TN-EOT-xx
Ethernet over Two-wire Extender SFPs
User Guide

- Enable the Ethernet over 2-wire on our MC/Switch by plugging in the Ethernet Extender SFP
- Compliant with any Gigabit MSA standard SFP slot
- Based on VDSL2 technology
- Utilize the existing 2-wire cable
- Support maximum data rate up to 300Mbps per line
- Distance up to 3000 meters
- Hardened -40 to +75°C operating temperature

Contents

Description

The Transition Networks TN-EOT-xx is an integrated SFP, an MSA compliant Small-Form Factor Pluggable (SFP) module that enables traditional Ethernet switch, media converter and other network appliances to connect beyond typical Ethernet coverage (100 meters). Incorporated with the latest VDSL2 technology, this SFP can be easily adapted to existing applications with existing 2-wire cable, such as phone line, to avoid the cost of rewiring. It can drastically extend the Ethernet service on UTP wire with distance up to 3000 meters, and even with the rate of 100Mbps speed up to 400 meters on a standard Cat 5e 2-wire cable.

The SFP also supports Telco grade noise cancellation techniques like Interleave, high SNR profile, and retransmission that can effectively eliminate the noise impact to ensure your service/control messages can securely deliver in a harsh environment.

With long reach coverage, high noise immunity, and compact board size, the Transition Networks TN-EOT-xx is an ideal upgrade for your Enterprise or Industry applications.

Order Information

The TN-EOT-CO and the TN-EOT-RT are sold separately and are used in pairs.

Model	Interface
TN-EOT-CO	SFP, Ethernet Extender, Server, 1000Base-X, RJ-45 (includes RJ to BNC and RJ to Terminal Block adapters). SFP Compliant; CO side Ethernet Extender SFP; 300Mbps (Aggregate rate).
TN-EOT-RT	SFP, Ethernet Extender, CPE, 1000Base-X, RJ-45 (includes RJ to BNC and RJ to Terminal Block adapters). SFP Compliant; CPE side Ethernet Extender SFP; 300Mbps (Aggregate rate).

TN-EOT-CO Extender SFP

TN-EOT-RT Extender SFP

RJ-45 to BNC (Pigtail) Adapter, 28008

RJ-45 to Terminal Block Adapter, 28009

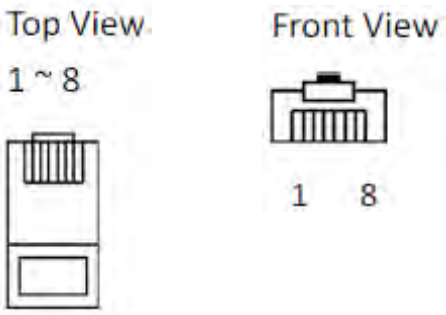
Specifications

Standards	IEEE 802.3z, ITU-T VDSL2
Connectors	One RJ-45
Software	MTU: Max. 2048 bytes MAC Address: 00-C0-F2-7A-00-00 through 00-C0-F2-7A-CE-1F Self Boot & Managed by Internal Flash when plugged into an unmanaged device
Status LEDs	LED1: ORANGE: On: Server; Off: CPE LED2: GREEN: Link Status
Dimensions	Width: 0.52” [13 mm] x Depth: 3.1” [79 mm] x Height: 0.67” [17 mm]
Power Input	3.3v, 700mA
Environment	Operating Temperature: -40 ~ +75°C. Storage Temperature: -40 ~ +85°C Operating Humidity: 10% to 90% (non-condensed) Storage Humidity: 5% to 95% (non-condensed)
Weight	0.07 lbs. [.03 kg]
ESD Class	2kV
Compliance	Safety; CE / FCC
Warranty	1 year

