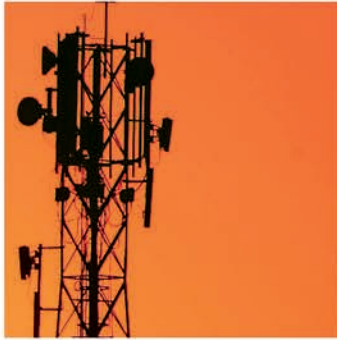YOUR NETWORK. OUR CONNECTION.

TRANSITION
NETWORKS®

SERVICE PROVIDER CATALOG

2012

Corporate Overview

Vision Statement

Transition Networks will be the preferred technology partner providing innovative networking and specialized products worldwide.

Mission Statement

Transition Networks will enable our customers, partners and stakeholders' success by providing the highest quality products and services. We support our employees; enabling them to create a rewarding and innovative culture.

Quality Policy

Transition Networks is committed to providing consistent quality and environmentally friendly products. It is essential for all levels of our organization to strive for excellence and continual improvement in quality, maintaining our competitive edge.

History

Founded in 1987 as Transition Engineering, the company's first products adapted coaxial cable to twisted-pair cables; connecting terminals to mainframe computers. The company was renamed Transition Networks, Inc. in 1995 and experienced continued rapid growth as its products evolved from general Ethernet networking equipment to a complete line of conversion technology solutions. In 1998, Transition Networks was purchased by Communication Systems, Inc, (NASDAQ: JCS).

In 2005, Communication Systems, Inc. integrated MILAN Technologies into Transition Networks. This integration expanded the Transition Networks product portfolio to include a complete line of multilayer switches. This product family of Ethernet switches offers customers unique configurations and a high level of service and reliability. These switches are designed to facilitate low-cost network evolution with unique solutions, all while easing the stress on networks caused by high-bandwidth applications.

In 2011, Communications Systems, Inc. integrated Patapsco Communications into Transition Networks. With this acquisition, Transition adds industry leading technologies such as: circuit emulation services (CESoIP), also known as TDM over IP or pseudowire and a variety of ISDN products including ISDN over IP (ISDNoIP). The acquired Packetband and Mediaband product lines add a wide range of technology allowing for the transportation of TDM traffic over IP and Ethernet packet networks.

Today, Transition Networks, Inc. offers a full suite of fiber connectivity products that enable you to deliver and manage your network traffic reliably over fiber optics. The company's Transition Networks brand of devices make assimilation between disparate media types possible; while helping companies leverage their existing network infrastructure. These media conversion technologies are offered across a broad spectrum of networking protocols including Ethernet, Fast Ethernet, Gigabit, 10 Gigabit, TDM over IP, ISDN over IP, T1/E1, DS3, ATM, RS232/485, video, Power-over-Ethernet, and many more.

Based in Minneapolis, Transition Networks distributes hardware-based connectivity solutions exclusively through a distribution network of resellers in more than 100 countries.

Market Opportunity

Computer networks have evolved into an indispensable business component for corporations around the world. These complex systems of cables, jacks, patch panels, switches, routers, and servers provide the foundation for the communications of our global economy. Many corporations view their networks as a strategic advantage over their competition and focus on constant improvement in performance and capabilities of their networks.

While network managers yearn for the latest equipment and higher speeds, budgetary restrictions impose limitations and precipitate a less than homogeneous network. Inevitably, network administrators must contend with a variety of protocols, speeds, and media in their networks. NIDs were developed to address these problems and evolved from a stop gap technology into a technology that offers network administrators new choices for deploying fiber optics into their networks in a cost effective manner.

Conversion technology enables network evolution, allowing network planners to migrate to new technologies without overhauling existing infrastructure investments or being locked into less flexible and more expensive networking equipment. Fiber provides the distance and bandwidth capability needed for the network backbone, making it the core technology for network evolution.

Transition Networks leverages its expertise in fiber and the physical layer into a full suite of fiber connectivity products, which are unmatched by other industry players. Our products are used by a wide variety of customers including enterprise, government, education, retail, industrial, security, and service providers.

Transition Networks' Portfolio of Products

The company's Transition Networks brand of Network Interface Devices make conversion between disparate media types possible, providing conversion technology solutions that offer the necessary adaptations without affecting the performance, nature or appearance of the network. The company designs and markets these media conversion technologies across a broad spectrum of networking protocols including Ethernet, Fast Ethernet, ATM, Gigabit Ethernet, TDM over IP, ISDN over IP, T1/E1, DS3, video, Power-over-Ethernet, and more. Transition Networks offers its products in chassis, stand alone, and PCI form factors. Our devices are SNMP manageable and can be managed via our graphical user interface Focal Point, a web browser, or a command line interface.

Product Overview

With over 20 years of growth and expertise in hardware manufacturing, Transition Networks offers the ability to affordably integrate the benefits of fiber optics into any data network – in any application – in any environment. Offering support for multiple protocols, any interface, and a multitude of hardware platforms; Transition's portfolio gives you the power to deliver and manage your network traffic reliably over fiber.

Product Quality

Transition Networks' fiber optic/networking products are known for their ruggedness and reliability. Select Transition Networks products carry a lifetime warranty.

For further information call 800-526-9267 or +1-952-941-7600.

Visit our website at www.transition.com.

‣ **Free Worldwide Technical Support** via the web or telephone
‣ **ISO 9001 2000** Quality System Certified
‣ **ISO 14001** Environmental Certification
‣ **Lifetime Warranty** Hassle-free Lifetime Warranty on select Transition Networks products (including power supply and fan)
‣ **Transition NOW** Free Live Web-based training with 8-12 seminars per month, "Chat" Live via the Web

Notes:

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Call us at 800.526.9267 or 952.941.7600

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Carrier Grade Products

The Point System™

Slide-In-Modules housed in a multi-slot chassis; SNMP Management;
High-density applications; Redundant power. [pg 56-64]

Stand-Alone Network Interface Devices (NIDs)

Single point of conversion; Mid to low density applications;
Rack or Wall Mountable. [pg 65-78]

The ION Platform

The ION Platform is an all new intelligent, high density, multi protocol system supporting a
variety of network interface devices and modules. Designed for network applications where
multiple points of fiber intergration and secure network management
at the fiber devices are essential. [pg .29-51]

Small Form Factor Pluggables (SFPs)

Copper to Fiber connections via the GBIC or SFP port on switches and routers;
Economical; Hot-swappable. [pg 97-111]

CWDM

While utilizing existing infrastructure, CWDM products allow you
to transmit multiple protocols over an existing duplex fiber link. [pg 112]

Switching Solutions

Full selection of low port count to high port count Ethernet switching solutions. [pg 94-96]

< 6 >   Call us at 800.526.9267 or 952.941.7600

Product Guide

Ethernet Access/Metro Ethernet
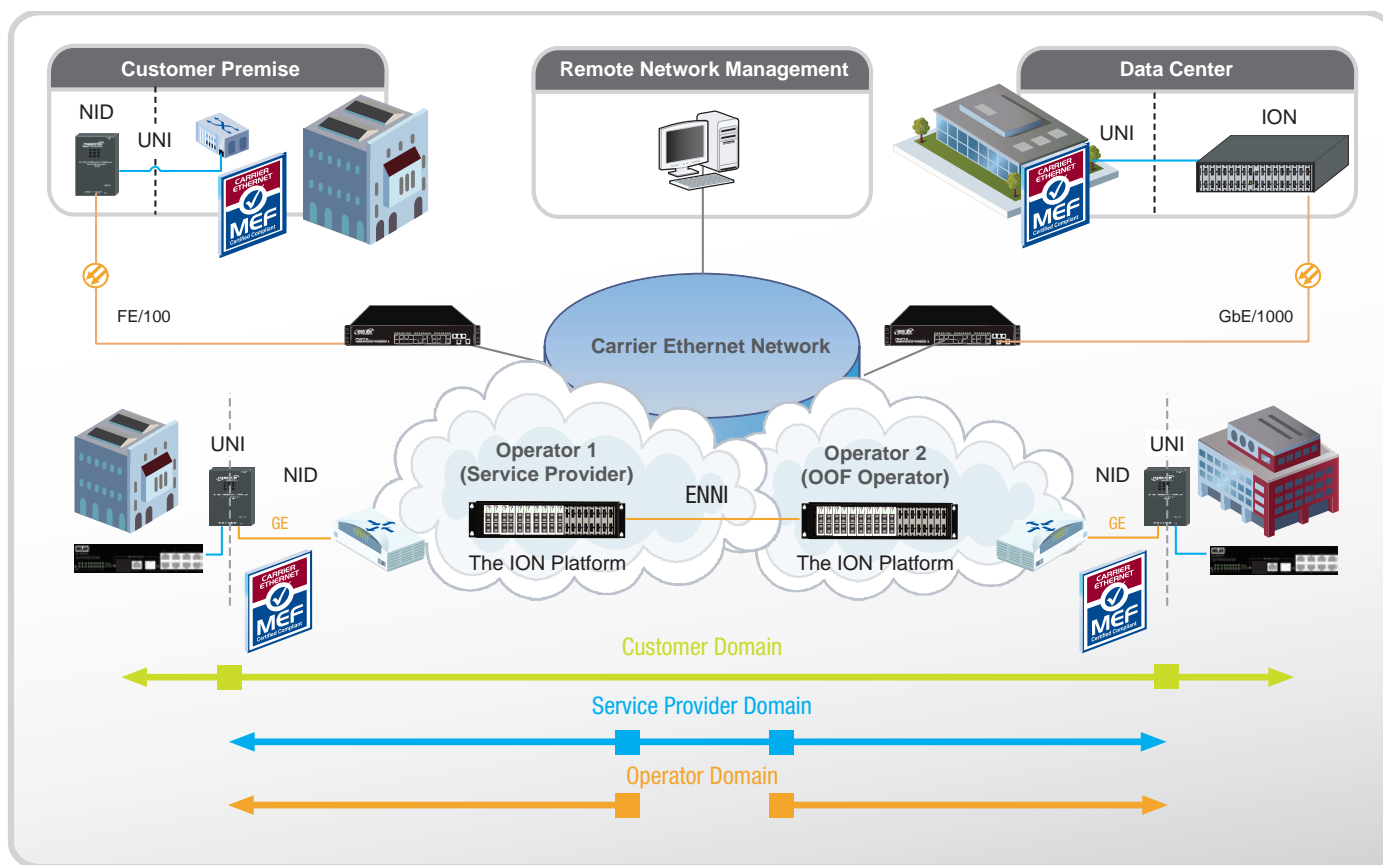
Application Description

Ethernet Access / Metro Ethernet using IEEE 802.3ah, 802.3ag & ITU Y.1731

As an active participant in the MEF (Metro Ethernet Forum) IEEE and other standards bodies, Transition offers a full line of MEF-compliant Ethernet Network Interface Devices (NIDs) both in stand-alone, chassis based, fixed or SFP optical ports. Designed for Metro Ethernet and Mobile Backhaul, Transitions' family of NIDs are available in a variety of port counts, redundant AC/DC power options, Link OAM or full Service OAM with Performance Monitoring (802.3ah, 802.1ag, Y.1731) and integrated Layer 2 features including full VLAN support, double tagging (Q-in-Q – IEEE 802.1ad) and bandwidth allocation to limit both ingress/egress traffic. Designed for networks that require strong security (SSH/SSL, RADIUS, ACL) and advanced troubleshooting, Transitions' NIDs are designed for achieving best-in-class Ethernet services.

Features and Benefits:

- MEF compliant when delivering MEF services
- Remote Management utilizing OAM - 802.3ah Link Layer OAM, 802.1ag Service OAM, and Y.1731 Performance Monitoring
- Advanced features such as: Bandwidth Allocation, 802.1q VLANS and 802.1p QoS to deliver tiered services
- Intelligent demarcation device to clearly define the UNIProvision and turn-up Ethernet Virtual Circuits (EVCs) traversing multiple operators
- Provision and turn-up Ethernet Virtual Circuits (EVCs) traversing multiple operators
- Verify connectivity with continuity checks, link trace, loopbacks and perform SLA verification with performance monitoring, Frame Loss Ratio (FLR) and Frame Delay (FD)
- Ensure accuracy with 1588v2 and SyncE synchronized clock frequency across network devices

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S3280	[pg 45]

Fiber Access Solutions

WDM/CWDM/BWDM - Fiber Exhaustion

Wave Division Multiplexing

T1/E1
ATM
FAST ETHERNET
GIGABIT ETHERNET
10G ETHERNET
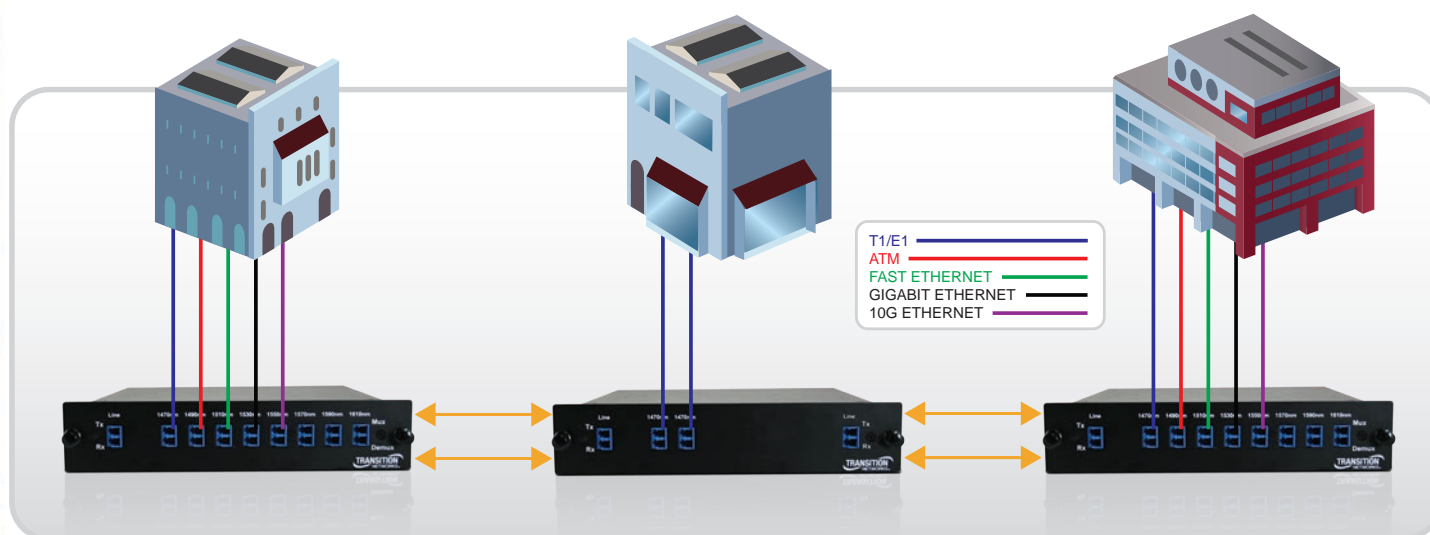
Application Description

CWDM/Fiber Exhaustion

WDM is an excellent method for better utilization of existing fiber infrastructure.   It is expensive to install additional fiber optic lines when fiber is exhausted and the result is often a considerable length of time to recognize this addition as a return on investment.   For the locations where additional services are required to be delivered beyond what the current fiber infrastructure can support, BWDM and CWDM are an excellent way to deliver these additional services without changing your current infrastructure. As shown in the figure above, copper to optical conversion is taking place in building A through the use of a copper Ethernet switch and a Point System™ chassis to a CWDM mux/demux. In building B, a specific wavelength (color) is being dropped off to a switch and then distributed. In building C, CWDM SFPs are being utilized for a direct connection to a fiber switch.

Features and Benefits:

- Passive equipment that uses no electrical power
- Much lower cost per channel than DWDM
- Scalability to grow the fiber capacity as needed with little or no increased cost
- Protocol transparent
- CWDM can provide connectivity for multiple Wireless Carriers using virtually any protocol to the cell tower over a single pair of fiber.

Transition Product Finder	
SFMFF	[pg 73]
TN-SFP	[pg 98]
CWDM	[pg 112]

Private Line/TDM Services

Application Description

Private Line/TDM Services

To support the large base of TDM services, Transition Networks offers many different products across many different protocols to enable a variety of services to be extended over fiber. Customers will continue to use TDM services in certain scenarios and applications, so service providers need an economical way of deploying and managing these TDM services. As shown in the figure above T1/E1 services may be extended from a CO/POP to interface with an enterprise customer's PBX. Up to 4 T1/E1s can be carried across fiber to a Point System™ chassis for Mobile Backhaul scenarios. Companies requiring DS3/E3 services can be extended from a CO/POP over fiber to the customer location.

Transition's Circuit Emulation products provide an economical path forward for legacy TDM networks to cost effectively migrate all TDM traffic to IP/ Ethernet using carrier-class technology offered in our PacketBand TDM multiplexers. Packetband-TDM is designed and proven for transporting highly-accurate clocked TDM circuits over packets.

