteristics of the cable connection and automatically configures the unit to link up, regardless of the cable configuration.

The AutoCross jumper is located on the media converter's circuit board (*labeled E and D -- see the figure to the right*).

Enabled	Either straight-through or crossover cable can be used for all twisted-pair copper links.	E  D <i>Enable Autocross</i>
Disabled	Straight-through or crossover twisted-pair cable, depending on installed site devices, MUST be installed at EACH twisted-pair copper link.	E  D <i>Disable Autocross</i>

Note: Factory default is “enable.” Transition Networks recommends leaving the device in the “enable” mode.

Set the Jumper(s)

- Using a small screwdriver, remove the four (4) screws that secure the cover and carefully remove the cover from the media converter.
- Locate the jumpers on the circuit board.
- Using small needle-nosed pliers or similar device, move the jumpers to the desired positions. (*See the above drawings.*)
- Carefully replace the cover on the media converter and replace the four (4) screws that secure the cover to the media converter.

Installation -- Continued

Install the Cable

Port 1: 10/100/1000Base-TX Copper Port

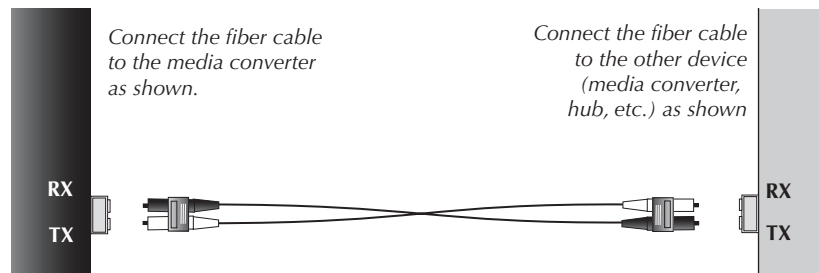
1. Locate or build 10, 100, or 1000Base-TX compliant copper cables with male, RJ-45 connectors installed at both ends.
2. Connect the RJ-45 connector at one end of the cable to the media converter's 10/100/1000Base-TX RJ-45 port (*port 1*).
3. Connect the RJ-45 connector at the other end of the cable to the 10, 100, or 1000Base-TX RJ-45 port on the other device (*switch, workstation, etc.*).

Note: The AutoCross feature, when enabled, allows the use of either straight-through or crossover configuration cables.



Port 2: 1000Base-SX/LX Fiber Port

1. Locate or build 1000Base-SX/LX compliant fiber cable with male, two-stranded TX to RX connectors installed at both ends.
2. Connect the fiber cables to the media converter's 1000Base-SX/LX fiber port (*port 2*) as described:
 - Connect the male TX cable connector to the female TX connector.
 - Connect the male RX cable connector to the female RX connector.
3. Connect the fiber cables to the 1000Base-SX-LX fiber port on the other device (another media converter, hub, etc.) as described:
 - Connect the male TX cable connector to the female RX connector.
 - Connect the male RX cable connector to the female TX connector.



Operation

Power the Media Converter

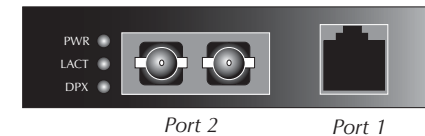
1. Connect the barrel connector on the power adapter to the media converter's power port (*located on the back of the media converter*).
2. Connect the power adapter plug to AC power.
3. Verify that the media converter is powered by observing the illuminated LED power indicator light.

Status LEDs

Fiber Status LEDs

The status LEDs for the 1000Base-SX-LX fiber connection (*labeled DPX, LACT and PWR*) are located next to the fiber port (*Port 2*).

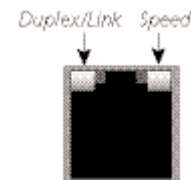
PWR	power	On = Connection to external AC power.
LACT	link activity	On = A link has been established for the fiber connection. Flashing = The fiber connection is transmitting or receiving data.
DPX	duplex	On = Full-duplex mode for the fiber connection. Off = Half-duplex mode for the fiber connection.



Copper Status LEDs

The status LEDs for the copper connection are integrated into the RJ-45 port. These LEDs are not labeled on the media converter. Refer to the drawing to the right for their locations.

Duplex/Link	Yellow	A link in half-duplex mode has been established for the copper connection.
	Flashing Yellow	The copper connection is transmitting/receiving data in half-duplex mode.
	Green	A link in full-duplex mode has been established for the copper connection.
	Flashing Green	The copper connection is transmitting/receiving data in full-duplex mode.
Speed	Off	10 Mb/s operation.
	Yellow	100 Mb/s operation.
	Green	1000 Mb/s operation.