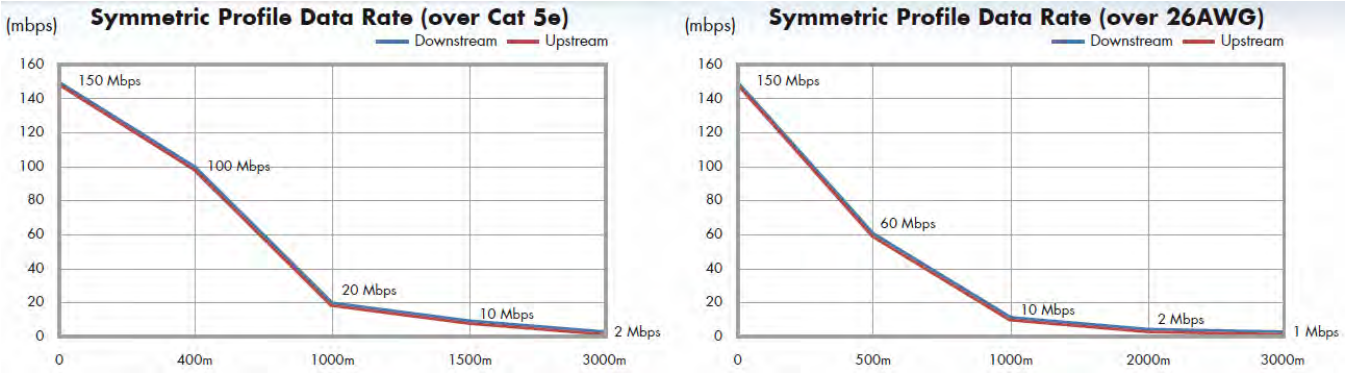
Interface Pin Assignments (RJ-45)

The interface is a standard eight-pin modular jack. The table below shows the pin out assignments.

Pin #	Description
1	Not Used
2	Not Used
3	Not Used
4	Analog Input
5	Analog Input
6	Not Used
7	Not Used
8	Not Used



Data Rates - UTP



Data transfer rates are shown in the table below.

Cable (2-wire Cat 5)	CO to RT (Mbps)	RT to CO (Mbps)	Bi-dir. (Mbps)
260 feet	160	160	320 (160/160)
1000 feet	111	111	222 (111/111)
1260 feet	89	89	178 (89/89)

Data transfer measurements were made on Transition Networks M/GE-ISW-SFP-01 media converters. Frame size used = 2048 bytes.

Data Rates - Coax

Data transfer rates are shown in the table below.

Coax Cable	CO to RT (Mbps)	RT to CO (Mbps)	Bi-dir. (Mbps)
260 feet	160	160	320 (160/160)
1000 feet	111	111	222 (111/111)
1260 feet	89	89	178 (89/89)

Data transfer measurements were made on Transition Networks M/GE-ISW-SFP-01 media converters. Frame size used = 2048 bytes.

Application Example

TN-EOT-xx SFPs are typically used with Transition Networks' M/GE-ISW-SFP-01.

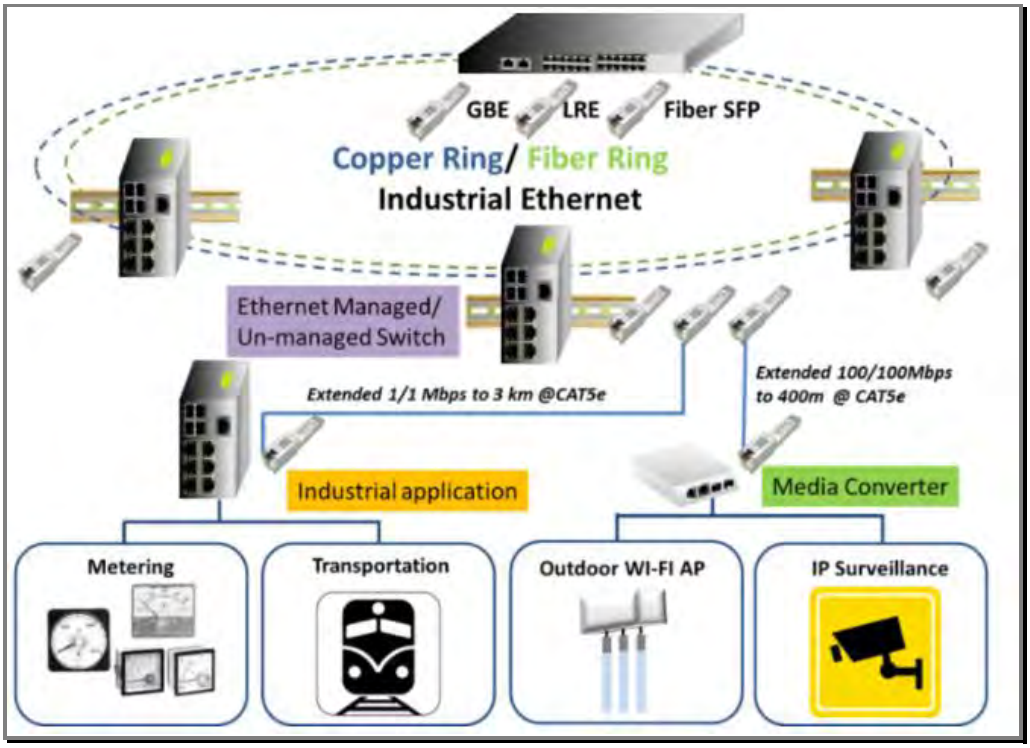
Recommended for use with media converters and unmanaged switches.