Features and Benefits:

- Remote management capabilities
- Products to support a variety of TDM services
- Loopback capabilities
- North American and European line settings
- Circuit Emulation (TDM over IP)
- Eliminates the need to lease T1s/T3s and reduces operating costs
- TDM over IP is transparent to protocols or signaling, supports proprietary features and signaling
- Toll-quality voice across the network
- Standards-compliant with TDM over IP, SAToP and CESoPSN
- No forklift upgrades to your equipment

Remote Network Management — Terminal

PBX — Phone — T1/ISDN PBX (T1)

PoP (DS 3)

TDM - Private Line

PBX (T1) (T1)

Main Campus — PBX — (4 x T1)

Fiber Private Line — Building to Building

Building A — PBX

End-to-End Synchronization

TDM Subscriber Demarcation (up to 32 TDM lines)

TDM Network Interface (up to 32 TDM lines)

WAN

Ethernet — Ethernet

PacketBand — PacketBand

Ethernet Virtual Circuit (EVC)

Building A — Building B
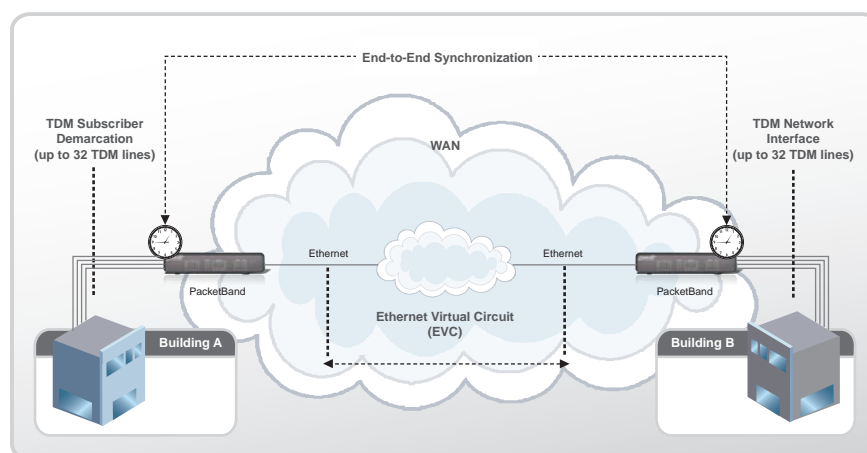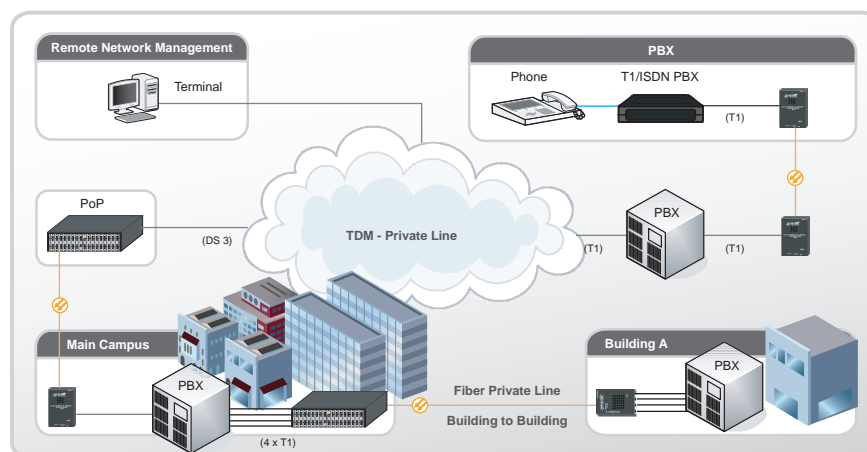
Transition Product Finder

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SCSCF30	[pg 75]
SSDTF	[pg 76]
S4TEF10	[pg 77]

Fiber Access Solutions

Mobile Backhaul - Metro/TDM

End-to-End SLA Monitoring & Diagnostics with 802.3ah, 802.1ag and Y.1731

4G LTE/WIMAX
UNI
Ethernet

FE/GbE

Transport ETH/IP/MPLS

RAN

Carrier Ethernet Aggregation

3G HSDPA
UNI
Ethernet

GbE

Network Contol/Base Station

PoP Site

4G
UNI
Ethernet

GbE/10G

2G
UNI

TDM (T1, E1)

TDM

3G
UNI

4 x T1

RNC/BNC

PoP Site

WIMAX
UNI

Ethernet

8 x T1/E1

End-to-End Synchronization

3G

PacketBand

Slave

RAN

Ethernet Tunnels

TDM
(n x E1/T1)

Master (PRC) in

MPLS

(PRC) in

TDM
(n x E1/T1)

Network Contol/Base Station

3G CDMA & HSPA

2G GSM & GPRS

ATM
(8 x T1)

PacketBand Slave

Fiber Access Solutions

Application Description

Mobile Backhaul

Mobile Backhaul is the single most critical link between the mobile radio equipment and the Operators core network. Mobile operators world-wide are optimizing their networks fueled by massive growth in new data applications, with the most cost efficient backhaul technologies. The shift to newer 3G or all IP 4G/LTE technologies to increase backhaul capacity while maintaining existing 2G TDM cellular services is challenging and often requires a phased-in plan for relieving current backhaul capacity constraints. Transition Networks understands that retaining investments in TDM infrastructure is critical, after all, our commitment and industry wide reputation has always been to extend networks while providing the latest in new carrier class products and technology.

Whether you're looking to extend TDM circuits over fiber, adding TDM to packet convergence or implementing a pure all IP/Ethernet intelligent demarcation devices, Transition Networks has a corporate-wide, long standing commitment to quality.
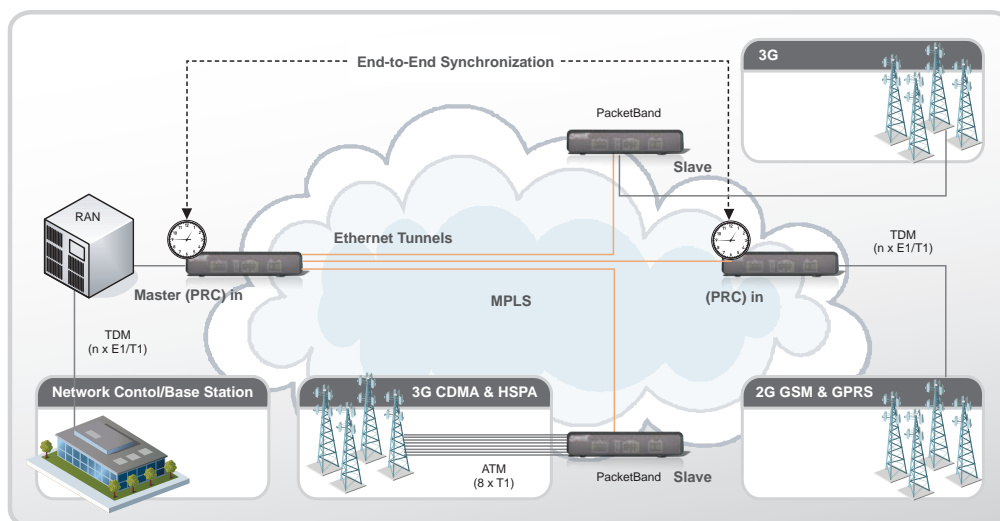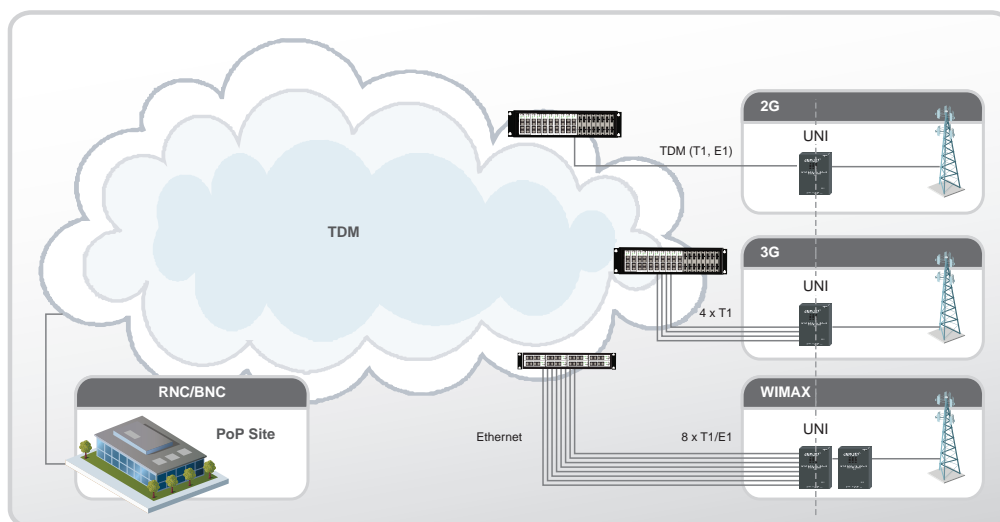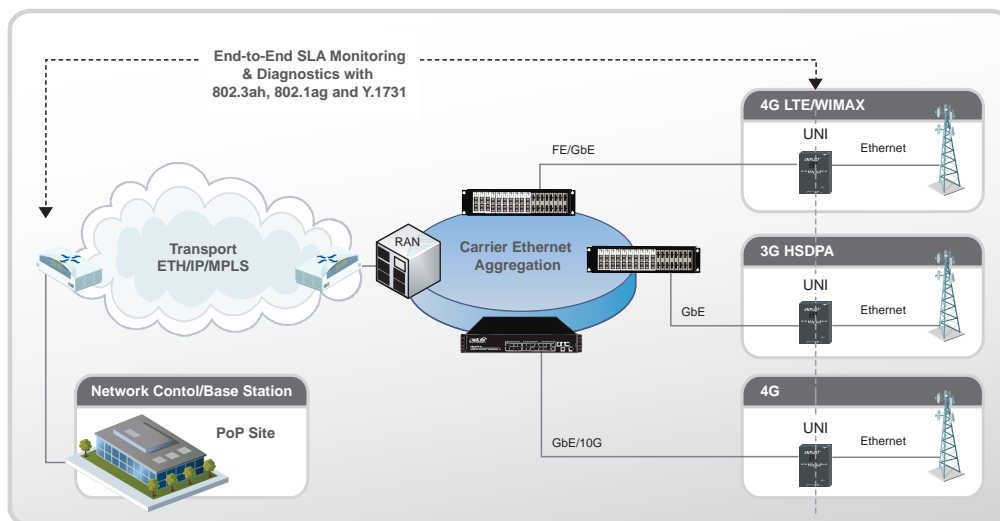
Features and Benefits:

- Remote management capabilities
- Products to support a variety of TDM services
- Loopback capabilities
- North American and European line settings
- Eliminates the need to lease T1s/T3s and reduces operating costs
- TDM over IP that is transparent to protocols or signaling, supports proprietary features and signaling
- No forklift upgrades to your equipment
- Toll-quality voice across the network
- Standards-compliant with TDM over IP, SAToP and CESoPSN
- IEEE 1588v2 and ITU-T Synchronous Ethernet (SyncE) to synchronize clock frequency across devices in the Ethernet backhaul network and improve clock accuracy to satisfy the timing requirements of supporting mobile voice subscribers
- Remote Management utilizing OAM - 802.3ah Link Layer OAM, 802.1ag Service OAM, and Y.1731 Performance Monitoring
- Advanced features such as: bandwidth allocation, 802.1q VLANS and 802.1p QoS to deliver tiered services
- Intelligent demarcation device to clearly define the UNI
- Provision and turn-up Ethernet Virtual Circuits (EVCs) traversing multiple operators
- Verify connectivity with continuity checks, link trace, loopbacks and perform SLA verification with Performance Monitoring, Frame Loss Ratio (FLR) and Frame Delay (FD)

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MDU/MTU Distribution

SRMFE

Business A

CRMFE

Business A

SBFFG

Business B

SFBRM

Business C

Business D

MIL-SM8002TG

MILAN

SM24-1000SFP-AH

GbE/1000

CBFFG

Business A

SFBRM

Business B

SSDTF

Business C

SCSCF30

Business D

S4TEF10

Business E

4 x T1

DS3/T3/E3

T1

GbE/1000

C4TEF/CCSCF/CSDTF/CFBRM/CBFFG
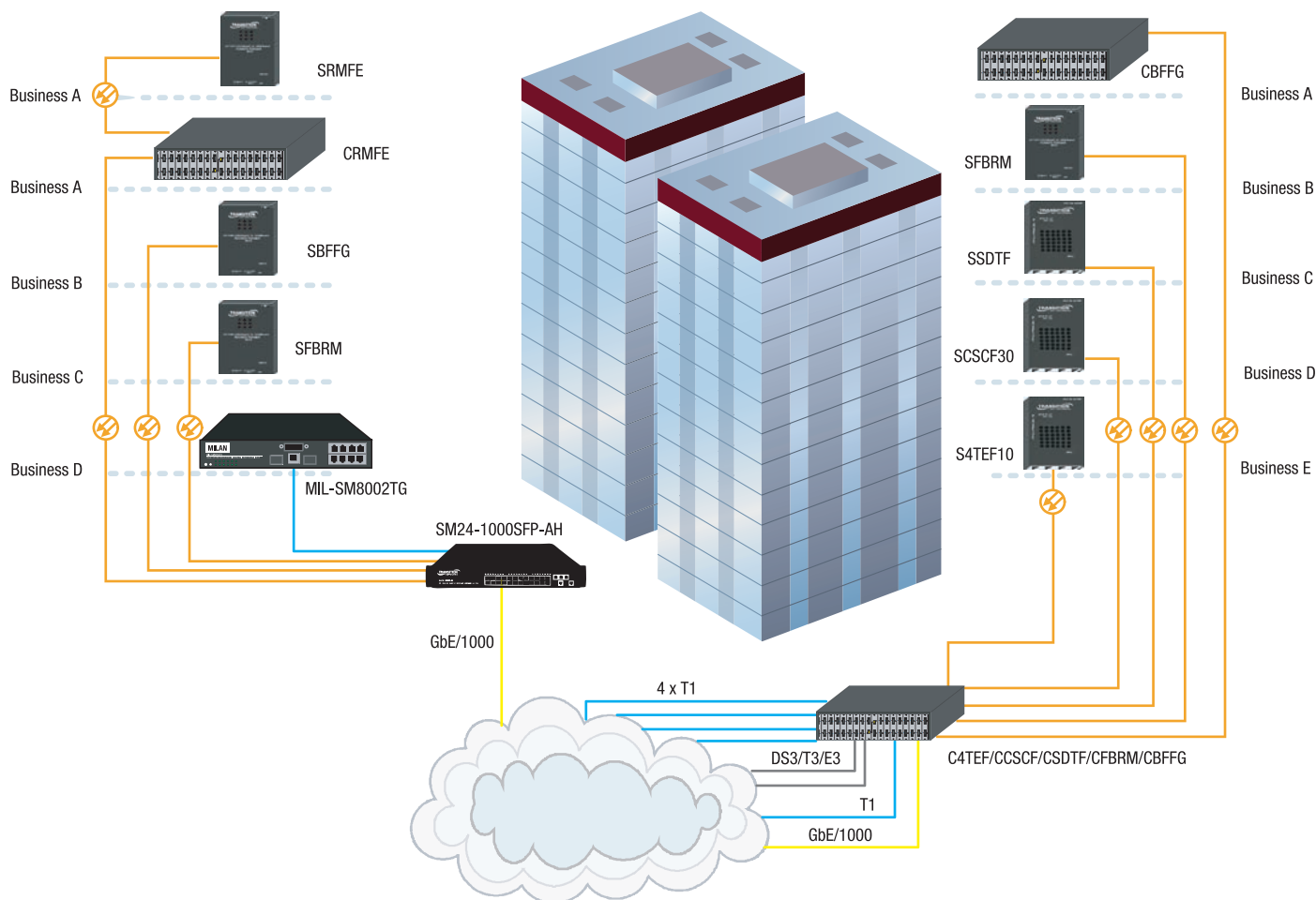
Application Description

MTU Distribution

Delivering service to multiple buildings or tenants over the same fiber is an excellent way to efficiently provide service to customers.   As shown in the figure above a gigabit Ethernet connection is being delivered to a fiber switch and then that Ethernet connectivity can be distributed to various tenants in the building by utilizing the buildings fiber optic or copper riser infrastructure.   If the building requires multiple protocols and services, a chassis based solution can be used to distribute the appropriate protocols and services to the various tenants and locations.

Features and Benefits:

- Efficiently uses existing building infrastructure
- Enables multiple protocol distribution with chassis solution
- Full management capabilities to each tenant / floor
- Scalable to support additional tenants / floors

Transition Product Finder	
CFBRM	[pg 57]
CBFFG	[pg 58]
CCSCF	[pg 61]
CSDTF	[pg 62]
C4TEF	[pg 63-64]
SFBRM	[pg 69-71]
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Fiber Access Solutions

Fiber Extension in the Data Center

Customer Cages

COPPER LIMIT = 100M

MMR

Service Provider & Public Network

Colocation Cross-Connect

Service Provider 1 | Service Provider 2 | Service Provider 3 | Service Provider 4
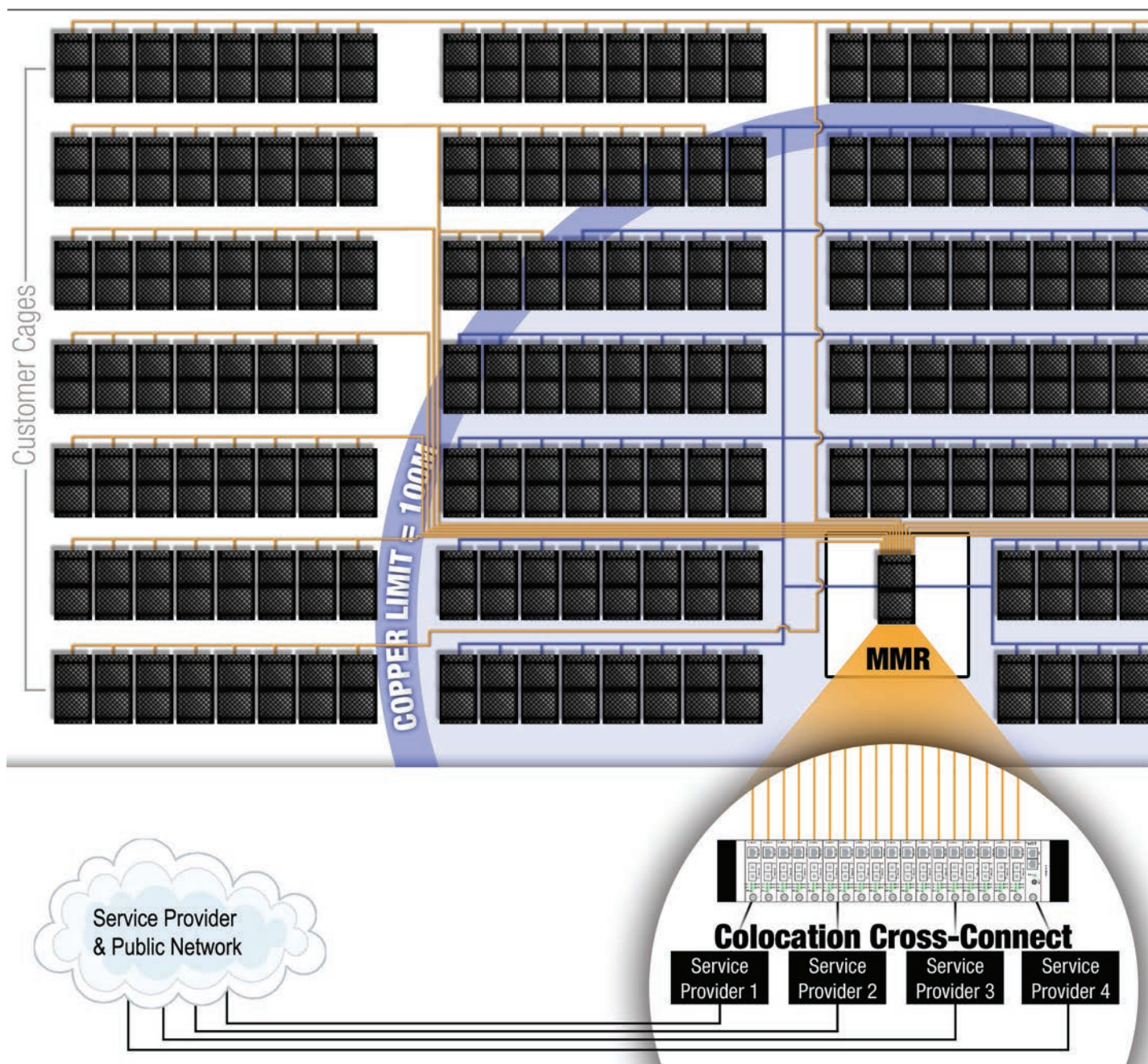
Let Transition Networks help you maintain 99.999%+ availability and Layer 1 Services.

Many Carrier Hotels and large Data Center facilities are often met with the distance limitation of copper cabling. Adding Transition Networks' Copper to Fiber products to your Data Center allows you to maintain a Physical Layer, Transparent, Pass-through connection between the customer cage and the Meet-Me-Room (MMR). The use of media conversion gives the customer and carrier the reassurance that the data is NOT passing through a switched network. This guarantees that the customer will have no added latency, no jitter, no packet inspections and no potential traffic sniffing.

Transition has a broad portfolio of plug and play, stand alone and slide-in-card devices. Built to support multiple protocols (TDM and Ethernet) across any interface and physical infrastructure—our conversion platforms offer the power to deliver and manage cross-connections reliably over fiber.