Operation -- Continued

Product Features

Auto-Negotiation

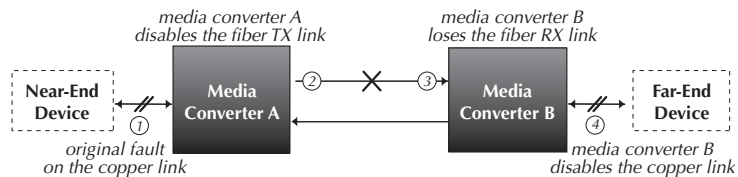
The Auto-Negotiation feature allows the SGFEB10xx-1xx media converter to automatically configure itself to achieve the best possible mode of operation over a link. The media converter broadcasts its speed (10 Mb/s, 100 Mb/s, or 1000 Mb/s) and duplex capabilities (full or half) to the other devices and negotiates the best mode of operation. Auto-Negotiation allows quick and easy installation because the optimal link is established automatically. No user intervention is required to determine the best mode of operation.

A scenario where the media converter is linked to a non-negotiating device is a case where the user may want to disable Auto-Negotiation. In this instance, the mode of operation will drop to the least common denominator between the two devices (e.g., 100 Mb/s, half-duplex). Disabling this feature gives the user the ability to force the connection to the best mode of operation.

NOTE: The SGFEB10xx-10x media converter also supports 1000 Mb/s fiber Auto-Negotiation.

Link Pass-Through

The Link Pass-Through feature allows the media converter to monitor both the fiber and copper RX (receive) ports for loss of signal. In the event of a loss of an RX signal (1), the media converter will automatically disable the TX (transmit) signal (2), thus, “passing through” the link loss (3). The far-end device is automatically notified of the link loss (4), which prevents the loss of valuable data unknowingly transmitted over an invalid link.



Operation -- Continued

Half-Duplex Network (512-Bit Rule)

In a half-duplex network, the maximum cable lengths are determined by the round trip delay limitations of each Fast Ethernet collision domain. (A collision domain is the longest path between any two terminal devices, e.g. a terminal, switch, or router.)

The 512-Bit Rule determines the maximum length of cable permitted by calculating the round-trip delay in bit-times (BT) of a particular collision domain. If the result is less than or equal to 512 BT, the path is good.

For more information on the 512-Bit Rule, see the white paper titled “Collision Domains” on the Transition Networks website at: www.transition.com.

Full-Duplex Network

In a full-duplex network, maximum cable lengths are determined by the type of cables that are used. See pages 1 and 2 for the cable specifications for the different SGFEB10xx-1xx models.

The 512-Bit Rule does not apply in a full-duplex network.

Pause

Note: The “pause” feature is not supported in this product.

Cable Specification

The physical characteristics must meet or exceed IEEE 802.3™ specifications.

Fiber Cable

Bit Error Rate:	<10-9
Single mode fiber (<i>recommended</i>):	9 µm
Multimode fiber (<i>recommended</i>):	62.5/125 µm
Multimode fiber (<i>optional</i>):	100/140, 85/140, 50/125 µm
SGFEB1013-100, SGFEB1013-110	850 nm multimode
Fiber Optic Transmitter Power:	min: -10.0 dBm max: -4.0 dBm
Fiber Optic Receiver Sensitivity:	min: -17.0 dBm max: 0.0 dBm
Link Budget:	7.5 dB
SGFEB1014-100, SGFEB1014-110	1310 nm single mode
Fiber Optic Transmitter Power:	min: -13.0 dBm max: -3.0 dBm
Fiber Optic Receiver Sensitivity:	min: -20.0 dBm max: -3.0 dBm
Link Budget:	7.0 dB
SGFEB1015-100, SGFEB1015-110	1310 nm single mode
Fiber Optic Transmitter Power:	min: -5.0 dBm max: 0.0 dBm
Fiber Optic Receiver Sensitivity:	min: -20.0 dBm max: -3.0 dBm
Link Budget:	15.0 dB
SGFEB1017-100, SGFEB1017-110	1550 nm single mode
Fiber Optic Transmitter Power:	min: -3.0 dBm max: 2.0 dBm
Fiber Optic Receiver Sensitivity:	min: -23.0 dBm max: -3.0 dBm
Link Budget:	20.0 dB
SGFEB1029-100, SGFEB1029-110	1310(TX)/1550(RX) nm single mode
Fiber Optic Transmitter Power:	min: -8.0 dBm max: -3.0 dBm
Fiber Optic Receiver Sensitivity:	min: -21.0 dBm max: -3.0 dBm
Link Budget:	13.0 dB
SGFEB1029-101, SGFEB1029-111	1550(TX)/1310(RX) nm single mode
Fiber Optic Transmitter Power:	min: -8.0 dBm max: -3.0 dBm
Fiber Optic Receiver Sensitivity:	min: -21.0 dBm max: -3.0 dBm
Link Budget:	13.0 dB
SGFEB1029-102, SGFEB1029-112	1310(TX)/1550(RX) nm single mode
Fiber Optic Transmitter Power:	min: -3.0 dBm max: +2.0 dBm
Fiber Optic Receiver Sensitivity:	min: -23.0 dBm max: -8.0 dBm
Link Budget:	20.0 dB
SGFEB1029-103, SGFEB1029-113	1550(TX)/1310(RX) nm single mode
Fiber Optic Transmitter Power:	min: -3.0 dBm max: +2.0 dBm
Fiber Optic Receiver Sensitivity:	min: -23.0 dBm max: -8.0 dBm
Link Budget:	20.0 dB