Does not support use of "Link Pass Thru". The media converter's Link Pass Through (LPT) feature does not work. Supports a maximum MTU of 2048.

Typically for use with unmanaged devices; lock up issues may occur when used with managed devices.

When the TN-EOT-xx SFP is installed in managed switches, the SFPs maintain synchronization during port state changes (Disable/Enable). During resets and power cycles, the SFPs maintain sync if the ports were specifically configured for 1Gbps speed rather than Auto. With some switches, the S3290 in particular, this configuration must be performed before you insert the SFP.

The TN-EOT-xx SFP doesn't support SGMII; the port is set to 1Gbps speed by default.



Package Contents

Verify you have received the following items. Contact your sales representative if any of these items is missing or damaged. Save the packaging for possible future use.

- ☐ One TN-EOT-CO or one TN-EOT-RT SFP
- ☐ One RJ-45 to BNC (Pigtail) Adapter, 28008
- ☐ One RJ-45 to Terminal Block Adapter, 28009
- ☐ One Printed Quick Install Guide

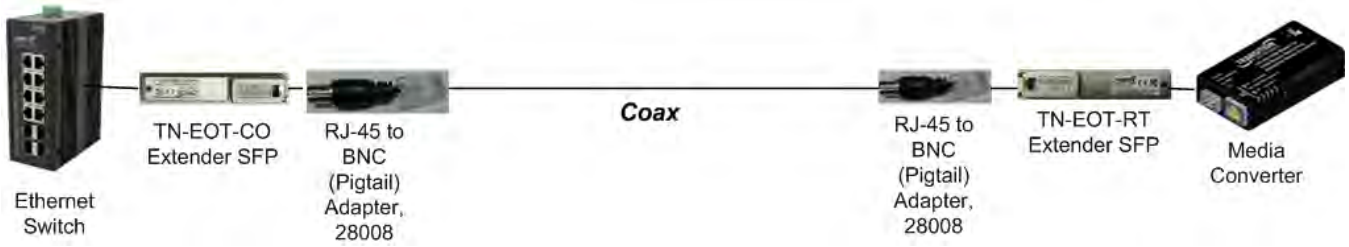
Install Overview

The TN-EOT-xx is an Ethernet Extender in a standard SFP form factor; it provides the ability to leverage the existing 2-Wire or Coax cable infrastructure to extend the Ethernet service. The TN-EOT-xx complies with MSA standards and can quickly enable any switch or media converter with a Gigabit SFP slot to connect beyond typical Ethernet distances (100 meters).

Ethernet over Coax

The TN-EOT-xx can extend the Ethernet service on Coax up to 500 meters at 120Mbps bi-directional data rate (60Mbps downstream and upstream).

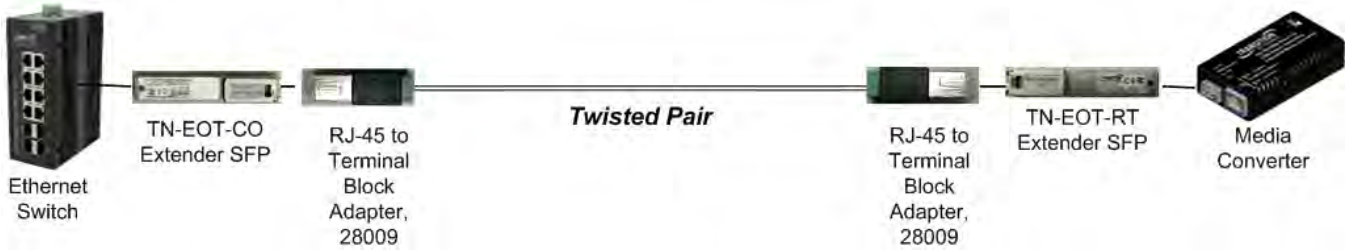
Use the RJ-45 to BNC (Pigtail) Adapter, 28008 on both ends for Ethernet over Coax:



Ethernet over 2 Wire with Adapter

The TN-EOT-xx can extend the Ethernet service on 2-wire with distances up to 400 meters at 200Mbps bi-directional data rate or extend Ethernet on non-UTP 26AWG with distances up to 500 meters at 120Mbps bi-directional data rate.