Classes of Remote Management

Remote Monitoring Capabilites	x2210	x2220/x322x	x323x/S3240	S3280
	Basic	802.3ah Link OAM	802.1ag Service OAM	ITU Y.1731
Basic Remote Monitoring				
Link Pass Through (LPT)	✔	✔	✔	
Transparent Link Pass Through (TLPT)	✔	✔	✔	
Far-End-Fault	✔	✔	✔	
Automatic Link Restoration	✔	✔	✔	✔
Field Upgradeable Firmware	✔	✔	✔	✔
Advance Remote Monitoring				
Loopback		✔	✔	✔
Dying Gasp		✔	✔	✔
RMON Counters		✔	✔	✔
IEEE 802.3ah - Link OAM				
Discovery		✔	✔	✔
Dying Gasp		✔	✔	✔
Link Fault		✔	✔	✔
Critical Events		✔	✔	✔
Remote Loopback		✔	✔	✔
Local Loopback		✔	✔	✔
Fault Isolation		✔	✔	✔
IEEE 802.1ag - Service OAM				
Discovery			✔	✔
Continuity Checks			✔	✔
Loopback			*Port Level	✔
Link Trace			✔	✔
ITU Y.1731 - Performance Monitoring				
Discovery			✔	✔
Continuity Checks			✔	✔
Loopback			*Port Level	✔
Link Trace			✔	✔
AIS			✔	✔
RDI			✔	✔
ETH-TST			✔	✔
Loss Measurement			*Port Only	✔
Delay Measurement			*Roundtrip Only	✔
Delay Variation Measurement			*Roundtrip Only	✔

Product Features	x2210	x2220/x322x	x323x/S3240	S3280
802.1q VLANs		✔	✔	✔
Q-in-Q VLANs		✔	✔	✔
IEEE 802.1P QoS		✔	✔	✔
Bandwidth Allocation		✔	✔	✔
MEF 9 certification		✔	✔	* ✔
MEF 14 certification		✔	✔	* ✔
MEF 21 certification		✔	✔	* ✔
IP addressable		✔	✔	✔
SNMP Management v1, v2, v3	✔ (via mgmt)	✔	✔	✔
1588/Sync-E timing				✔
IPv6				✔

*Note: Certification pending

< 14 >   Call us at 800.526.9267 or 952.941.7600

Advanced Features

If someone tells you media conversion is a commodity product that anyone can bring to market, they probably haven't looked at the extensive product suite offered by Transition Networks. With the industry's most comprehensive offering of full-featured products, Transition's media converters stand out as "the choice" among industry IT professionals.

Generally, media converters are low-level OSI model devices with no IP or MAC addresses and therefore are transparent to the network. This "transparency" makes them very inexpensive and easy to use, but also can make troubleshooting the network very difficult. In an effort to overcome this difficulty and to make media converters "visible" to network managers, Transition has designed full-featured products to include the most advanced features on the market today such as:

- • Auto-Negotiation
- • AutoCross™
- • Far-End-Fault
- • Link Pass Through
- • Transparent Link Pass Through
- • Pause
- • Remote Management
- • Automatic Link Restoration
- • Loopback
- • Bandwidth Allocation
- • Field Upgradeable Firmware
- • Source Address Change
- • Last Gasp
- • Single Fiber Optics

= AUTO NEG

Auto-Negotiation (802.3u)

Auto-Negotiation allows devices to perform automatic configuration to achieve the best possible mode of operation over a link. Devices with this feature will broadcast their speed and duplex capabilities to other devices and negotiate the best mode of operation between the two devices.

▶ No user intervention required to determine best mode of operation

▶ Optimal link established automatically

▶ Quick and easy installation

While the inclusion of this feature is beneficial, the ability to disable it is equally beneficial. In the event of a non-negotiating end device trying to connect to a negotiating device, the mode of operation will drop to the least common denominator between the two devices (i.e. 100 Mbps, half-duplex). Disabling this feature gives the user the ability to force the connection to the best mode of operation when trying to link with a non-negotiating device. Most Transition converters with Auto-Negotiation will allow you to disable this feature.

× AUTO CROSS

AutoCross™

Automatically detects and configures the twisted pair port on the converter to the correct MDI or MDI-X configuration.

▶ Eliminates an entire category of troubleshooting

▶ No need to identify cable type—straight-through or crossover

▶ No user intervention required to determine correct button / switch settings

FAR END FAULT

Far-End-Fault (802.3u)

Far-End-Fault (FEF) is a troubleshooting feature that is generally used in conjunction with Link Pass Through to notify both end devices of a loss of link by monitoring the fiber receive (Rx) signal. In the event of a loss of the fiber RX signal on the far end, the converter will automatically generate a Far-End-Fault signal and send it on its TX fiber port to notify the near end converter of a fiber link loss. Link Pass Through will then disable the copper links on both ends; alerting both end devices of network trouble (see diagram below).

▶ Both end devices automatically notified of link loss

▶ Prevents loss of valuable data unknowingly transmitted over invalid link

▶ Allows for quick diagnosis and resolution of network problems

Transition Networks' media converters that include the FEF feature do not need to be used as pictured left as they will work with other network devices that support Far-End-Fault per IEEE standards.

Advanced Product Features

Advanced Features

Link Pass Through

Link Pass Through is a troubleshooting feature that prevents devices from isolating link failures and it allows end devices to be notified in the event of a loss of link. Link Pass Through provides the device with the abili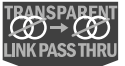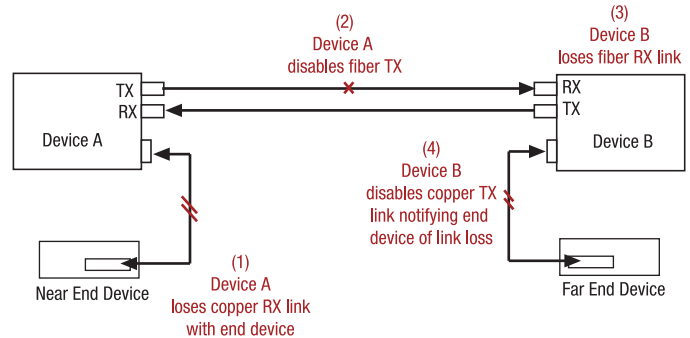ty to monitor both the fiber and the copper RX ports for a loss of signal. If a loss of RX signal occurs on one media port, the device will automatically disable the TX signal on the other port. By shutting down the fiber TX port, the link failure is "passed through" to the remote and local devices (see diagram below).

▶ End device automatically notified of link loss

▶ Prevents loss of valuable data unknowingly transmitted over an invalid link

(2) Device A disables fiber TX
(3) Device B loses fiber RX link
(4) Device B disables copper TX link notifying end device of link loss
(1) Device A loses copper RX link with end device

TX / RX Device A
RX / TX Device B
Near End Device
Far End Device

Transparent Link Pass Through

Transparent Link Pass Through will notify an end device of a link failure just like Link Pass Through, however it uses a different method for "passing through" this information. Transparent Link Pass Through sends a link loss signal over the fiber, instructing the remote device to shut down the copper port thus notifying the end device, while maintaining the fiber link between the two devices (see diagram below).

▶ End device automatically notified of link loss

▶ Fiber link remains up as it carries a link loss signal

(2) Device A sends a link loss signal over the fiber
(3) Device B receives link loss signal and disables the copper TX port
(4) End device is notified of link failure
(1) Device A loses copper RX link with end device

TX / RX Device A
RX / TX Device B
Near End Device
Far End Device
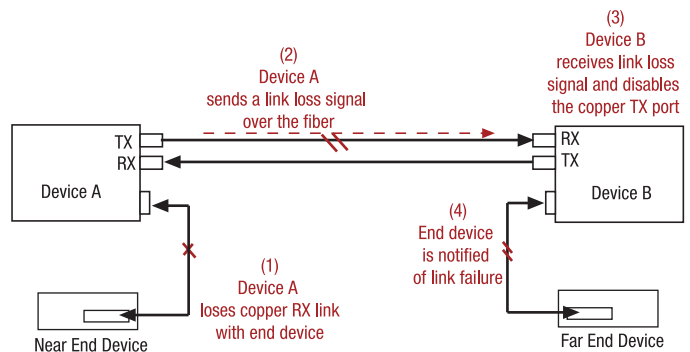
Pause (IEEE 802.3x)

PAUSE signaling is an IEEE feature that temporarily suspends data transmission between two devices in the event that one of the devices becomes overwhelmed. In the event that a device needs some time to clear network congestion, it will send out a PAUSE signal to the other end device, which will then wait a pre-determined amount of time before re-transmitting the data. Transition's devices will pass PAUSE signaling unhindered; ensuring that the message is delivered to the end device.

▶ PAUSE enabled devices allowed to work properly

▶ Prevents loss of valuable data transmission

▶ Reduces bottlenecks and allows for efficient use of network devices

▶ PAUSE signaling is not standardized over fiber media. Transition's devices will communicate this signaling over fiber between the units to pass this signaling on to the other end device.

Remote Management

All chassis-based converters from Transition Networks can be managed through SNMP. Select stand-alone products can also be managed through SNMP. Some remotely managed devices are IP addressable, while others must be used in conjunction with a managed chassis based device. While chassis based products are generally placed in the telecommunications room, stand-alone devices are generally placed in remote locations away from network administrators. Remote in-band management over fiber allows administrators access to the remote device to check status and enable/disable features or the device itself.

▶ Visibility of remote converters for network administrators

▶ Allows for centralized management of devices

Advanced Features

Automatic Link Restoration

After a link failure condition has been corrected, Transition Networks' devices will automatically re-establish the link in all network conditions.

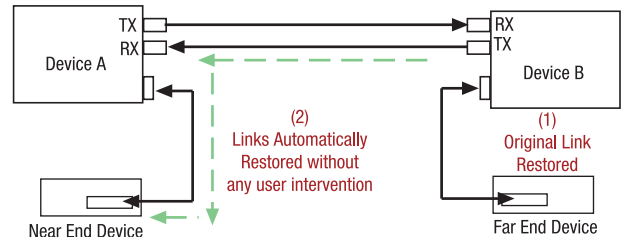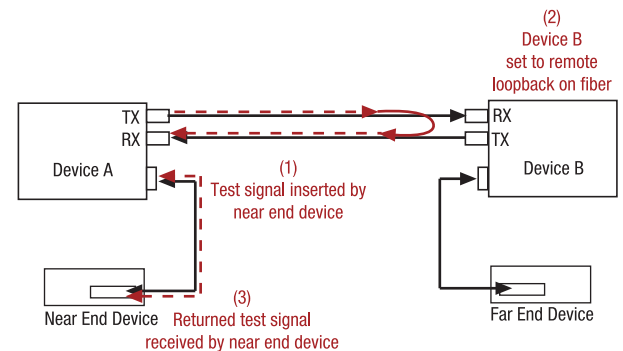▸ No need to reset devices: Transition Networks' devices will automatically re-establish the link when connected to switches if link was lost. With other manufacturers' devices the user must reset the converter to re-establish the link.

▸ Auto-Negotiation Enabled: Automatic Link Restoration allows the users to continue using Auto-Negotiation with Link Loss Notification features. With other manufacturers' devices the user must disable Auto-Negotiation and hard set the link.

▸ Link Pass Through Activated in both directions: Automatic Link Restoration on Transition Networks' products allows users to continue using Link Loss Notification feature activated in both directions. Many competitive solutions allow for Link Loss Notification activation only in one direction. If Link Loss feature is activated in both directions, competitive products are put in a "deadly embrace" and they cannot restore the link without resetting the devices.

Device A
TX
RX
RX
TX
Device B
(2)
Links Automatically
Restored without
any user intervention
(1)
Original Link
Restored
Near End Device
Far End Device

Loopback

Select Transition Networks' products are equipped with Loopback. This feature puts a converter in a special mode that enables the device to loop back the signal from the RX port to the TX port on either media for testing and troubleshooting purposes. Test signals from a tester (Firebird, etc.) can then be inserted into the link and looped back as received by a device to test a particular segment of the link (i.e. copper or fiber). Loopback can be either local or remote depending on the location of the device in the link.

▸ Allows network diagnostics from local or remote location

▸ Quickly pinpoints problem areas of end to end link by testing a particular segment. Some devices have separate copper and fiber loopback functions that can be enabled separately, while others will loopback both copper and fiber at the same time when enabled. Please refer to the specific product page for details.

(2)
Device B
set to remote
loopback on fiber
Device A
TX
RX
RX
TX
Device B
(1)
Test signal inserted by
near end device
Near End Device
(3)
Returned test signal
received by near end device
Far End Device

Bandwidth Allocation

Bandwidth allocation is an important feature found on select devices which allows network administrators to set the bandwidth of the device ports for both ingress and egress bandwidth allocation. The bandwidth can be allocated in a variety of rates up to the full bandwidth capability of the device. See the device product manual for the rates available for that device.

▸ Effectively manage bandwidth usage in the network to support critical processes or activities

▸ Provide only the contracted amount of bandwidth to paying customers

▸ Provide only the bandwidth necessary to end users

Field Upgradeable Firmware

New product features are continuously being added to Transition Networks' products. These improvements are also available for many products already installed in the field. Management modules and many devices can be updated remotely via firmware upgrade. The field upgradeable feature eliminates the need to ship the products back to the manufacturer. The firmware upgrades can be performed by a user either locally via a Console port or remotely via TFTP. The upgrades do not require the reconfiguration of the SNMP management or converter feature settings.

Advanced Product Features

Advanced Features

Single Fiber

Single fiber technology offers a 50% savings in fiber utilization. It is an attractive solution to maximize the usage of a limited number of fiber runs. In a traditional optical link, a fiber pair consists of two uni-directional strands. The single fiber technology multiplexes two optical wavelengths of 1310nm and 1550nm into a single strand fiber. In a single fiber device, each wavelength is responsible for either the transmit or receive function. Consequently, the bi-directional transmission is achieved by using a single strand. The devices in a single fiber scenario "match" each other's wavelengths. Device A transmits at the wavelength of 1310nm and receives at 1550nm while the other device transmits at 1550nm and receives at 1310nm. Therefore, devices are usually used in pairs. Single fiber technology is available on all Transition Networks' Devices in maximum distance ranges from 20 to 120 km.

TX (1310nm) RX (1310nm)
RX (1550nm) TX (1550nm)

Remote Fault Detect

Remote Fault Detect (RFD) is a trouble shooting feature found on Gigabit Ethernet copper-to-fiber devices. By enabling Remote Fault Detect on the remotely located device, the status of the fiber link will be monitored and any link failures will be reported back to the local device. Should the remote device lose its fiber RX signal, Remote Fault Detect will force the device to shut down its fiber TX port. If Link Pass Though is enabled on both ends, then the copper ports will also be shut down to notify both end devices of the link failure.

▶ Enable Remote Fault Detect on the remote device
▶ Local end-device will be notified of remote fiber RX loss

(1) Device B loses fiber RX link
(2) Device B disables TX copper via Link Pass Through to alert Remote End Device of link loss
(3) Device B disables fiber TX port to alert Device A of link loss
(4) Device A disables TX copper via Link Pass Through to alert Local end device of link loss

TX RX Device A Near End Device
RX TX Device B RFD enabled on Remote Device Remote End Device
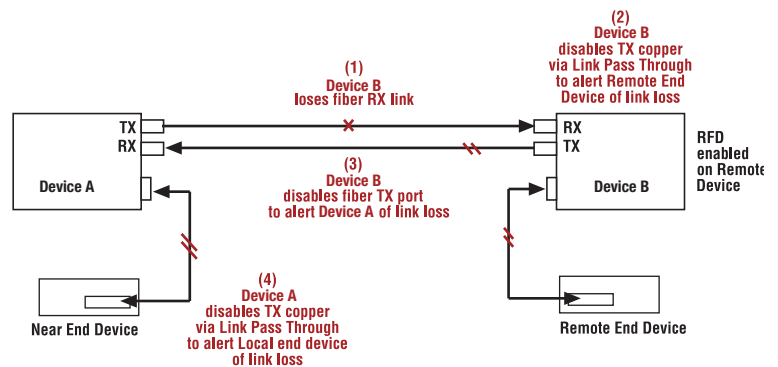
Last Gasp

Select Transition Networks' products are equipped with Last Gasp. This feature enables the device to store a small amount of power to enable it to send out an SNMP trap to alert the management console in the event of a power failure.

▶ Notification of an impending power loss before it happens
▶ Allows for quicker resolution of the power loss

PoE

Power over Ethernet or PoE technology describes a system to pass electrical power safely, along with data, on Ethernet cabling. The IEEE standard for PoE requires category 5 cable or higher for high power level. Power comes from a power supply within a PoE-enabled networking device such as an Ethernet Switch, a Media Converter, or a Midspan Injector.

The original IEEE 802.3af-2003 PoE standard provides up to 15.4 W of DC power to each device. The updated IEEE 802.3at-2009 PoE standard also known as PoE+ or PoE plus, provides up to 25.5 W of power. Typical devices powered via PoE include IP cameras, IP phones, and wireless access points.

PoE Device
TX RX
TX & RX Data on Fiber Power & Data on UTP
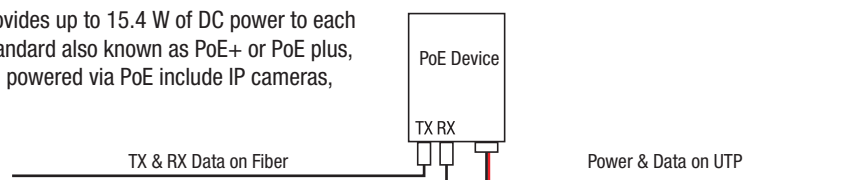
Certification(s)

Metro Ethernet Forum (MEF)

Many of Transition Networks' families of remotely managed network interface devices (NIDs) have been certified to comply with the requirements for MEF certification.

The Metro Ethernet Forum (MEF) is a global industry alliance comprising more than 145 organizations including telecommunications service providers, cable operators, MSOs, network equipment, test vendors, labs and software manufacturers, semiconductor vendors and testing organizations.

The MEF develops technical specifications and implementation agreements to promote interoperability and deployment of Carrier Ethernet worldwide. The MEF's mission is to accelerate the worldwide adoption of Carrier-class Ethernet networks and services.

Transition Networks is a member of the MEF to promote Carrier Ethernet services and products while ensuring interoperability based on standards.

Network Equipment Building System (NEBS)

Transition's Point System™ Chassis has been built to meet NEBS (Network Equipment Building System) requirements. NEBS standards are a major test of quality that is extremely valuable for any organization supplying or purchasing network equipment. A product that is NEBS certified has passed a suite of tests ensuring that the product will:

▸ Operate reliably and be serviceable

▸ Not negatively affect other service providing equipment

▸ Operate properly in adverse environmental conditions

▸ Not cause harm to the environment or personnel

There Are Three levels of NEBS Approvals. Transition Networks' Point System™ Meets The NEBS Level 3 Requirements:

▸ **Level 1:**
  • Minimum environmental compatibility
  • Applications: Prototype equipment, equipment used for non-vital services
▸ **Level 2:**
  • Assures limited equipment operability in controlled or normal environment
  • Applications: equipment used in data centers or failure-tolerant services
▸ **Level 3:**
  • Assures maximum equipment operability
  • Applications: critical network equipment (e.g. switches, transport products, power systems)

ROHS Compliance

All Transition Networks products are now available for shipment in compliance with the European Union Commission Decision of August 18, 2005, Directive 2002/95/EC on the Reduction of Hazardous Substances (RoHS), which took effect on July 1, 2006.