Cable Specifications - Continued

Fiber Cable - Continued

SGFEB1035-100, SGFEB1035-110	1550 nm single mode
Fiber-optic Transmitter Power:	min: 0.0 dBm max: +5.0 dBm
Fiber-optic Receiver Sensitivity:	min: -32.0 dBm max: -8.0 dBm
Link Budget:	32.0 dB
SGFEB1024-100, SGFEB1024-110	1300 nm multimode **
Fiber Optic Transmitter Power:	min: -10.0 dBm max: -4.0 dBm
Fiber Optic Receiver Sensitivity:	min: -17.0 dBm max: -3.0 dBm
Link Budget:	7.0 dB

**Fiber cable for SGFEB1024-100 and SGFEB1024-110 must be 62.5/125 µm.

Product is certified by the manufacturer to comply with DHHS Rule 21/CFR, Subchapter J applicable at the date of manufacture.

CAUTION: Visible and invisible laser radiation when open. Do not stare into the beam or view directly with optical instruments.

CAUTION: Use of controls, adjustments or the performance of procedures other than those specified herein may result in hazardous radiation exposure.

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.

Copper Cable

Category 5 (<i>minimum requirement</i>)	
Gauge:	24 to 22 AWG
Attenuation:	22.0 dB /100 m @ 100 MHz
Maximum Cable Distance:	100 meters

- Straight-through OR crossover twisted-pair cable may be used.
- Shielded (STP) OR unshielded (UTP) twisted-pair cable may be used.
- All pin pairs (1&2, 3&6, 4&5, 7&8) are active.
- Use only dedicated wire pairs for the active pins:
(*e.g., blue/white & white/blue, orange/white & white/orange, etc.*)
- Do not use flat or silver satin wire.

Technical Specifications

For use with Transition Networks Model SGFEB10xx-1xx.

Standards:	IEEE 802.3™
Dimensions:	4.8" x 3.25" x 1.0" (122 x 82 x 25 mm)
Weight:	10 oz (283 g)
Power Consumption:	7.28 watts
Power Supply:	12VDC, 1.25 A
Data Rate (<i>copper</i>):	10, 100, 1000 Mb/s
Data Rate (<i>fiber</i>):	1000 Mb/s (<i>operates in full-duplex only</i>)
Latency:	64 256 1024 1518 (<i>frame size</i>)
1000Base-T:	3.2 4.8 10.9 14.8 micro seconds
1000Base-SX/LX:	3.2 4.8 10.9 14.8 micro seconds
Packet Size:	Unicast MAC address: 4K bytes Maximum packet size: 1536 bytes Memory: 256K bytes (2 Mbit)
MTBF	48,000 hours (MIL217F2V5.0) (MIL-HDBK-217F) 122,000 hours (Bellcore7 V5.0)
Environment:	Tmra*: 0°C to 50°C (32°F to 122°F) Storage Temp: -40°C to 85°C (-40°F to 185°F) Humidity: 5% to 95°C%, non-condensing Altitude: 0 to 10,000 feet
Warranty:	Lifetime

*Manufacturer's rated ambient temperature.

The information in this user's guide is subject to change. For the most up-to-date information, see the user's guide on-line at www.transition.com.