Use the RJ-45 to Terminal Block Adapter, 28009 on both ends for Ethernet over 2 Wire:



Ethernet over 2 Wire without Adapter

The TN-EOT-xx can extend the Ethernet service on 2-wire with distances up to 400 meters at 200Mbps bi-directional data rate or extend Ethernet on non-UTP 26AWG with distances up to 500 meters at 120Mbps bi-directional data rate.

Connect the twisted pair directly to the SFP through the RJ-45 connector (not using the adapters):

Install Procedure

When the TN-EOT-xx SFP is installed in managed switches, the SFPs maintain synchronization during port state changes (Disable/Enable). During resets and power cycles, the SFPs maintain sync only if the ports were specifically configured for 1Gbps speed rather than Auto. With some switches, the S3290 in particular, this configuration must be performed before you insert the SFP.

The TN-EOT-xx doesn't work on 100Base SFP slot or in SGMII Auto mode; if used with a managed switch, set speed of SFP slots to Gigabit.

Use the provided adapters as follows:

- Use the RJ-45 to BNC (Pigtail) Adapter, 28008 on both ends for Ethernet over Coax.
- Use the RJ-45 to Terminal Block Adapter, 28009 on both ends for Ethernet over 2 Wire.

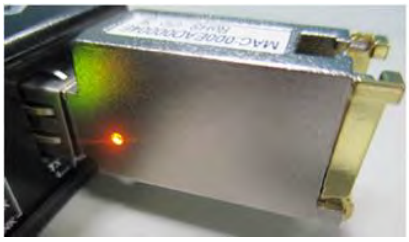
1. Insert a TN-EOT-RT into the host device. LED1 lights (orange) as an indicator of RT. Check for physical connection: LED 2 begins flashing green slowly as soon as you insert the TN-EOT-RT.

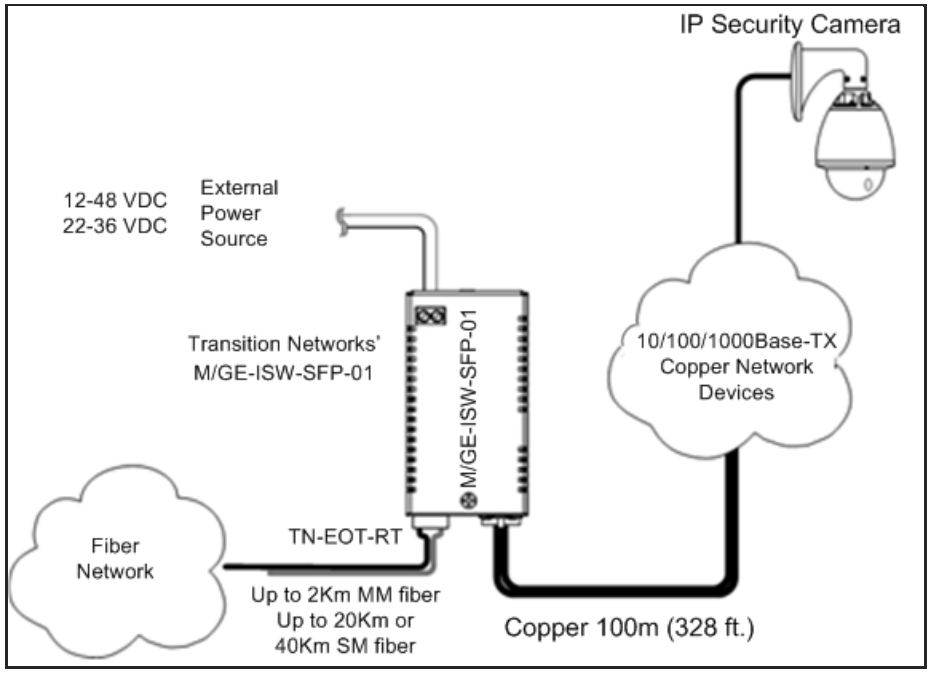
2. Insert an Adapter into the TN-EOT-RT. Connect the cabling.