The RoHS Directive prohibits the sale into the European Union of electronic equipment containing certain amounts of lead, mercury, hexavalent chromium, polybrominated biphenyls (PBBs) and polybrominated diphenylethers (PBDEs). Their maximum contents are defined at a maximum concentration value of less than 0.1% by weight in homogenous material. An additional substance, cadmium, is restricted to 0.01% in homogenous material.

The RoHS Directive allows a lead-in-solder exemption for telecommunication products and Transition Networks will be taking this exemption. Our component vendors and sub-contract manufacturers are continuing to remove lead from the entire process whereby this exemption will no longer be required.

There is no change in the model number or ordering procedure.

Environmental Stewardship

While the RoHS and WEEE directives are limited to the European Union other countries are considering similar legislation. Transition Networks will continue to monitor the development of new legislation and implement any new requirements. Transition Networks is currently ISO14001 compliant and will continue to work to minimize our impact on the environment.

CISPR Class A

FCC (Federal Communications Commission) is the regulatory body that establishes standards for interstate telecommunication services in the United States. Part of the FCC's responsibilities is to establish standards for radiated emissions for a variety of operating environments such as residential and commercial structures. FCC Class A describes requirements for radiated emissions in commercial structures while FCC Class B describes emissions requirements for residential applications.

In addition to being FCC & CISPR Class A compliant (commercial use), Transition's 18-slot Point System™ chassis (CPSMC1800-200) is also FCC Class B and CISPR Class B compliant (residential).

CISPR Class B

CISPR is the acronym standing for the Comité International Spécial des Perturbations Radioélectriques (International Special Committee on Radio Interference) of IEC.

CISPR Class B is an international standard that covers the amount of interference from electromagnetic signals allowed from electronics in homes and multi-tenant dwellings. It is more stringent than the Class A certifications required of most electronics. Point System™ products have been tested to meet all requirements of Class A. Transition's 18-slot Point System™ chassis (CPSMC1800-200) is also FCC Class B and CISPR Class B compliant (residential).

In order to maintain Class B rating all devices in the system must also be Class B rated.

Waste Electronic Equipment (WEEE)

Transition Networks is also working to implement the WEEE recycling program with its partners in the EU. The WEEE directive addresses the problem of recycling products and requires product to be labeled to identify participation in the program. The EU approved "double-crossed wheelie bin" symbol will be affixed to the product, and recycling instructions included in the user's manual.

Advanced Certification

chassis-based conversion features

Conversion Features

Transition Networks' Chassis-based systems are cost effective, fully configurable, managed modular media conversion systems, that provide users with the flexibility to build their own custom media conversion platform. The system includes rack mountable chassis' and modular, hot-swappable slide-in-cards. Each Modular media converter, regardless of protocol, can slide into the same chassis and provide managed media conversion services to a custom network application.

- Cost Savings
- Flexibility
- Maximum Control
- Reliability
- Potential for Future Growth

Cost Savings

Transition's media converters allow users to only pay for fiber ports as needed when adding fiber to their networks. Combining media conversion with copper-based equipment can save up to 45% in cost. Modular media converters allow users to add converters as they need to add fiber to their network. Therefore, users can utilize their existing copper-based equipment and not buy fixed multiport fiber devices.

Flexibility

(☑ I NEED ONE PLACE TO CONVERT MULTIPLE LINKS)
(☑ I NEED ONE PLACE TO CONVERT MULTIPLE PROTOCOLS/SPEEDS)

Because the cards are modular, users can add them gradually when fiber is added to the network and when the network grows. All card blades are hot-swappable and powered by chassis power supplies. The modularity also means that the Chassis supports a mix of various protocols. For example, a 19-slot chassis could be populated with 19 homogenous or unique converters (e.g. Ethernet, T1/E1, ATM or OC-12). Network designs differ widely, so Transition Networks has introduced a variety of chassis models, with different port densities to address each specific need.

Maximum Control

(☑ I NEED SNMP MANAGED MEDIA CONVERTERS)

Administrators continuously monitor the network, allowing them to quickly respond to and troubleshoot possible issues. Configuring the network is essential to the administrators as no one has a perfect network that can run without any intervention. To improve the efficiency and lower the response time, administrators turn to SNMP management because it offers them considerable cost savings by eliminating the need to send a technician to a remote location and by improving the accuracy of the configuration.The Point System™ offers full control over the media conversion process. This full control translates into three major aspects of network management. It offers:

▸ A complete monitoring capability where cards can be monitored for power status, link status, individual card settings and connection options. The chassis cabinet itself provides information about internal temperature conditions, redundancy configuration of each power supply and current power consumption by each power supply.

▸ Active configuration of the media conversion platform (drive-by-wire). The users have the ability to power on or off chassis card slots and reconfigure each power supply's mode (where available). Each media converter card provides a distinct set of user configurable features such as Auto-negotiation Disable/Enable; Force 100 Mbps/Full Duplex; Assign priority level threshold (IEEE 802.1P); etc.

▸ Alarm notification capability. Failure conditions and specific events discovered by Point System™ are reported to multiple user-defined destinations in the form of an SNMP Trap.

This full control is protected by sophisticated SNMP Management Security Features to ensure that only authorized personnel can access the management.

Is a Chassis-Based System What I Need?

- ☑ I need one place to convert multiple links.
- ☑ I need redundant power supplies.
- ☑ I need SNMP managed media converters.
- ☑ I will be adding links in the future.
- ☑ I will be upgrading protocols in the future.

If you answered YES to the majority of the questions then the Chassis system was designed for you.

Why a Chassis System?

- ▸ Complete Modularity
- ▸ SNMP Management
- ▸ Management Redundancy
- ▸ Power Redundancy
- ▸ Power Surge Protection
- ▸ Hot-swappable converters
- ▸ Field Upgradeable Firmware
- ▸ Scalability

chassis-based conversion features

Conversion Features

Reliability

(☑ I NEED REDUNDANT POWER SUPPLIES OR REDUNDANT MANAGEMENT)

Network uptime is crucial and Transition Networks offers several features that will ensure that your network will stay up and running. Chassis-based systems offer a redundant power option. Each chassis is shipped with one power supply. The chassis can accommodate a second power supply. Power supplies are available for AC or DC power. The power supplies are hot swappable so they can be replaced while the chassis is running. The instant fail-over bus ensures that if one power supply fails, the second power supply will keep the chassis up and running.

Redundancy of SNMP management is also available by placing two primary management modules in a chassis or a stack of chassis. The management modules negotiate primary and secondary responsibility to manage the chassis. In the event the primary management module fails the secondary unit takes control.

Furthermore, each individual converter maintains its feature configuration within a microcontroller on the converter card. If a management module fails the cards will stay up and running because the configuration information is not lost with the loss of a management module. Each card and power supply has a built in surge protection to protect the unit from power surges. The power supplies are equipped with a standard 4-Amp fuse and can be repaired in the field.

When multiple chassis are connected to each other the SNMP management protection becomes critical. Healing Bus enables the users to maintain full control of the daisy chained chassis so that the failure of any one module will not effect remaining modules in the stack.

Future Growth

(☑ I WILL BE ADDING LINKS IN THE FUTURE)

Chassis-based conversion systems bridge the gap between continuous development of new networking technologies and the long-term nature of an investment in networking gear. Transition Networks has implemented several features that will allow you to keep your conversion platform current.

▸ Each of the management modules can be updated via firmware upgrade. So, as network technologies advance and new converters are introduced, the management module of today can support the media converter of tomorrow.

▸ Similarly, our media converters can also be updated in the field.
The firmware upgrade can be performed either:
  • locally via a Console port or
  • remotely via TFTP

▸ Furthermore, a new converter addition does not require the reconfiguration of the SNMP management setting\

Chassis System Components

The typical system will consist of four major components:
▸ Chassis Cabinet (19-, 18-, 13-, 8-, 2-, or 1-slot(s))
▸ Management card for SNMP management
▸ Media Converter Slide-In-Modules
▸ System Accessories (GUI, redundant power supplies, fans, rack extensions, etc.)

All Point System™ & ION Slide-In-Modules Can Be SNMP Managed

The card inside the chassis slot is connected to the backplane. Through the backplane, the management card communicates with each card in the chassis and sends requests for status and configuration. Each card has a set of predefined features that are known to the management card so the user can receive current statuses and can enable or disable all configurable features. The information about these manageable features is included in the MIB document so the management application software can access this document and ask for a particular feature to be changed accordingly. The user communicates with the management card over the Ethernet cloud or directly through the serial port.

Product Family

Chassis

Slide-In-Module Media Converters

Management Modules

Focal Point SNMP Management Platform

ION and Point System™ Platform

ION and Point System™ Platform

Physical Hardware Configuration	The Point System	The ION Platform
1 Slot Chassis	✓	✓
19 Slot Chassis	✓	✓
Slot Numbers		✓

Power Supplies		
Primary AC	✓	✓
Primary DC	✓	✓
Redundant AC	✓	✓
Redundant DC	✓	✓
Instant Failover	✓	✓

Management Module Port Info		
Craft Port	DB-9 Male	USB Type B
Ethernet Ports	(1) 10Mbps Half Duplex	(2) 10/100Mbps Configurable

Management Module Features		
SNMP v1	✓	✓
SNMP v2		✓
SNMP v3		✓
IP v4	✓	✓
IP v6		✓
SNTP		✓
Command Line Interface (CLI)	*To MMU	**To MMU and Cards

Management Security Features		
Management VLAN		✓
Telnet	✓	✓
Secure Socket Layer (SSL)		✓
Secure Shell (SSH)		✓
802.1x RADIUS		✓
Public MIBs	Private	Public

Access Control Lists (ACL)		
MAC ACL (Layer 2)	Filter MAC	✓
IP ACL (Layer 3)	IP Firewall	✓
TCP/UDP ACL (Layer 4)		✓

File Management		
Remote Firmware Upgrade	✓	✓
Human Readable / Editable Configuration File		✓
Back-up and Restore of Configuration File		✓

Chassis Cards Supported		
Point System Cards	✓	✓ *** (with IONADP & MMU)
ION Cards		✓
10/100 and 10/100/1000	✓	✓
10G	✓	✓ Q3-Q4 2012
802.1ah	✓	✓
802.1ag		✓
Y.1731		✓
T1/4xT1/4xT1 with Ethernet	✓	✓
DS3	✓	✓

*   To Management Module

** To Management Module, Chassis,
     Local Cards, & Remote Stand-Alones

*** Requires Point System Management Module

< 22 >   Call us at 800.526.9267 or 952.941.7600

ion and point system™ chassis specifications

ION and Point System™ Management

Remote Management

Select Transition devices can be remotely managed. This enables administrators to monitor & configure remotely located stand-alone converters straight from the Network Management Station (NMS) without leaving the office.

Transition Networks also offers devices using the IEEE 802.3ah and IEEE 802.1ag standard for remote management and fault detection. Select Network Interface Devices (NIDs) are MEF certified compliant.

SNMP, Telnet, HTTP and TFTP are some of the standard protocols used by the Point System™ and ION management. Point System™ Chassis cabinets can be daisy chained (a maximum of 8 can be stacked) and managed via a single IP.

The following is a partial list of features that are currently available and manageable on select Transition Networks' devices:

- Auto-Negotiation enabled/disabled [pg 15]
- AutoCross™enabled/disabled [pg 15]
- Link Pass Through enabled/disabled [pg 16]
- Far-End-Fault enabled/disabled [pg 15]
- Bandwidth Allocation [pg 17]
- Remote Loopback [pg 17]
- Pause enabled/disabled [pg 16]
- 802.1P enabled/disabled
- Port mirroring enabled/disabled
- AIS fiber enabled/disable
- AIS Copper enabled/disabled
- Loopback copper enabled/disabled [pg 17]

- Loopback fiber enabled/disabled [pg 17]
- Chassis reset
- Module reset
- Module - software mode/hardware mode
- Power Supply - hardware mode/software mode
- Signal detect
- Line build out
- Redundant management mode (Primary/Secondary)
- Redundant Power Supply mode (Primary/Secondary)

* Please refer to the product manual for a complete list of manageable features for a specific device.

Alert Notification Features

Users can receive information about failures happening in the network through SNMP notifications.   These notifications are referred to as traps. The traps inform administrators either about the failure or when the failure was corrected and the network is back to its full operational capability. Several events are considered trappable. The following is a list of some of the traps that are generated by a Transition Networks management module:

pSError (111)
A monitored MIB variable (e.g. Fiber Link) has changed from its 'operational' state to its 'error' state.

pSErrorClear (112)
 A monitored MIB variable has changed from its 'error' state back to its 'operational' state.

pSDeviceInserted (113)
A new slide-in device was detected on the bus.

pSDeviceRemoved (114)
A slide-in device that had previously been detected on the bus has not been recording its presence for a long time, and is presumed to have been physically removed.

pSDeviceColdStart (115)
A slide-in device has indicated that it has rebooted. This is most common when the device is initially powered up, but in some cases this trap indicates a warm start.

pSPowerLost (116)
The cabinet (e.g. chassis) into which this management module is installed has lost power and is running on capacitors. Both the cabinet and the management module must support the Last Gasp feature for this trap to be sent.

pSCabinetInserted (117)
A new cabinet was detected.

pSCabinetRemoved (118)
A cabinet that had previously been detected has not been heard from in a long time, and is presumed to have been physically removed.

ion and point system™ chassis specifications

ION and Point System™ Management

Management Access Methods

There are several ways to access the Point System™ and the ION management modules to perform maintenance or monitoring functions.

The Point System™ and the ION management module can be accessed via:

▸ Transition's Focal Point Graphical User Interface (GUI) Application

▸ Web-Based application, standard web browser already installed on the network (Internet Explorer, Firefox, Chrome)

▸ Command line interface via:
- Console Port
- Telnet

The management capabilities of Focal Point and Web Based are almost identical. Other NMS applications can also be used to manage Transition's products provided the users import the Transition MIB's (available on-line) into these NMS platforms. This process is called Compiling the MIBs.

Focal Point (Free of Charge)

Transition Networks' SNMP software management platform, Focal Point, is free of charge and is available to users with any chassis or management card purchase. Focal Point is designed to offer full SNMP read/write management capabilities via a user friendly graphical user interface (GUI).

Focal Point software allows the user to enable and disable features incorporated into each of the devices. Focal Point has several new unique features to simplify network administration. The new features include:

▸ Tree View for all loaded/discovered IPs

▸ Pop-up eliminator/minimizer

▸ Save settings tab required to implement changes

▸ GUI interface divided into 3 distinct sections that can be re-sized or hidden at user discretion

▸ GUI interface displays entire chassis within a single screen viewer

▸ Enable/Disable buttons for each feature

▸ Zoom in view for all cards in chassis

▸ Universal Trap Viewer allows viewers to receive all traps, including traps from third party devices, on the network

▸ One-click-telnet

▸ Upgrade tool

▸ Live-chat with Transition Networks' Tech support personnel

▸ Direct links to product literature such as datasheets, manuals and release notes

▸ Email notification and audible alarms

Focal Point's newly designed screens are very intuitive and easy to navigate. Customers can now navigate between multiple agents from within one screen and switch between chassis cabinets through the drop down menu. Focal Point has two types of views: a summary screen, that reports the devices' link status and its critical features, and a detailed screen that brings up everything about the particular device. These views provide quick access to network management.

One of the most important features of this package is an integrated Trap Viewer application. It allows users to see and log received traps from IP based network equipment (including third party devices). Traps are displayed in a user friendly, readable format. Users can filter traps to read desired messages only.

focal point
SNMP SOFTWARE

Focal Point Features

▸ Graphical User Interface (GUI)

▸ Status monitoring

▸ Enables/disables converter features

▸ Universal Trap Viewer Allows viewers to receive all traps, including traps from third party devices, on the network.

▸ One-click-telnet

▸ Upgrade tool

▸ Links to product literature

ion and point system™ chassis specifications

ION and Point System™ Management

Focal Point Main Screen

The main screen allows users to enter new or existing IPs of all agents (management cards).
When the IP is entered/selected the list of available chassis is displayed.

Type in new IPs

Type in new IP range
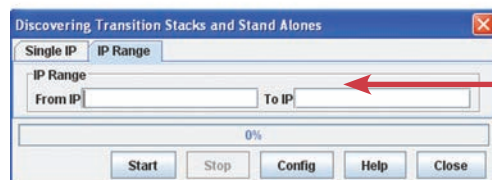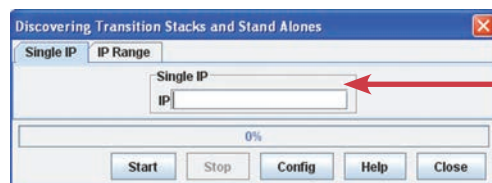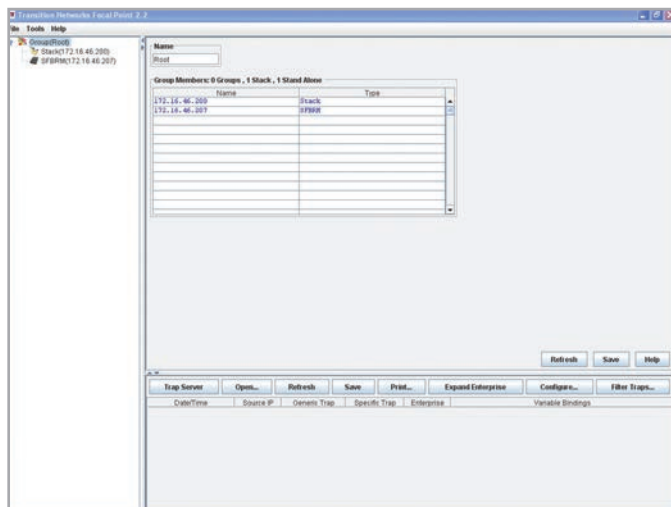
Focal Point View Screen

Displays the selected chassis information. Each converter is displayed with connectors, LEDs, and status (e.g. ALERT).

Ion

Point System

Point System cards in Ion chassis

Immediate access to trap server/viewer; telnet, technical support & upgrade agent

Trap Summaries

View other chassis and IP based converters

Tree view includes IPs
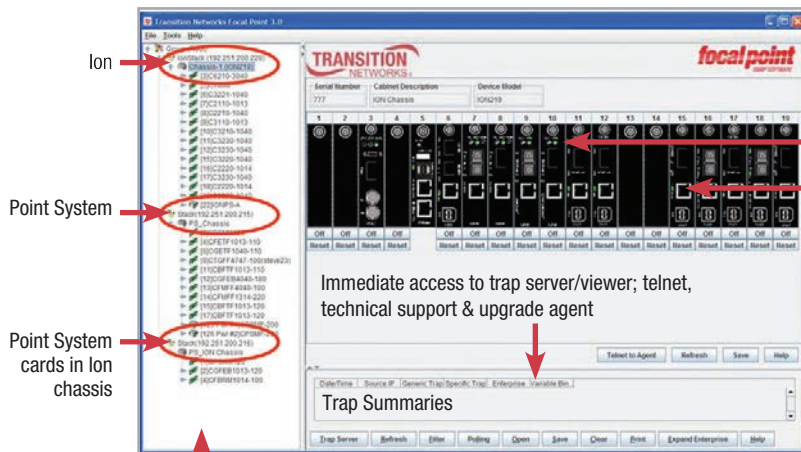
An Alert is displayed if a link is lost or if there is another problem

LEDs display actual status

Specific cards with connectors are displayed

Larger view of card when mouse is hovering

* Above screen shots are from Point System™

ION and Point System™

Management Specifications

ION and Point System™

Management Specifications

point system™ chassis and ion specifications

Focal Point Card Screen

An individual card can be highlighted by clicking on the card in the Chassis Screen. A screen is displayed that allows the network administrator to edit the card's configuration.