Troubleshooting

- Is the Power LED illuminated?
NO
 - Ensure that the power adapter is the proper type of voltage and cycle frequency for the outlet (See "Power Supply" on page 11.)
 - Ensure the power adapter is properly installed in the media converter and in the grounded outlet.
 - Contact Tech Support: 1-800-260-1312, Int'l: 00-1-952-941-7600.
 YES
 - Proceed to step 2.
- Is the Duplex LED illuminated yellow OR green?
NO
 - Check the copper cables for proper connection.
 - Contact Tech Support: 1-800-260-1312, Int'l: 00-1-952-941-7600.
 YES - Yellow
 - The media converter has selected half-duplex mode. If this is not the correct mode, disconnect and reconnect the copper cable to restart the initialization process.
 - Proceed to step 3.
 YES - Green
 - The media converter has selected full-duplex mode. If this is not the correct mode, disconnect and reconnect the copper cable to restart the initialization process.
 - Proceed to step 3.
- Is the LACT LED illuminated?
NO
 - Check the fiber cables for proper connection.
 - Verify that the TX and RX cables on the media converter are connected to the RX and TX ports, respectively, on the other device.
 - Contact Tech Support: 1-800-260-1312, Int'l: 00-1-952-941-7600.
 YES
 - Proceed to step 4.
- Is the DPX LED illuminated?
YES
 - The converter has selected full-duplex mode for the fiber link. If this is not the correct mode, disconnect and reconnect the fiber cable to restart the initialization process.
 - Proceed to step 5.
 NO
 - The converter has selected half-duplex mode for the fiber link. If this is not the correct mode, disconnect and reconnect the fiber cable to restart the initialization process.
 - Proceed to step 5.

Troubleshooting -- Continued

5. Is the Speed LED illuminated?

NO

- The media converter has selected 10 Mb/s operation. If this is not the correct speed, disconnect and reconnect the copper cable to restart the initialization process.
- Contact Tech Support: 1-800-260-1312, Int'l: 00-1-952-941-7600.

YES - Flashing Yellow

- The media converter has selected 100 Mb/s speed. If this is not the correct speed, disconnect and reconnect the copper cable to restart the initialization process.
- Contact Tech Support: 1-800-260-1312, Int'l: 00-1-952-941-7600.

YES - Flashing Green

- The media converter has selected 1000 Mb/s operation. If this is not the correct speed, disconnect and reconnect the copper cable to restart the initialization process.
- Contact Tech Support: 1-800-260-1312, Int'l: 00-1-952-941-7600.

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

Transition Now

Chat live via the Web with Transition Networks Technical Support.

Log onto www.transition.com and click the Transition Now link.

Web-Based Seminars

Transition Networks provides seminars via live web-based training.

Log onto www.transition.com and click the Learning Center link.

E-Mail

Ask a question anytime by sending an e-mail to our technical support staff.

techsupport@transition.com

Address

Transition Networks


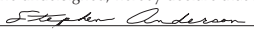
6475 City West Parkway

Minneapolis, MN 55344, U.S.A.

telephone: 952-941-7600

toll free: 800-526-9267

fax: 952-941-2322

 Declaration of Conformity	
Name of Mfg:	Transition Networks 6475 City West Parkway, Minneapolis MN 55344 U.S.A.
Model:	SGFEB10xx-1xx Series Media Converters
Part Number(s):	SGFEB1013-100, SGFEB1014-100, SGFEB1015-100, SGFEB1017-100, SGFEB1024-100, SGFEB1035-100, SGFEB1029-100, SGFEB1040-100, SGFEB1029-101, SGFEB1029-102, SGFEB1029-103, SGFEB1013-110, SGFEB1014-110, SGFEB1015-110, SGFEB1017-110, SGFEB1024-110, SGFEB1029-110, SGFEB1029-111, SGFEB1029-112, SGFEB1029-113, SGFEB1035-110
Regulation:	EMC Directive 89/336/EEC
Purpose: To declare that the <i>SGFEB10xx-1xx</i> to which this declaration refers is in conformity with the following standards. CISPR 22: 1993; EN 55022:1994 A1:1995 A2:1997 Class A; EN 55024:1998; FCC Part 15 Subpart B; 21 CFR subpart J	
I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s) and Standard(s).	
	December 7, 2005
Stephen Anderson, Vice-President of Engineering	Date

Compliance Information

CISPR22/EN55022 Class A + EN55024

CE Mark

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 classe 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.



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 EG-Mitgliedstaaten 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.

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