3. Insert a TN-EOT-CO into the host device. Check for physical connection: LED2 (green) begins flashing Green slowly as soon as you insert the TN-EOT-CO.

4. Insert an Adapter into the TN-EOT-CO. Connect the cabling.

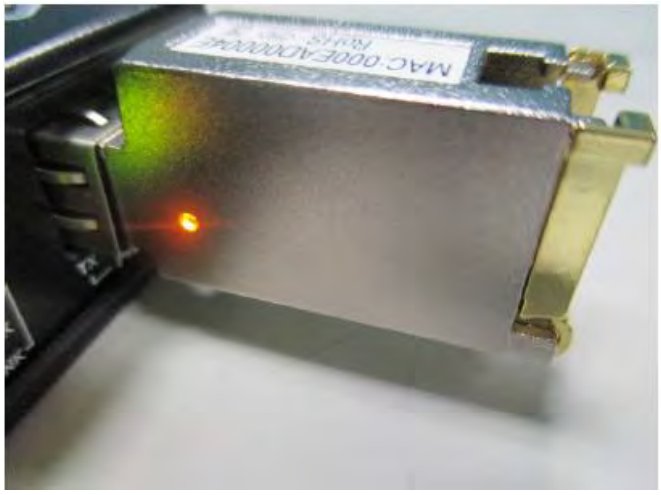
5. Link time takes about 60 seconds. Fast flashing Green LED2 indicates DSL training. LED2 on both SFPs (TN-EOT-CO and TN-EOT-RT) stays Green when devices link up.





LED Descriptions

The TN-EOT-xx SFP LEDs are shown and described below.



LED 1 (Orange): CO/RT Indicator

LED 2 (Green): DSL Link Status Indicator

LED	Color	State	Description
LED 1	Orange	Off On	CO side RT side
LED 2	Green	Off Blinking On	No DSL connection DSL trying to train DSL link is on

Troubleshooting

Use the steps below to isolate the problem to the TN-EOT-xx and correct the problem.

1. Verify the operating environment matches the specs; see the Specifications section on page 2 above.
2. Check the LEDs; see the Install Procedure on page 5 above.
3. Make sure your application is supported; see Application Example on page 4 above.
4. Make sure the power source meets specs and is operating correctly.
5. For problems with large frames (greater than 4098 bytes) causing the link to drop, try setting the max. MTU to 2048 bytes in the application.
6. Make sure the CO side connections and devices are good.
7. Make sure the CPE side connections and devices are good.
8. Record system and device information (see below) before contacting TN Technical Support:
9. Contact Transition Networks Technical Support. See Contact Us on page 12 below.

See the device and package labels for recording troubleshooting information.

TN-EOT-CO SFP Extender

TN-EOT-RT SFP Extender

TN-EOT-xx SFP Package Label

Record System and Device Information

After performing the troubleshooting procedures, and before calling or emailing Technical Support, please record as much information as possible in order to help the TN Technical Support Specialist.

1. Record the **Model Information** for your system. See Package and Device Labeling below.
2. Model # TN-EOT-CO **SN**: _____ Model # TN-EOT-RT **SN**: _____
3. Provide additional product information to your Technical Support Specialist.

   Your Transition Networks service contract number: _____

   Describe the failure: _____

   _____

   Describe any action(s) already taken to resolve the problem (e.g., change switch mode, reboot, etc.):

   _____

   _____

   The model # of other Transition Networks product in the network: _____

   _____

   _____
4. Describe your network environment (devices, layout, cable type, etc.): _____

   _____

   _____

   _____

   Network load and frame size at the time of trouble (if known): _____

   The device history (i.e., have you returned the device before, is this a recurring problem, etc.):

   _____

   _____
5. Any previous Return Material Authorization (RMA) numbers: _____

   _____

Service, Warranty, and Tech Support

Transition Networks warrants to the original consumer or purchaser that this product and all components thereof will be free from defects in material and/or workmanship for a period of one year from the original factory shipment date. Any warranty hereunder is extended to the original consumer or purchaser and is not assignable. Transition Networks makes no express or implied warranties including, but not limited to, any implied warranty of merchantability or fitness for a particular purpose, except as expressly set forth in this warranty. In no event shall Transition Networks be liable for incidental or consequential damages, costs, or expenses arising out of or in connection with the performance of the product delivered hereunder. Transition Networks will in no case cover damages arising out of the product being used in a negligent fashion or manner.
This warranty does not cover damage from accident, acts of God, neglect, contamination, misuse or abnormal conditions of operation or handling, including over-voltage failures caused by use outside of the product's specified rating, or normal wear and tear of mechanical components.