Assign a group name

View DMI statistics

Change individual port information

Change various features

Show serial numbers
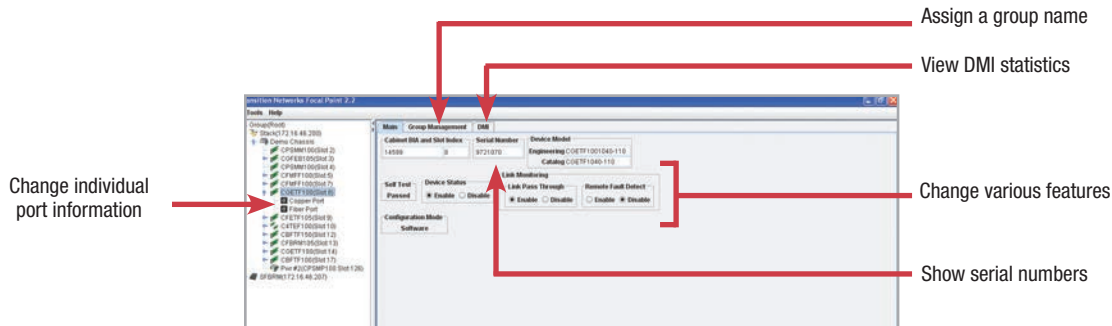
Focal Point Management Module Screen

Displays the interface for the management card.

Show rev levels

Edit contact name and location

Assign trap managers

Assign IP information
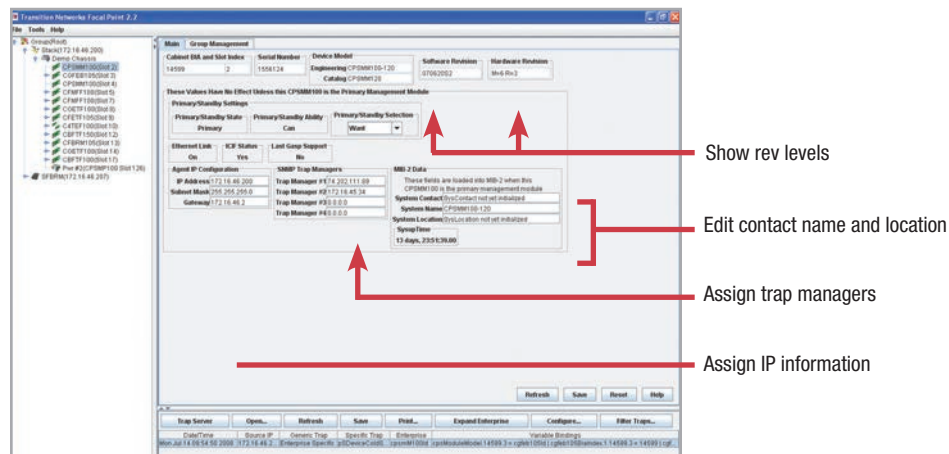
Focal Point TrapViewer Screen

Displays traps received from Transition as well as third party devices.

See trap history time & date stamp

* Above screen shots are from Point System™

< 26 >   Call us at 800.526.9267 or 952.941.7600

ion and point system™ chassis specifications

ION and Point System™ Management

Web Agent Summary Screen

Transition Networks Point System™ and the ION platform can be managed using a standard web browser.
Full configuration is available via the web browser.

Click to View
Chassis Summary

User Defined Description of Chassis
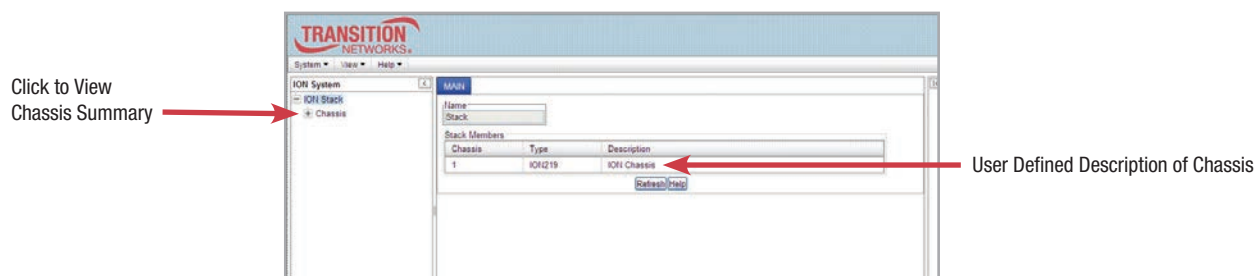
Web Cabinet View Screen

Displays all of the cards in the selected chassis.

Click to view card

ION Chassis Information

Inserted card Description
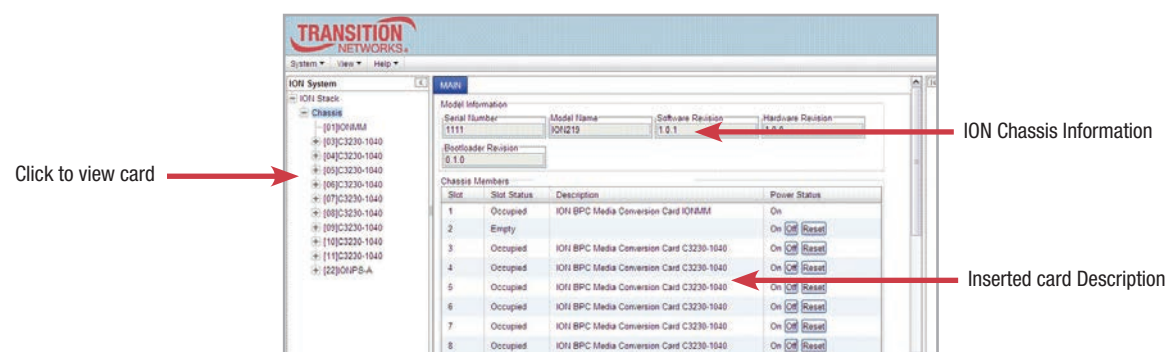
Web Card View Screen

Allows user to view and change settings.

Local Card Information

Local Port Info

Remote Unit Information

Remote Port Information

Gray Boxes are not user definable

White boxes are user definable
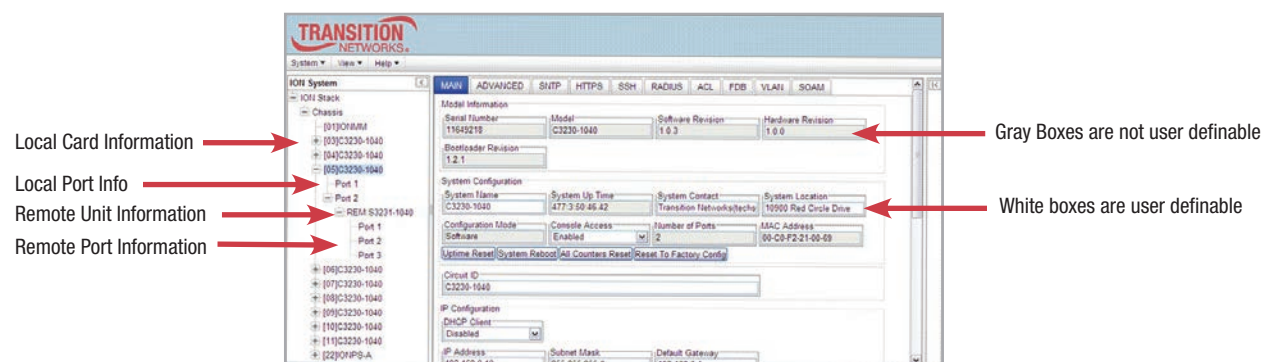
* Above screen shots are from The ION Platform

ION and Point System™ Management

Command Line Interface (CLI)

CLI offers the most comprehensive set of management features. CLI is used during the initial setup (set IPs etc.) and trouble shooting, but can also be used for day-to-day management (device management, firmware upgrades, management security features, etc.)
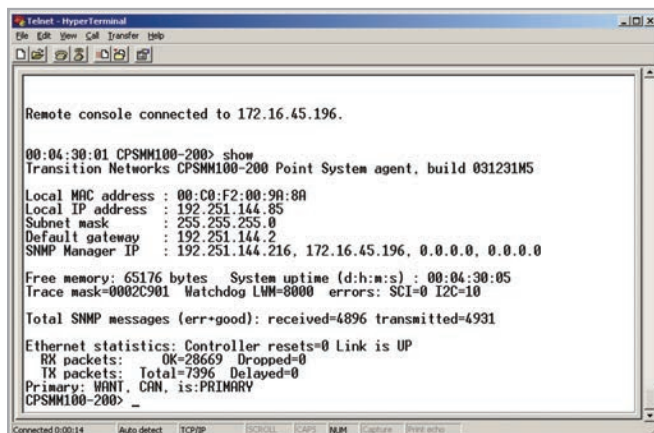
Transition Networks understands that every network is managed differently and that different security levels and management interfaces are often required depending on the deployment of the Point System or ION Chassis.

With that in mind, we have a variety of security features available in the Point System and ION Management Modules.

Security Features

The ION Platform
Key Security Features

These security features allow you to control access to the ION Chassis via the ION Management Module to ensure that only authorized personnel are able to view and change the settings to the slide-in-modules.

▸ Management VLAN

▸ SSL

▸ SSH

▸ 802.1x

▸ SNMPv1 & v2c, v3

▸ IPv6

Point System
Key Security Features

These security features allow you to control access to the Point System Chassis via the Point System Management Module to ensure that only authorized personnel are able to view and change the settings to the slide-in-modules.

▸ Firewall

▸ FILTERMAC

▸ SNMP Lock

▸ Lock/Unlock CLI

▸ SNMPv1

For complete details on all of the security features for the Point System and ION management modules please refer to the specific product manual.

* Above screen shots are from Point System™

the ion platform accessories

ION Chassis

A Third Generation Chassis From Transition Networks

The ION219-A is an all new intelligent, high-density, multi-protocol system supporting a variety of network interface devices. Designed for both carrier class and enterprise network applications where multiple points of fiber integration and secure network management of the fiber interface devices is essential. An end-to-end fiber integration solution can be achieve by pairing the modules in a high density ION chassis with the modules in another ION chassis, an ION stand-alone, or a Transition Networks' Point System™ stand-alone device. To take full advantage of all the features and functions available with the ION Chassis, an ION Management Module is required. The ION Management Module connects to the chassis backplane and communicates with the individual cards in the ION Chassis. Each slide-in-module for the ION Chassis has specific features and functions that are controlled via the ION Management Module. A network administrator can configure, monitor and troubleshoot ION slide-in-modules remotely via the ION Management Module.

Transition Networks understands that no network is managed in the same manner and that different security levels and management interfaces are often required depending on the deployment of the ION Chassis. With that in mind, the ION Platform has been designed to be one of the most versatile and secure fiber integration systems available today.

Ordering Information

ION219-A
19-Slot Chassis for The ION Platform, AC Powered

ION219-D
19-Slot Chassis for The ION Platform, DC Powered

ION001-A
1-Slot Chassis for The ION Platform

Optional Accessories (sold separately)

IONPS-A [pg 30]
ION Power Supply Module, Universal Input 100 – 240 VAC

IONPS-D [pg 31]
-48 VDC Power Supply Module

IONMM [pg 32]
ION Management Module

IONFP
ION Face Plate (required for all empty slots)

WMBC-2RU
Wall mount brackets for a 2RU Chassis

IONRE-23
ION 23" Rack Mount Ears

ION001-A

ION219-A

Access Methods

- Web-browser: Access the ION Management Module using a standard web browser such as Internet Explorer or Mozilla Firefox.

- Command Line Interface (CLI): CLI access can be done via telnet remotely or via the local console port on the ION Management Module.

- SNMP: Since the ION platform is based on public MIBs you can easily manage the ION with a standard network management system (NMS) such as SNMPc, HPOV or any other standard SNMP platform.

- Focal Point: Transition Networks offers a free SNMP graphical user interface (GUI) software (Focal Point) for the management purposes. Focal Point offers full read and read/write capabilities in a user friendly GUI.

Specifications

Slots	ION219-A	(19) Slots in front for ION slide-in-modules (2) Slots in rear for power supply modules
	ION001-A	(1) Slot in front for ION slide-in-module
Unit LEDs	ION219-A	Power On LED for each installed power supply module
	ION001-A	None
Dimensions	ION219-A	**Width:** 17.0" [430 mm] **Depth:** 15.8" [401 mm] **Height:** 3.5" [89 mm]
Dimensions	ION001-A	**Width:** 4.0" [102 mm] **Depth:** 7.1" [180 mm] **Height:** 1.4" [36 mm]
Power	ION219-A	Two open bays for ION power supply modules, supporting Universal Input 100 – 240 VAC, or -48 VDC rated at 200 watts max output Note: Power supply module supplies +12 VDC maximum to each slot in the chassis. Only one power supply module is required to power the chassis and the installed modules, the optional second power supply module provides reduncancy for instant fail-over.
	ION001-A	External AC/DC power supply included, 12VDC, 0.5A unregulated
Environment		0~ 50°C operating 5% - 95% humidity (non-condensing) 0 to 10,000 ft. altitude
Shipping Weight	ION219-A	19 lbs. [8.6 kg]
	ION001-A	2.0 lbs. [0.9 kg]
Compliance		UL listed, EN55022, EN55024, CE Mark, FCC Class A, CISPR Class A
Warranty		Lifetime

Security Features

When the optional management module is used, the following security features are available, allowing you to control access to the ION Chassis via the ION Management Module. Ensuring that only authorized personnel are able to view and change the settings to the slide-in-modules.

☑ Management VLAN

☑ SSL

☑ SSH

☑ 802.1x

☑ SNMPv1 & V2c, +V3

(v3 via future firmware upgrade)

Key Management Features

▸ Variety of management access methods including; telnet, web, SNMP

▸ Single slot design allows for more slide-in-modules to be inserted in the ION Chassis

▸ Management VLAN

▸ Based on Public MIBs

▸ 2 10/100 Ethernet interfaces

▸ USB console port

▸ TFTP upgrade/backup of slide-in-modules

▸ Import/Export configuration files in human readable/editable format

▸ Multiple community strings

the ion platform accessories

IONPS-A

Power Supply Module For The ION Platform

The ION Platform is an all new intelligent, high-density, multi-protocol system supporting a variety of network interface devices. Designed for both carrier class and enterprise network applications where multiple points of fiber integration and secure network management of the fiber interface devices is essential.

The ION chassis can support up to two power supply modules which mount in the rear of the chassis. A single power supply can be used to power all the devices installed in the chassis; however the system can be made redundant with the use of a second power supply. In this configuration, the power supplies operate in an instant-fail-over mode.

Ordering Information

IONPS-A
  Redundant AC Power Supply for 19-Slot ION Chassis

Specifications

Application	Up to 2 power supply modules can be used in the 19-slot ION chassis, ION219-A
Unit LEDs	**PWR(Power):** Indicates the power supply module is providing power to the ION chassis
Standards	UL Listed (UL60950), FCC Class A, CISPR Class A, CE Mark
Dimensions	**Width:** 8.3" [211 mm] **Depth:** 9.0" [229 mm] **Height:** 3.4" [86 mm]
Weight	3.4 lbs. [1.5 kg]
Power Input	100 – 240 VAC, 47 – 63 Hz, 3.5 A @ 100 VAC
Environment	0 - 50ºC operating 5% - 95% humidity, non-condensing 0 to 10,000 ft. altitude
Warranty	Lifetime

IONDCR

Dry Contact Relay Module

The IONDCR is a field installable dry contact relay module for the IONPS-A power supply. This module mounts in the lower right-hand corner of the IONPS-A face-plate, allowing the power supply to be tied into a separate alarm circuit. Contacts will be activated on the loss of power, enabling an external visual or audible alarm.

Applications for this type of fault alarm output would include enterprise networks as well as in industrial applications. The dry contact relay modules provides another layer of fault indicators, complementing network management software by providing a signal to either a local or remote alarm system.

Optional Accessories (sold separately)

IONDCR
  Dry contact relay module for AC Power Supply

< 30 >

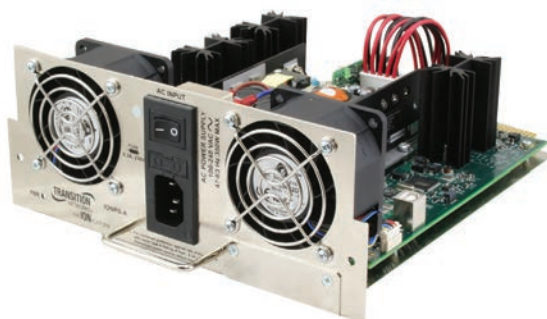Call us at 800.526.9267 or 952.941.7600

the ion platform accessories

IONPS-D

Power Supply Module For The ION Platform

The ION Platform is an all new intelligent, high-density, multi-protocol system supporting a variety of network interface devices. Designed for both carrier class and enterprise network applications where multiple points of fiber integration and secure network management of the fiber interface devices is essential.

The ION chassis can support up to two power supply modules which mount in the rear of the chassis. A single power supply can be used to power all the devices installed in the chassis; however the system can be made redundant with the use of a second power supply. In this configuration, the power supplies operate in an instant-fail-over mode.

Ordering Information

IONPS-D
Redundant -48 VDC Power Supply Module for 19-Slot ION Chassis

Specifications

Application	Up to 2 power supply modules can be used in the 19-slot ION chassis, ION219-A
Unit LEDs	**PWR(Power):** Indicates the power supply module is providing power to the ION chassis
Standards	UL Listed (UL60950), FCC Class A, CISPR Class A, CE Mark
Dimensions	**Width:** 8.3" [211 mm] **Depth:** 9.0" [229 mm] **Height:** 3.4" [86 mm]
Weight	4.0 lbs. [6.35 kg]
Power Input	48 VDC (40-60 VDC) @ 5A
Environment	0 - 50ºC operating 5% - 95% humidity, non-condensing 0 to 10,000 ft. altitude
Warranty	Lifetime

IONDCR-R1

Dry Contact Relay Module

The IONDCR is a field installable dry contact relay module for the IONPS-D power supply. This module mounts in the lower right-hand corner of the IONPS-D face-plate, allowing the power supply to be tied into a separate alarm circuit. Contacts will be activated on the loss of power, enabling an external visual or audible alarm.

Applications for this type of fault alarm output would include enterprise networks as well as in industrial applications. The dry contact relay modules provides another layer of fault indicators, complementing network management software by providing a signal to either a local or remote alarm system.
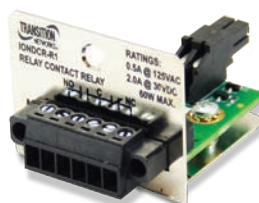
Optional Accessories (sold separately)

IONDCR-R1
Dry contact relay module for DC Power Supply

the ion platform accessories

IONMM

The ION Management Module

To take full advantage of the features and functions available with the ION Chassis, an ION Management Module is required. The ION Management Module connects to the chassis backplane and communicates with the individual cards in the ION Chassis. Only management traffic – no end-user data traffic - is sent across the ION Chassis backplane to maintain security.