Transition Networks will, at its option:

- Repair the defective product to functional specification at no charge
- Replace the product with an equivalent functional product
- Refund a portion of purchase price based on a depreciated value

To return a defective product for warranty coverage, contact Transition Networks' Customer Support for a return authorization number.

Send the defective product postage and insurance prepaid to the following address:

Transition Networks, Inc.
10900 Red Circle Drive
Minnetonka, MN 55343
USA
Attn: RETURNS DEPT: CRA/RMA # _____

Failure to properly protect the product during shipping may void this warranty. The return authorization number must be written on the outside of the carton to ensure its acceptance. We cannot accept delivery of any equipment that is sent to us without a CRA or RMA number.
CRA's are valid for 60 days from the date of issuance. An invoice will be generated for payment on any unit(s) not returned within 60 days.
Upon completion of a demo/ evaluation test period, units must be returned or purchased within 30 days. An invoice will be generated for payment on any unit(s) not returned within 30 days after the demo/ evaluation period has expired.

The customer must pay for the non-compliant product(s) return transportation costs to Transition Networks for evaluation of said product(s) for repair or replacement. Transition Networks will pay for the shipping of the repaired or replaced in-warranty product(s) back to the customer (any and all customs charges, tariffs, or/and taxes are the customer's responsibility).
Before making any non-warranty repair, Transition Networks requires a $200.00 charge plus actual shipping costs to and from the customer. If the repair is greater than $200.00, an estimate is issued to the customer for authorization of repair. If no authorization is obtained, or the product is deemed not repairable, Transition Networks will retain the $200.00 service charge and return the product to the customer not repaired. Non-warranted products that are repaired by Transition Networks for a fee will carry a 180-day limited warranty. All warranty claims are subject to the restrictions and conventions set forth by this document.
Transition Networks reserves the right to charge a $50 fee for all testing and shipping incurred, if after testing, a return is classified as "No Problem Found."

THIS WARRANTY IS YOUR ONLY REMEDY. NO OTHER WARRANTIES, SUCH AS FITNESS FOR A PARTICULAR PURPOSE, ARE EXPRESSED OR IMPLIED. TRANSITION NETWORKS IS NOT LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOSSES, INCLUDING LOSS OF DATA, ARISING FROM ANY CAUSE OR THEORY. AUTHORIZED RESELLERS ARE NOT AUTHORIZED TO EXTEND ANY DIFFERENT WARRANTY ON TRANSITION NETWORKS'S BEHALF.

Contact Us

Call us at 800-526-9267 or +1-952-941-7600. Telephone: +1-952-941-7600. Toll Free: 800-526-9267
Fax: 952-941-2322 Web: https://www.transition.com
Address: 10900 Red Circle Drive, Minnetonka, MN 55343 USA
Email: customerservice@transition.com or techsupport@transition.com or sales@transition.com

Regulatory Agency Information

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-EOT-CPE, TN-EOT-CO, TN-EOT-RT

Conform to the following Product Regulations:

FCC Part 15 Subpart B, Class B, ANSI C63.4:2014 and ISED ICES-003 Issue 6

EN 55032-2012 / AC:2013, Class B
EN 61000-4-2:2008, EN 61000-4-3:2006 + A1:2007 + A2:2010, EN 61000-4-4:2012, EN 61000-4-6:2013, EN 61000-4-8:2009

With the technical construction on file at the above address, this product carries the
CE Mark

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

Minnetonka, Minnesota — Place
June 19,2017 — Date
Signature
Stephen Anderson — Full Name
Vice President of Engineering — Position
28141B

Standards CE / FCC

FCC Regulations

NOTE: 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 his own expense.

CE Marking

This is a Class A product. In a domestic environment, this product could cause radio interference; as a result, the customer may be required to take adequate preventative measures.

European Regulations

WARNING: This is a Class A product. In a domestic environment, this product could 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 ist der Benutzer für Gegenmaßnahmen verantwortlich.

Attention ! Ceci est un produit de Classe A. Dans un environment 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.

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 EG-Mitgliedstaaten 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.

Record of Revisions

Rev	Date	Description
A	6/20/17	Initial release.
B	8/8/17	Add coax data rates.