Each slide-in-module for the ION Chassis has specific features and functions that are controlled via the ION Management Module. A network administrator can configure, monitor and troubleshoot ION slide-in-modules remotely via the ION Management Module. This remote management helps reduce operating expenses (OpEx) by reducing technician dispatches. Remote Management [pg 16] allows for faster mean-time-to-repair (MTTR) by proactively receiving traps and alerts on potential issues. With less downtime you are able to focus on revenue generating aspects of your business.

Complete Visibility and Control

Remote Configuration

Remote Monitoring

Remote Fault Detection & Resolution
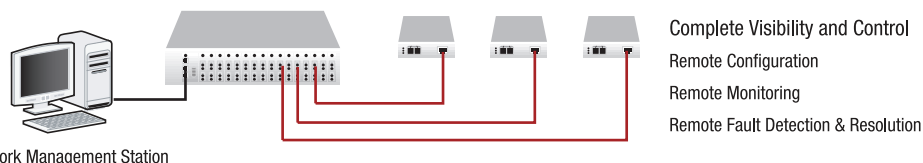
Network Management Station

Access Methods

- Web-browser: Access the ION Management Module using a standard web browser such as Internet Explorer or Mozilla Firefox.

- Command Line Interface (CLI): CLI access can be done via telnet remotely or via the local console port on the ION Management Module.

- SNMP: Since the ION platform is based on public MIBs you can easily manage the ION with a standard network management system (NMS) such as SNMPc, HPOV or any other standard SNMP platform.

- Focal Point: Transition Networks offers a free SNMP graphical user interface (GUI) software (Focal Point) for the management purposes. Focal Point offers full read and read/write capabilities in a user friendly GUI.

Transition Networks understands that no network is managed in the same manner and that different security levels and management interfaces are often required depending on the deployment of the ION Chassis.

With that in mind, we have made the ION Management Module one of the most versatile and secure management modules available today.

Specifications

Standards	IEEE Std. 802.3, IEEE Std. 802.1X
Ports	(2) 10/100 Mbps RJ-45 USB 2.0 device port USB 2.0 host port
Dimensions	**Width:** 0.86" [22 mm] **Depth:** 6.5" [165 mm] **Height:** 3.4" [86 mm]
Power Consumption	2 Watts under normal operation 4.8 Watts with full 2.5 Watts used by USB host port (Example: Flash Drive connected requiring 2.5 Watts)
Environment	See chassis specifications
Shipping Weight	1 lb. [0.45 kg]
Compliance	EN55022 Class A, EN55024,CE Mark
Warranty	Lifetime

Ordering Information

IONMM

Management Module for the ION Chassis

Optional Accessories (sold separately)

USB Cables

USBC-AM-BM-03
  USB 2.0 Cable A male to B male [3 ft. Gray]

USBC-AM-BM-06
  USB 2.0 Cable A male to B male [6 ft. Gray]

Security Features

These security features allow you to control access to the ION Chassis via the ION Management Module to ensure that only authorized personnel are able to view and change the settings to the slide-in-modules.

☑ Management VLAN

☑ SSL

☑ SSH

☑ 802.1x/RADIUS

☑ SNMPv1 & v2c, and v3

☑ ACL Rules

Key Features

▶ Variety of management access methods including; telnet, web, SNMP

▶ Single slot design allows for more slide-in-modules to be inserted in the ION Chassis

▶ Based on Public MIBs

▶ 2 10/100 Ethernet interfaces

▶ USB console port

▶ TFTP upgrade/backup of slide-in-modules

▶ Import/Export configuration files in human readable/editable format

▶ Multiple community strings

▶ SNTP

< 32 >   Call us at 800.526.9267 or 952.941.7600

part number key
Part Number Key Chassis Cards

```
1    2  3  4  5  —  6  7  8  9  —  x  x
```

Character #1

S	Stand-Alone
C	Chassis

Characters #2, 3

21	100BASE Ethernet
22	10/100 Ethernet
31	1000BASE Ethernet
32	10/100/1000 Ethernet
41	10GBASE Ethernet
42	10/100/1000/10G
60	T1/E1
61	4xT1
62	DS3-T3/E3

Characters #4, 5

10	Standard Conversion
20	Advanced Management
xx	Unique Identifier

Characters #6, 7, 8, 9

10	RJ-45
11	Multimode ST
13	Multimode SC
14	Single Mode SC
15	Single Mode SC Long Haul
16	Single Mode SC Extra Long Haul
17	Single Mode SC Long Wave 1550
19	Single Mode LC
24	Extended Multimode SC
29	Single Fiber SC
30	Dual BNC
33	RJ-11
35	Single Mode SC Long Wave 1550 Extended
39	Multimode LC
40	SFP Slot
47	XFP Slot
48	SFP+ Slot

Additional Expandable Characters (xx)
Part numbers grow as new products with new features or capabilities are designed. For example:

A1	Single Strand 1310TX/1550RX
A2	Single Strand 1550TX/1310RX

see also: 10/100Base-TX to 100Base-FX Stand-Alone NIDs [pg 41]

slide-in-module for the ion platform

C2220 Series

CARRIER ETHERNET
✓ **MEF** Certified Compliant ™

OAM/IP-Based Remotely Managed NID (Network Interface Device)

Features

▸ MEF 9, 14 & 21 certified
▸ 802.3ah Link OAM
▸ 10K Jumbo Frame Support
▸ Two selectable Remote Management modes [pg 16]
  • IP-Based Remote Management
  • In-Band (remote device managed by local peer)
▸ AutoCross™ [pg 15]
▸ Auto-Negotiation [pg 15]
▸ Pause [pg 16]
▸ Transparent Link Pass Through [pg 16]
▸ Far-End-Fault [pg 15]
▸ Remote Loopback [pg 17]
▸ Field Upgradeable Firmware [pg 17]
▸ IEEE 802.1p q VLAN and double VLAN tagging with 4096 VIDs
▸ DHCP client
▸ SNTP
▸ TFTP
▸ RADIUS client
▸ RMON counters for each port
▸ Bandwidth profiling [pg 17]
▸ DMI Optical Management
▸ Cable diagnostic function for copper ports
▸ SSH
▸ Telnet
▸ Command Line Interface (CLI)
▸ Web management
▸ Focal Point management
▸ SNMP v1, v2c, and v3
▸ USB port for basic setup
▸ Management VLAN

The ION 2220 Series of Network Interface Devices (NIDs) are a remotely managed product that offers IP or IP-Less management methods for secure delivery of Ethernet services for business and Mobile Backhaul applications. With MEF 9, 14 & 21 certification the ION 2220 Series ensures you are compliant with the latest standards. The ION 2220 Series is a 10/100Mbps product with advance features including – IEEE 802.3ah Link OAM, VLAN, QoS, SSH/SSL, Jumbo Frame Support and bandwidth allocation.

Applications

▸ Ethernet in the First Mile (EFM)
▸ Fiber-to-the-Premise (FTTP)
▸ E-Line Services (EPL & EVPL)
▸ Enterprise Markets

Complete End to End Visibility

Remote Management and Monitoring

NOC

S2220

UNI

Metro Ethernet Network

ION Chassis w/C2220 Card

S2220

UNI

S2220

UNI

Remote Troubleshooting and Diagnostics
802.3ah
SNMP traps
Provider Visiblity and Control

Specifications

Complete list of fiber optic connector specifications [pg 117-123]

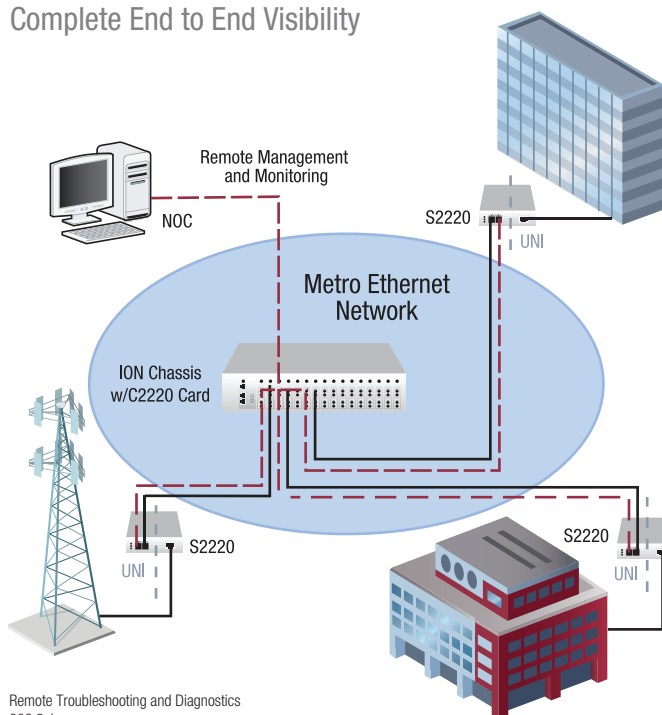|	
Standards	IEEE Std. 802.3, IEE std. 802.3ah, IEE Std. 802.1P, IEEE std. 802.1Q
Data Rate	**Copper:** 10/100 Mbps **Fiber:** 100 Mbps
Filtering Address	8K MAC Addresses
Max Frame Size	10,240 bytes
Dimensions	**Width:** 0.86" [22 mm] **Depth:** 6.5" [165 mm] **Height:** 3.4" [86 mm]
Power Consumption	4.5 Watts
Environment	See chassis specifications
Shipping Weight	1 lb. [.45 kg]
Regulatory Compliance	EN55022 Class A, EN55024, CE Mark
Warranty	Lifetime

Ordering Information

C2220-1011
C2220-1011-D (DMI Options)
   10/100BASE-TX (RJ-45) **[100 m]**
to 100BASE-FX 1310nm MM (ST)
   [2 km/1.2 mi.] Link Budget: 11.0 dB

C2220-1013
C2220-1013-D (DMI Options)
   10/100BASE-TX (RJ-45) **[100 m]**
to 100BASE-FX 1310nm MM (SC)
   [2 km/1.2 mi.] Link Budget: 11.0 dB

C2220-1014
C2220-1014-D (DMI Options)
   10/100BASE-TX (RJ-45) **[100 m]**
to 100BASE-FX 1310nm SM (SC)
   [20 km/12.4 mi.] Link Budget: 16.0 dB

C2220-1015
C2220-1015-D (DMI Options)
   10/100BASE-TX (RJ-45) **[100 m]**
to 100BASE-FX 1310nm SM (SC)
   [40 km/24.8 mi.] Link Budget: 26.0 dB

C2220-1016
   10/100BASE-TX (RJ-45) **[100 m]**
to 100BASE-FX 1310nm SM (SC)
   [60 km/32.3 mi.] Link Budget: 29.0 dB

C2220-1017
   10/100BASE-TX (RJ-45) **[100 m]**
to 100BASE-FX 1550nm SM (SC)
   [80 km/49.7 mi.] Link Budget: 29.0 dB

C2220-1035
   10/100BASE-TX (RJ-45) **[100 m]**
to 100BASE-FX 1550nm SM (SC)
   [120 km/77.5 mi.] Link Budget: 36.0 dB

C2220-1040
   10/100BASE-TX (RJ-45) **[100 m]**
to 100Base-X SFP Slot (empty)

Single Fiber Products
Recommended use in pairs [pg 18]

C2220-1029-A1
C2220-1029-DA1 (DMI Options)
   10/100BASE-TX (RJ-45) **[100 m]**
to 100BASE-BX-U 1310nm TX/1550nm RX Bi-Di SM (SC)
   [20 km/12.4 mi.] Link Budget: 19.0 dB

C2220-1029-A2
C2220-1029-DA2 (DMI Options)
   10/100BASE-TX (RJ-45) **[100 m]**
to 100BASE-BX-U 1550nm TX/1310nm RX Bi-Di SM (SC)
   [20 km/12.4 mi.] Link Budget: 19.0 dB

C2220-1029-B1
   10/100BASE-TX (RJ-45) **[100 m]**
to 100BASE-BX-U 1310nm TX/1550nm RX Bi-Di SM (SC)
   [40 km/24.9 mi.] Link Budget: 25.0 dB

C2220-1029-B2
   10/100BASE-TX (RJ-45) **[100 m]**
to 100BASE-BX-D 1550nm TX/1310nm RX single fiber single mode (SC)
   [40 km/24.9 mi.] Link Budget: 25.0 dB

*Note all units feature USB port for local management application.

Optional Accessories (sold separately)
SFP Modules [pg 98-104]

USB Cables

USBC-AM-BM-03
   USB 2.0 Cable A male to B male [3 ft. Gray]
USBC-AM-BM-06
   USB 2.0 Cable A male to B male [6 ft. Gray]

AUTO CROSS	AUTO NEG	LOOP BACK	FIELD UPGRADEABLE FIRMWARE ▶	REMOTE FAULT DETECT	SINGLE FIBER	LAST GASP	BANDWIDTH ALLOCATION	REMOTE MGMT	NEW PRODUCT

slide-in-module for the ion platform

C322x Series

Gigabit Ethernet

CARRIER ETHERNET ✓ MEF Certified Compliant ™

OAM/IP-Based Remotely Managed NID (Network Interface Device)

Features

▶ MEF 9, 14 & 21 certified

▶ 802.3ah Link OAM

▶ 10K Jumbo Frame Support

▶ Two selectable Remote Management modes: [pg 16]
  • IP-Based Remote Management
  • In-Band (remote device managed by local peer)

▶ AutoCross™ [pg 15]

▶ Auto-Negotiation [pg 15]

▶ Pause [pg 16]

▶ Transparent Link Pass Through [pg 16]

▶ Far-End-Fault [pg 15]

▶ Remote Loopback [pg 17]

▶ Field Upgradeable Firmware [pg 17]

▶ IEEE 802.1p QoS packet classification

▶ IPv4 IP TOS, DiffDerv and IPv6 traffic class QoS classification

▶ IEEE 802.1q VLAN and double VLAN tagging with 4096 VIDs

▶ DHCP client

▶ SNTP

▶ TFTPt

▶ RADIUS client

▶ RMON counters for each port

▶ Bandwidth profiling [pg 17]

▶ DMI Optical Management

▶ Cable diagnostic function forcopper ports

▶ SSH

▶ Telnet

▶ Command Line Interface (CLI)

▶ Web management

▶ Focal Point Management

▶ SNMP v1, v2c, and v3

▶ USB port for basic setup

▶ Management VLAN

Complete End to End Visibility

Remote Management and Monitoring

NOC

S3220

UNI

Metro Ethernet Network

ION Chassis w/C3220 Card

S3220

UNI

S3220

UNI

Remote Troubleshooting and Diagnostics
802.3ah
SNMP traps
Provider Visiblity and Control

Applications

▶ Ethernet in the First Mile (EFM)

▶ Fiber-to-the-Premise (FTTP)

▶ E-Line Services (EPL & EVPL)

▶ Enterprise Markets

Specifications

Complete list of fiber optic connector specifications [pg 117-123]

Standards	IEEE Std. 802.3, IEEE Std. 802.3ah, IEEE Std 802.1P, IEEE Std 802.1Q, IEE Std. 802.1X
Data Rate	**Copper:** 10/100/1000 Mbps **Fiber:** 1000 Mbps
Filtering Addresses	8K MAC Addresses
Max Frame Size	10,240 bytes
Dimensions	**Width:** 08.6" [22 mm] **Depth:** 6.5" [165 mm] **Height:** 3.4" [86 mm]
Power Consumption	4.5 Watts
Environment	See chassis specifications
Shipping Weight	1 lb. [.45 kg]
Regulatory Compliance	EN55022 class A, EN55024, CE Mark
Warranty	Lifetime

*C3220-1040 and C3221-1040 have SGMII support for use with 10/100/1000BASE-T copper SFPs.

The ION 3220 Series of Network Interface Devices (NIDs) are a remotely managed product that offers IP or IP-Less management methods for secure delivery of Ethernet services for business and Mobile Backhaul applications. With MEF 9, 14 & 21 certification the ION 3220 Series ensures you are compliant with the latest standards. The ION 3220 Series is a 10/100/1000Mbps product with advance features including – IEEE 802.3ah Link OAM, VLAN, QoS, SSH/SSL, Jumbo Frame Support and bandwidth allocation.

Ordering Information

Complete list of fiber optic connector specifications [pg 117-123]

C3220-1013
C3220-1013-D (DMI Options)
  10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-SX 850nm MM (SC)
  [62.5/125 μm fiber: 220 m/722 ft.]
  [50/125 μm fiber: 550 m/1804 ft.]
  Link Budget: 8.5 dB

C3220-1014
C3220-1014-D (DMI Options)
  10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-LX 1310nm SM (SC)
  [10 km/6.2 mi.] Link Budget: 10.5 dB

C3220-1015
C3220-1015-D (DMI Options)
  10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-LX 1310nm SM (SC)
  [30 km/18.6 mi.] Link Budget: 15.0 dB

C3220-1017
  10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-LX 1550nm SM (SC)
  [80 km/49.7 mi.] Link Budget: 21.0 dB

C3220-1035
  10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-LX 1550nm SM (SC)
  [120 km/77.7 mi.] Link Budget: 27.0 dB

*C3220-1040
  10/100/1000BASE-T (RJ-45) **[100 m]**
to (1) 100/1000Base-X SFP Slot (empty)

*C3221-1040
  10/100/1000BASE-T (RJ-45) **[100 m]**
to (2) 100/1000Base-X SFP Slots (empty)

Single Fiber Products [pg 18]

C3220-1029-A1
C3220-1029-DA1 (DMI Options)
  10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-BX-U 1310nm TX/1490nm RX Bi-Di SM (SC)
  [20 km/12.4 mi.] Link Budget: 14.0 dB

C3220-1029-A2
C3220-1029-DA2 (DMI Options)
  10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-BX-D 1490nm TX/1310nm RX Bi-Di SM (SC)
  [20 km/12.4 mi.] Link Budget: 14.0 dB

C3220-1029-B1
  10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-BX-U 1310nm TX/1490nm RX single fiber single mode (SC)
  [40 km/24.8 mi.] Link Budget: 20.0 dB

C3220-1029-B2
  10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-BX-D 1490nm TX/1310nm RX single fiber single mode (SC)
  [40 km/24.8 mi.] Link Budget: 20.0 dB

*Note all units feature USB port for local management application.

Optional Accessories (sold separately)

SFP Modules [pg 98-104]

USB Cables
USBC-AM-BM-03
  USB 2.0 Cable A male to B male [3 ft. Gray]

USBC-AM-BM-06
  USB 2.0 Cable A male to B male [6 ft. Gray]

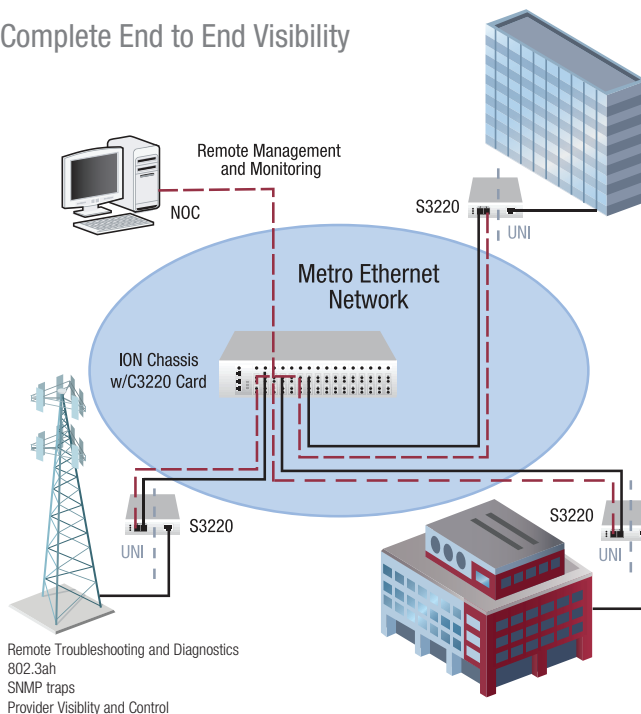slide-in-module for the ion platform

C323x Series

Gigabit Ethernet

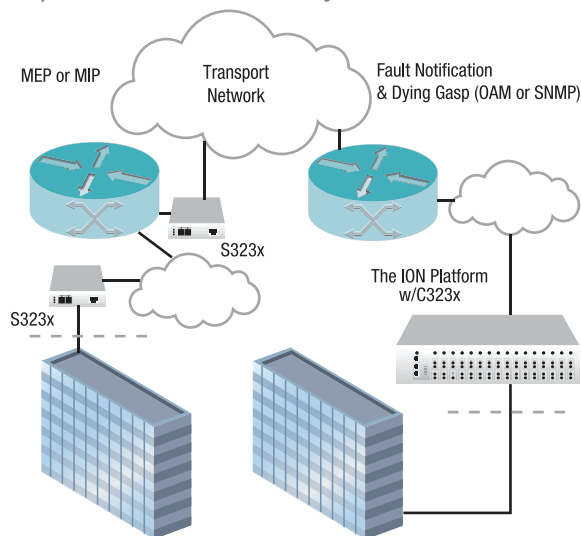## OAM/IP-Based Remotely Managed NID (Network Interface Device)

Features

▶ MEF 9, 14 & 21 certified
▶ 802.3ah Link OAM
▶ ITU Y.1731
▶ 802.1ag Service OAM
▶ 10K Jumbo Frame Support
▶ Two selectable Remote Management modes:
  • IP-Based Remote Management
  • In-Band (remote device managed by local peer) [pg 16]
▶ AutoCross [pg 15]
▶ Auto-Negotiation [pg 15]
▶ Pause [pg 16]
▶ Transparent Link Pass Through [pg 16]
▶ Far-End-Fault [pg 15]
▶ Remote Loopback [pg 17]
▶ Field Upgradeable Firmware [pg 17]
▶ IEEE 802.1p QoS packet classification
▶ IPv4 IP TOS, DiffDerv and IPv6 traffic class QoS classification
▶ IEEE 802.1q VLAN and double VLAN tagging with 4096 VIDs
▶ DHCP client
▶ SNTP
▶ TFTP
▶ RADIUS client
▶ RMON counters for each port
▶ Bandwidth profiling [pg 17]
▶ DMI Optical Management
▶ Cable diagnostic function for copper ports
▶ SSH
▶ Telnet
▶ Command Line Interface (CLI)
▶ Web management
▶ Focal Point Management
▶ SNMP v1, v2c, and v3
▶ USB port for basic setup
▶ Management VLAN

The ION 3230 Series of Network Interface Devices (NIDs) are multi-service NIDs that provide SLA-assurance and advance fault management that is compliant with MEF and IEEE standards. The ION 3230 Series are designed for business Ethernet and Mobile Backhaul deployments. The ION S3230 Series are MEF 9, 14 & 21 certified. The ION 3230 Series is a 10/100/1000Mbps product with advance features including – IEEE 802.1ag Service OAM, IEEE 802.3ah Link OAM, ITU Y.1731 Performance Monitoring, VLAN, QoS, SSH/SSL, Jumbo Frame Support and bandwidth allocation.

Applications

▶ Ethernet in the First Mile (EFM)
▶ Fiber to the Premise (FTTP)
▶ E-Line Services (EPL & EVPL)
▶ Enterprise Markets

Complete End to End Visibility

MEP or MIP

Transport Network

Fault Notification & Dying Gasp (OAM or SNMP)

S323x

S323x

The ION Platform w/C323x

Standard	Access	Core	Access	OAM
MEF & ITU-T				Service
802.1ag, Y.1731				Connectivity
IEEE				Link

Remote Troubleshooting and Diagnostics
802.3ah, 802.1ag, Y.1731, SNMP traps, Provider Visibility & Control

Specifications

Complete list of fiber optic connector specifications [pg 117-123]

Standards	IEEE Std. 802.3, IEEE Std. 802.3ah, 802.1ag, IEEE Std 802.1P, IEEE Std 802.1Q, IEE Std. 802.1X
Data Rate	**Copper:** 10/100/1000 Mbps
	Fiber: 1000 Mbps
Filtering Addresses	8K MAC Addresses
Max Frame Size	10,240 bytes
Dimensions	**Width:** 0.86" [22 mm] **Depth:** 6.5" [165 mm] **Height:** 3.4" [86 mm]
Power Consumption	4.5 Watts
Environment	See chassis specifications
Shipping Weight	1 lb. [.45 kg]
Regulatory Compliance	EN55022 class A, EN55024, CE Mark
Warranty	Lifetime

*C3230-1040 and C3231-1040 have SGMII support for use with 10/100/1000BASE-T copper SFPs.

Ordering Information

Complete list of fiber optic connector specifications [pg 117-123]

C3230-1013
C3230-1013-D (DMI Options)
  10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-SX 850nm MM (SC)
  [62.5/125 µm fiber: 220 m/722 ft.]
  [50/125 µm fiber: 550 m/1804 ft.]
  Link Budget: 8.5 dB

C3230-1014
C3230-1014-D (DMI Options)
  10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-LX 1310nm SM (SC)
  [10 km/6.2 mi.] Link Budget: 10.5 dB

C3230-1015
C3230-1015-D (DMI Options)
  10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-LX 1310nm SM (SC)
  [30 km/18.6 mi.] Link Budget: 15.0 dB

C3230-1017
  10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-LX 1550nm SM (SC)
  [80 km/49.7 mi.] Link Budget: 21.0 dB

C3230-1035
  10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-LX 1550nm SM (SC)
  [120 km/77.7 mi.] Link Budget: 27.0 dB

***C3230-1040**
  10/100/1000BASE-T (RJ-45) **[100 m]**
to (1) 100/1000Base-X SFP Slot (empty)

***C3231-1040**
  10/100/1000BASE-T (RJ-45) **[100 m]**
to (2) 100/1000Base-X SFP Slots (empty)

Single Fiber Products [pg 18]

C3230-1029-A1
C3230-1029-DA1 (DMI Options)
  10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-BX-U 1310nm TX/1490nm RX single fiber single mode (SC)
  [20 km/12.4 mi.] Link Budget: 14.0 dB

C3230-1029-A2
C3230-1029-DA2 (DMI Options)
  10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-BX-D 1490nm TX/1310nm RX single fiber single mode (SC)
  [20 km/12.4 mi.] Link Budget: 14.0 dB

C3230-1029-B1
  10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-BX-U 1310nm TX/1490nm RX single fiber single mode (SC)
  [40 km/24.8 mi.] Link Budget: 20.0 dB

C3230-1029-B2
  10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-BX-D 1490nm TX/1310nm RX single fiber single mode (SC)
  [40 km/24.8 mi.] Link Budget: 20.0 dB

*Note all units feature USB port for local management application.

Optional Accessories (sold separately)

SFP Modules [pg 98-104]

USB Cables
USBC-AM-BM-03
  USB 2.0 Cable A male to B male [3 ft. Gray]
USBC-AM-BM-06
  USB 2.0 Cable A male to B male [6 ft. Gray]

The ION Platform

10/100/1000BASE-T to 1000BASE-SX/LX

LOOP BACK   NEW PRODUCT

slide-in-module for the ion platform

C6010 Series

T1/E1 to Fiber Device

The T1/E1 copper to fiber device provides a solution for those users that need to extend T1/E1 connections over fiber.
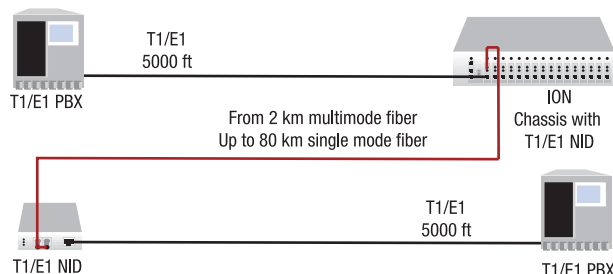
The T1/E1 supports Small Form Pluggable (SFP) transceivers to support a variety of fiber types, distances and wavelengths to provide maximum flexibility across a variety of network topologies. The use of Coarse Wave Division Multiplexing (CWDM) SFPs can be utilized to further increase the bandwidth capacity of the fiber infrastructure.

The T1/E1 device must be used in pairs. A typical installation will include a chassis card installed in the ION Platform locally and a stand-alone device installed at the remote location.

Features

‣ Remote in-band management
‣ Local or Remote Loopbacks - Copper or Fiber
‣ Switch selectable for T1 or E1
‣ Remote firmware upgrade
‣ LEDs for immediate visual status
‣ Supports dual or single fiber
‣ Supports multimode and single mode fiber at a variety of distances
‣ Supports CWDM SFPs
‣ SNMP management when used with ION chassis and management module
‣ Remote standalone can be managed by local peer

Application Diagram

T1/E1
5000 ft

T1/E1 PBX

From 2 km multimode fiber
Up to 80 km single mode fiber

ION
Chassis with
T1/E1 NID

T1/E1
5000 ft

T1/E1 NID

T1/E1 PBX

Specifications

Standards	ANSI T1.102, T1.402 and T1.408, ITU I.431, G.703. G.736, G.775 and G.823, ETSI 300-166, 300-233 and TBR12/12
Copper Connectors	RJ-48, BNC
Fiber Connectors	**SFP:** LC connector Uses standard 100BASE-X/OC-3 SFP **Fixed Optics:** ST or SC connector
Data Rates	T1 = 1.544 Mbit/s, E1 = 2.048 Mbit/s
Status LED	Power, Signal Detect Copper, Signal Detect Fiber
Dimensions	**W:** 0.86" [22 mm]; **D:** 6.5" [165 mm]; **H:** 3.4" [86 mm]
Power Consumption	2.6 Watts
Environment	See chassis specifications
Shipping Weight	1.0 lb. [.45 kg]
Regulatory Compliance	CISPR/EN55022 Class A; FCC Class A; CE Mark
MTBF	Greater than 250,000 hours (MIL-HDBD-217F) Greater than 687,000 hours (Bellcore)
Warranty	Lifetime

Ordering Information

Complete list of fiber optic connector specifications [pg 117-123]

C6010-1011
Twisted Pair (RJ-48) [1.5 km/0.9 mi.]
to 1300nm multimode (ST)
[2 km/1.2 mi.] Link Budget: 11.0 dB

C6010-1013
Twisted Pair (RJ-48) [1.5 km/0.9 mi.]
to 1300nm multimode (SC)
[2 km/1.2 mi.] Link Budget: 12.0 dB

C6010-1014
Twisted Pair (RJ-48) [1.5 km/0.9 mi.]
to 1310nm single mode (SC)
[20 km/12.4 mi.] Link Budget: 16.0 dB

C6010-1015
Twisted Pair (RJ-48) [1.5 km/0.9 mi.]
1310nm single mode (SC)
[40 km/24.9 mi.] Link Budget: 29.0 dB

C6010-1016
Twisted Pair (RJ-48) [1.5 km/0.9 mi.]
to 1310nm single mode (SC)
[60 km/37.3 mi.] Link Budget: 32.0 dB

C6010-1017
Twisted Pair (RJ-48) [1.5 km/0.9 mi.]
to 1550nm single mode (SC)
[80 km/49.7 mi.] Link Budget: 29.0 dB

C6010-1040
Twisted Pair (RJ-48) [1.5 km/0.9 mi.]
to SFP slot (empty)

C6010-3040
(2) Coax (BNC)
to SFP slot (empty)

Single Fiber Products
Recommended use in pairs

C6010-1029-A1
Twisted Pair (RJ-48) [1.5 km/0.9 mi.]
to 1310nm TX /1550nm RX single fiber SM (SC)
[20 km/12.4 mi.] Link Budget: 19.0 dB

C6010-1029-A2
Twisted Pair (RJ-48) [1.5 km/0.9 mi.]
to 1550nm TX /1310nm RX single fiber SM (SC)
[20 km/12.4 mi.] Link Budget: 19.0 dB

C6010-1029-B1
Twisted Pair (RJ-48) [1.5 km/0.9 mi.]
to 1310nm TX /1550nm RX single fiber SM (SC)
[40 km/24.9 mi.] Link Budget: 25.0 dB

C6010-1029-B2
Twisted Pair (RJ-48) [1.5 km/0.9 mi.]
to 1550nm TX /1310nm RX single fiber SM (SC)
[40 km/24.9 mi.] Link Budget: 25.0 dB

NEW PRODUCT

slide-in-module for the ion platform

C6110 Series

4xT1/E1/J1

The ION 4xT1/E1/J1 copper to fiber device provides a solution for those users that need to extend multiple T1/E1 connections over fiber.

The ION 4xT1/E1/J1 supports Small Form Pluggable (SFP) transceivers to support a variety of fiber types, distances and wavelengths to provide maximum flexibility across a variety of network topologies.

The use of Coarse Wave Division Multiplexing (CWDM) SFPs can be utilized to further increase the bandwidth capacity of the fiber infrastructure.

The ION 4xT1/E1/J1 device must be used in pairs. A typical installation will include a chassis card installed in the ION Platform locally and a stand-alone device installed at the remote location.

Features

▸ 4 x RJ-48 copper interfaces

 1 fiber interface (fixed or SFP)
 2 SFP ports on C6111-1040 model

▸ Loopback via test set

▸ Local and remote loopbacks

▸ LEDs for device status and troubleshooting

▸ Settings for line code, line build out, loopbacks and Alarm Indication Signal (AIS)

▸ Access to complete status and configuration on local and remote device

▸ Remote firmware upgrade

▸ Remote management

PBX — PBX — PBX
Router
ION Stand-Alone

ION Chassis
PBX — PBX — PBX
Router

Applications

▸ T1/E1/J1 extension over fiber
▸ Mobile Backhaul
▸ Business customers

Hardware and Performance Specifications

Complete list of fiber optic connector specifications [pg 117-123]

Standards	ANSI T1.102, T1.403 and T1.408 ITU I.431, G.703,G.736, G.775 and G.823 ETSI 300-166, 300-233 and TBR 12/13 AT&T Pub 62411
Switches	Numerous switch settings for line coding, line build out, loopback and AIS
Data Rate	Copper ports (RJ-48): T1(J1) = 1.544Mb/s, E1 = 2.048Mb/s SFP port(s) (empty): 100BASE-X/OC-3
Status LEDs	Power, Port Status, Loopback and AIS
Dimensions	**Width:** 1.72" [44 mm] **Depth:** 6.5" [165 mm] **Height:** 3.4" [86 mm]
Power Consumption	6W max for dual fiber model, 5.5W max for single fiber model
Environment	See chassis specifications
Safety Compliance	EN55022 Class A, EN55024, CE mark
Shipping Weight	1 lbs. (0.45 kg)
Warranty	Lifetime

Ordering Information

Complete list of fiber optic connector specifications [pg 117-123]

C6110-1011
 1300nm multimode (ST)
 [2 km/1.2 mi.] Link Budget: 11.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**

C6110-1013
 1300nm multimode (SC)
 [2 km/1.2 mi.] Link Budget: 11.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**

C6110-1014
 1310nm single mode (SC)
 [20 km/12.4 mi.]
 Link Budget: 16.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**

C6110-1015
 1310nm single mode (SC)
 [40 km/24.9 mi.]
 Link Budget: 29.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**

C6110-1016
 1310nm single mode (SC)
 [60 km/37.3 mi.]
 Link Budget: 32.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**

C6110-1017
 1550nm single mode (SC)
 [80 km/49.7 mi.]
 Link Budget: 29.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**

C6110-1035
 1550nm single mode (SC)
 [120 km/74.6 mi.]
 Link Budget: 36.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**

C6110-1040
 1 SFP port (Empty)
to (4) RJ-48 **[1.5 km/0.9 mi.]**

C6111-1040
 2 SFP ports (Empty)
to (4) RJ-48 **[1.5 km/0.9 mi.]**

Single Fiber Products
Recommended use in pairs [pg 18]

C6110-1029-A1
 1310nm TX/1550nm RX single fiber
 single mode (SC)
 [20 km/12.4 mi.] Link Budget: 19.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**

C6110-1029-A2
 1550nm TX/1310nm RX single fiber
 single mode (SC)
 [20 km/12.4 mi.] Link Budget: 19.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**

C6110-1029-B1
 1310nm TX/1550nm RX single fiber
 single mode (SC)
 [40 km/24.9 mi.] Link Budget: 25.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**

C6110-1029-B2
 1550nm TX/1310nm RX single fiber
 single mode (SC)
 [40 km/24.9 mi.] Link Budget: 25.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**

< 38 >

Call us at 800.526.9267 or 952.941.7600

C6120 Series

4xT1/E1/J1 + 10/100 Ethernet

The ION 4xT1/E1/J1 copper to fiber device provides a solution for those users that need to extend multiple T1/E1 connections and 10/100Mbps Ethernet over fiber.
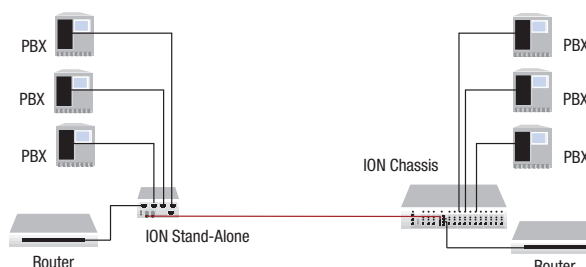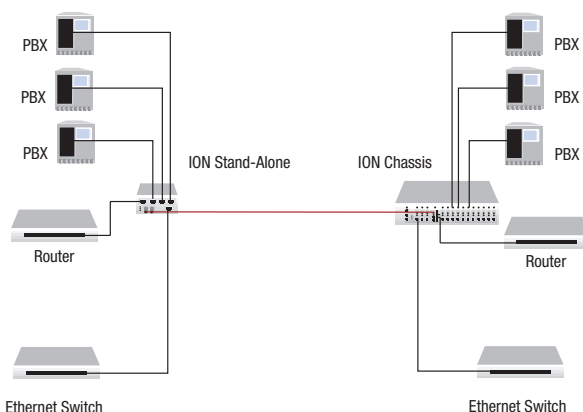
The ION 4xT1/E1/J1 supports Small Form Pluggable (SFP) transceivers to support a variety of fiber types, distances and wavelengths to provide maximum flexibility across a variety of network topologies.

The use of Coarse Wave Division Multiplexing (CWDM) SFPs can be utilized to further increase the bandwidth capacity of the fiber infrastructure.

The ION 4xT1/E1/J1 device must be used in pairs. A typical installation will include a chassis card installed in the ION Platform locally and a stand-alone device installed at the remote location.

Features

▸ 4 x RJ-48 copper interfaces
  1 fiber interface (fixed or SFP)
  2 SFP ports on C6121-1040 model
  1 RJ-45 10/100Mbps Ethernet port
▸ AutoCross (auto MDI/MDI-X on Ethernet port)
▸ Pause (Flow Control) on Ethernet port)
▸ Loopback via test set
▸ Local and remote loopbacks
▸ LEDs for device status and troubleshooting
▸ Settings for line code, line build out, loopbacks and Alarm Indication Signal (AIS)
▸ Access to complete status and configuration on local and remote device
▸ Remote firmware upgrade
▸ Remote management

Applications

▸ T1/E1/J1 extension over fiber
▸ Mobile Backhaul
▸ Business customers

Hardware and Performance Specifications

Complete list of fiber optic connector specifications [pg 117-123]

Standards	ANSI T1.102, T1.403 and T1.408 ITU I.431, G.703,G.736, G.775 and G.823 ETSI 300-166, 300-233 and TBR 12/13 AT&T Pub 62411 IEEE 802.3™-2008
Switches	Numerous switch settings for line coding, line build out, loopback and AIS
Data Rate	Copper ports (RJ-48): T1(J1) = 1.544Mb/s, E1 = 2.048Mb/s Ethernet port (RJ-45): 10/100Mbps SFP port(s) (empty): 100BASE-X/OC-3
Status LEDs	Power, Port Status, Loopback and AIS
Dimensions	**Width:** 1.72" [44 mm] **Depth:** 6.5" [165 mm] **Height:** 3.4" [86 mm]
Power Consumption	6W max for dual fiber model, 5.5W max for single fiber model
Environment	See chassis specifications
Safety Compliance	EN55022 Class A, EN55024, CE mark
Shipping Weight	1 lbs. (0.45 kg)
Warranty	Lifetime

Ordering Information

Complete list of fiber optic connector specifications [pg 117-123]

C6120-1011
  1300nm multimode (ST)
  [2 km/1.2 mi.] Link Budget: 11.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**
  plus 10/100BASE-TX (RJ-45) **[100m]**

C6120-1013
  1300nm multimode (SC)
  [2 km/1.2 mi.] Link Budget: 11.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**
  plus 10/100BASE-TX (RJ-45) **[100m]**

C6120-1014
  1310nm single mode (SC)
  [20 km/12.4 mi.] Link Budget: 16.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**
  plus 10/100BASE-TX (RJ-45) **[100m]**

C6120-1015
  1310nm single mode (SC)
  [40 km/24.9 mi.] Link Budget: 29.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**
  plus 10/100BASE-TX (RJ-45) **[100m]**

C6120-1016
  1310nm single mode (SC)
  [60 km/37.3 mi.] Link Budget: 32.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**
  plus 10/100BASE-TX (RJ-45) **[100m]**

C6120-1017
  1550nm single mode (SC)
  [80 km/49.7 mi.] Link Budget: 29.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**
  plus 10/100BASE-TX (RJ-45) **[100m]**

C6120-1035
  1550nm single mode (SC)
  [120 km/74.6 mi.] Link Budget: 36.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**
  plus 10/100BASE-TX (RJ-45) **[100m]**

C6120-1040
  1 SFP port (Empty)
to (4) RJ-48 **[1.5 km/0.9 mi.]**
  plus 10/100BASE-TX (RJ-45) **[100m]**

C6121-1040
  2 SFP ports (Empty)
to (4) RJ-48 **[1.5 km/0.9 mi.]**
  plus 10/100BASE-TX (RJ-45) **[100m]**

Single Fiber Products

Recommended use in pairs [pg 18]

C6120-1029-A1
  1310nm TX/1550nm RX single fiber SM (SC) **[20 km/12.4 mi.] LB: 19.0 dB**
to (4) RJ-48 **[1.5 km/0.9 mi.]**
  plus 10/100BASE-TX (RJ-45) **[100m]**

C6120-1029-A2
  1550nm TX/1310nm RX single fiber SM (SC) **[20 km/12.4 mi.] LB: 19.0 dB**
to (4) RJ-48 **[1.5 km/0.9 mi.]**
  plus 10/100BASE-TX (RJ-45) **[100m]**

C6120-1029-B1
  1310nm TX/1550nm RX single fiber SM (SC) **[40 km/24.9 mi.] LB: 25.0 dB**
to (4) RJ-48 **[1.5 km/0.9 mi.]**
  plus 10/100BASE-TX (RJ-45) **[100m]**

C6120-1029-B2
  1550nm TX/1310nm RX single fiber SM (SC) **[40 km/24.9 mi.] LB: 25.0 dB**
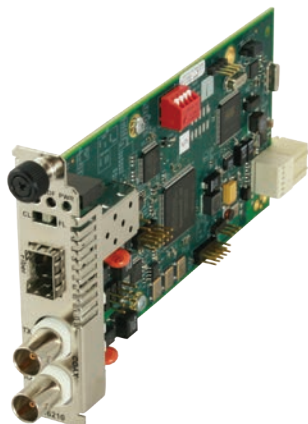to (4) RJ-48 **[1.5 km/0.9 mi.]**
  plus 10/100BASE-TX (RJ-45) **[100m]**

PBX
PBX
PBX
Router
Ethernet Switch
ION Stand-Alone
ION Chassis
PBX
PBX
PBX
Router
Ethernet Switch

LOOP BACK **NEW PRODUCT**

slide-in-module for the ion platform

C6210 Series

DS3 – T3/E3 Coax to Fiber Device

The DS3 – T3/E3 copper to fiber device provides a solution for those users that need to extend DS3 connections over fiber.
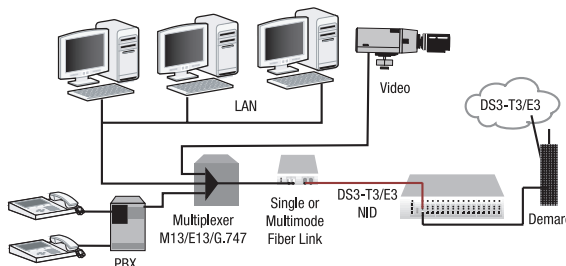
The DS3 – T3/E3s supports Small Form Pluggable (SFP) transceivers to support a variety of fiber types, distances and wavelengths to provide maximum flexibility across a variety of network topologies. The use of Coarse Wave Division Multiplexing (CWDM) SFPs can be utilized to further increase the bandwidth capacity of the fiber infrastructure.

The DS3 – T3/E3 device must be used in pairs. A typical installation will include a chassis card installed in the ION Platform locally and a stand-alone device installed at the remote location.

Features

▸ AIS (Alarm Indication Signal)
▸ Coax Line Build Out
▸ Switch selectable for DS3/T3 or E3
▸ Remote firmware upgrade
▸ Loopback – Coax and Fiber
▸ LEDs for immediate visual status]
▸ Supports dual or single fiber
▸ Supports multimode and single mode fiber at a variety of distances
▸ Supports CWDM SFPs
▸ SNMP management when used with ION chassis and management module
▸ Remote standalone can be managed by local peer

Integrate Voice & Data on Fiber Network

Specifications

Standards	ANSI, ITU-TS, ETSI, G.823 for jitter tolerance, G.755 for loss of signal
Coax Connectors	75 ohm coax
Fiber Connectors	**SFP:** LC connector Uses standard 100BASE-X/OC-3 SFP **Fixed Optics:** ST or SC connector
Data Rates	DS3/T3 = 44.7Mbps; E3 = 34.4Mbps
Status LEDs	Power, Coax link status, coax loop-back status, AIS on coax link; Fiber link status, fiber loop-back status, AIS on fiber link
Dimensions	**W:** 0.86" [22 mm]; **D:** 6.5" [165 mm]; **H:** 3.4" [86 mm]
Power Consumption	2.5 Watts
Environment	See chassis specifications
Shipping Weight	1 lb. [.45 kg]
Regulatory Compliance	CISPR/EN55022 Class A; FCC Class A; CE Mark
MTBF	Greater than 250,000 hours (MIL-HDBD-217F) Greater than 687,000 hours (Bellcore)
Warranty	Lifetime

Ordering Information

C6210-3011
(2) Coax (BNC)
to 1300nm multimode (ST)
[2 km/ 1.2 mi.] Link Budget: 11.0 dB

C6210-3013
(2) Coax (BNC)
to 1300nm multimode (SC)
[2 km/ 1.2 mi.] Link Budget: 11.0 dB

C6210-3014
(2) Coax (BNC)
to 1310nm single mode (SC)
[20 km/12.4 mi.] Link Budget: 16.0 dB

C6210-3015
(2) Coax (BNC)
to 1310nm single mode (SC)
[40 km/24.9 mi.] Link Budget: 29.0 dB

C6210-3016
(2) Coax (BNC)
to 1310nm single mode (SC)
[60 km/37.3 mi.] Link Budget: 32.0 dB

C6210-3017
(2) Coax (BNC)
to 1550nm single mode (SC)
[80 km/49.7 mi.] Link Budget: 29.0 dB

C6210-3040
(2) Coax (BNC)
to SFP slot (empty)

Single Fiber Products
Recommended use in pairs

C6210-3029-A1
(2) Coax (BNC)
to 1310nm TX/1550nm RX single fiber
single mode (SC)
[20 km/12.4 mi.] Link Budget: 19.0 dB

C6210-3029-A2
(2) Coax (BNC)
to 1550nm TX/1310nm RX single fiber
single mode (SC)
[20 km/12.4 mi.] Link Budget: 19.0 dB

C6210-3029-B1
(2) Coax (BNC)
to 1310nm TX/1550nm RX single fiber
single mode (SC)
[40 km/24.9 mi.] Link Budget: 25.0 dB

C6210-3029-B2
(2) Coax (BNC)
to 1550nm TX/1310nm RX single fiber
single mode (SC)
[40 km/24.9 mi.] Link Budget: 25.0 dB

< 40 >

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stand-alone device for the ion platform

S2220 Series

OAM/IP-Based Remotely Managed NID (Network Interface Device)
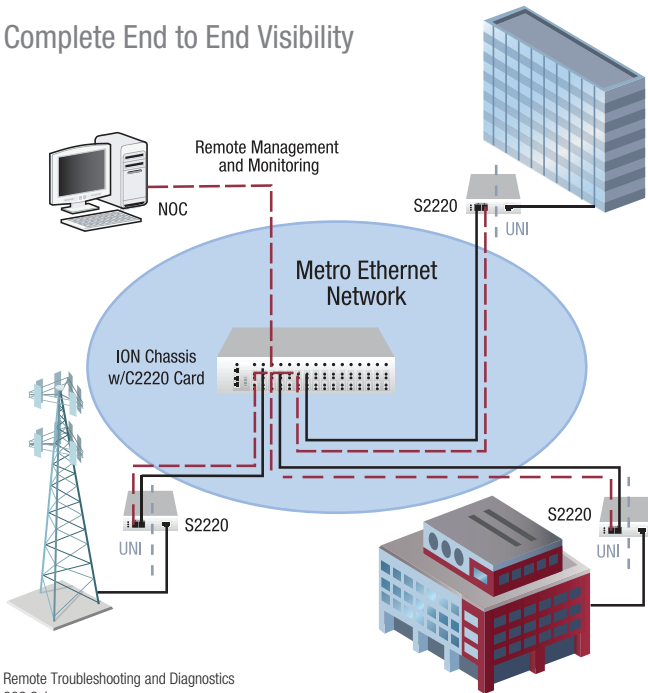
CARRIER ETHERNET ✓ **MEF** Certified Compliant™

Features

- MEF 9, 14 & 21 certified
- 802.3ah Link OAM
- 10K Jumbo Frame Support
- Two selectable Remote Management modes:
  - IP-Based Remote Management
  - In-Band (remote device managed by local peer) [pg 16]
- AutoCross™ [pg 15]
- Auto-Negotiation [pg 15]
- Pause [pg 16]
- Transparent Link Pass Through [pg 16]
- Far-End-Fault [pg 15]
- Remote Loopback [pg 17]
- Field Upgradeable Firmware [pg 17]
- IEEE 802.1p QoS packet classification
- IPv4 IP TOS, DiffDerv and IPv6 traffic class QoS classification
- IEEE 802.1q VLAN and double VLAN tagging with 4096 VIDs
- DHCP client
- SNTP
- TFTP
- RADIUS client
- RMON counters for each port
- Bandwidth profiling [pg 17]
- DMI Optical Management
- Cable diagnostic function for copper ports
- SSH
- Telnet
- Command Line Interface (CLI)
- Web management
- Focal Point Management
- SNMP v1, v2c, and v3
- USB port for basic setup
- Management VLAN

The ION 2220 Series of Network Interface Devices (NIDs) are a remotely managed product that offers IP or IP-Less management methods for secure delivery of Ethernet services for business and Mobile Backhaul applications. With MEF 9, 14 & 21 certification the ION 2220 Series ensures you are compliant with the latest standards. The ION 2220 Series is a 10/100Mbps product with advance features including – IEEE 802.3ah Link OAM, VLAN, QoS, SSH/SSL, Jumbo Frame Support and bandwidth allocation.

Complete End to End Visibility

Remote Management and Monitoring

NOC

S2220

UNI

Metro Ethernet Network

ION Chassis w/C2220 Card

S2220

UNI

S2220

UNI

Remote Troubleshooting and Diagnostics
802.3ah
SNMP traps
Provider Visiblity and Control

Complete End to End Visibility

- Ethernet in the First Mile (EFM)
- Fiber-to-the-Premise (FTTP)
- E-Line Services (EPL & EVPL)
- Enterprise Markets

Specifications

Complete list of fiber optic connector specifications [pg 117-123]

Standards	IEEE Std. 802.3, IEEE Std. 802.3ah, IEEE Std 802.1P, IEEE Std 802.1Q
Data Rate	**Copper:** 10/100 Mbps **Fiber:** 100 Mbps
Filtering Addresses	8K MAC Addresses
Max Frame Size	10,240 bytes
Dimensions	**Width:** 3.25" [82 mm] **Depth:** 6.5" [165 mm] **Height:** 1.0" [25 mm]
Power	**Input:** 100-240 VAC, 1A **Output:** 12 VDC, 1.25A
Operating Temperature	0°C to 50°C
Altitude	0-10,000 ft.
Operating Humidity	5%-95% (non-condensing)
Shipping Weight	2 lb. [.90 kg]
Regulatory Compliance	EN55022 class A, EN55024, UL60950, CE Mark
Warranty	Lifetime

Ordering Information

S2220-1011
S2220-1011-D (DMI Options)
10/100BASE-TX (RJ-45) **[100 m]**
to 100BASE-FX 1310nm MM (ST)
[2 km/1.2 mi.] Link Budget: 11.0 dB

S2220-1013
S2220-1013-D (DMI Options)
10/100BASE-TX (RJ-45) **[100 m]**
to 100BASE-FX 1310nm MM (SC)
[2 km/1.2 mi.] Link Budget: 11.0 dB

S2220-1014
S2220-1014-D (DMI Options)
10/100BASE-TX (RJ-45) **[100 m]**
to 100BASE-LX 1310nm SM (SC)
[10 km/6.2 mi.] Link Budget: 16.0 dB

S2220-1015
S2220-1015-D (DMI Options)
10/100BASE-TX (RJ-45) **[100 m]**
to 100BASE-FX 1310nm SM (SC)
[40 km/24.8 mi.] Link Budget: 26.0 dB

S2220-1016
10/100BASE-TX (RJ-45) **[100 m]**
to 100BASE-FX 1550nm SM (SC)
[60 km/37.3 mi.] Link Budget: 29.0 dB

S2220-1017
10/100BASE-TX (RJ-45) **[100 m]**
to 100BASE-FX 1550nm SM (SC)
[80 km/49.7 mi.] Link Budget: 29.0 dB

S2220-1035
10/100BASE-TX (RJ-45) **[100 m]**
to 100BASE-FX 1550nm SM (SC)
[120 km/77.7 mi.] Link Budget: 36.0 dB

S2220-1040
10/100BASE-TX (RJ-45) **[100 m]**
to 100Base-X SFP Slot (empty)

Single Fiber Products
Recommended use in pairs [pg 18]

S2220-1029-A1
S2220-1029-DA1 (DMI Options)
10/100BASE-TX (RJ-45) **[100 m]**
to 100BASE-BX-U 1310nm TX/1550nm RX Bi-Di SM (SC)
[20 km/12.4 mi.] Link Budget: 19.0 dB

S2220-1029-A2
S2220-1029-DA2 (DMI Options)
10/100BASE-TX (RJ-45) **[100 m]**
to 100BASE-BX-D 1550nm TX/1310nm RX Bi-Di SM (SC)
[20 km/12.4 mi.] Link Budget: 19.0 dB

S2220-1029-B1
10/100BASE-TX (RJ-45) **[100 m]**
to 100BASE-BX-U 1310nm TX/1550nm RX Bi-Di SM (SC)
[40 km/24.8 mi.] Link Budget: 25.0 dB

S2220-1029-B2
10/100BASE-TX (RJ-45) **[100 m]**
to 100BASE-BX-D 1550nm TX/1310nm RX Bi-Di SM (SC)
[40 km/24.8 mi.] Link Budget: 25.0 dB

*Note all units feature USB port for local management application.

Optional Accessories (sold separately)

SFP Modules [pg 98-104]

USB Cables
USBC-AM-BM-03
USB 2.0 Cable A male to B male [3 ft. Gray]

USBC-AM-BM-06
USB 2.0 Cable A male to B male [6 ft. Gray]

AUTO CROSS | AUTO NEG | LOOP BACK | FIELD UPGRADEABLE FIRMWARE | REMOTE FAULT DETECT | SINGLE FIBER | LAST GASP | BANDWIDTH ALLOCATION | REMOTE MGMT | **NEW PRODUCT**

stand-alone device for the ion platform

S322x Series

Gigabit Ethernet

OAM/IP-Based Remotely Managed NID (Network Interface Device)

CARRIER ETHERNET
MEF Certified Compliant ™

Complete End to End Visibility

Remote Management and Monitoring

NOC

S3220

UNI

Metro Ethernet Network

ION Chassis w/C3220 Card

S3220

UNI

S3220

UNI

Remote Troubleshooting and Diagnostics
802.3ah
SNMP traps
Provider Visiblity and Control

Features

▸ MEF 9, 14 & 21 certified
▸ 802.3ah Link OAM
▸ 10K Jumbo Frame Support
▸ Two selectable Remote Management modes:
  • IP-Based Remote Management
  • In-Band (remote device managed by local peer) [pg 16]
▸ AutoCross™ [pg 15]
▸ Auto-Negotiation [pg 15]
▸ Pause [pg 16]
▸ Transparent Link Pass Through [pg 16]
▸ Far-End-Fault [pg 15]
▸ Remote Loopback [pg 17]
▸ Field Upgradeable Firmware [pg 17]
▸ IEEE 802.1p QoS packet classification
▸ IPv4 IP TOS, DiffDerv and IPv6 traffic class QoS classification
▸ IEEE 802.1q VLAN and double VLAN tagging with 4096 VIDs
▸ DHCP client
▸ SNTP
▸ TFTP
▸ RADIUS client
▸ RMON counters for each port
▸ Bandwidth profiling [pg 17]
▸ DMI Optical Management
▸ Cable diagnostic function for copper ports
▸ SSH
▸ Telnet
▸ Command Line Interface (CLI)
▸ Web management
▸ Focal Point Management
▸ SNMP v1, v2c, and v3
▸ USB port for basic setup
▸ Management VLAN

Applications

▸ Ethernet in the First Mile (EFM)
▸ Fiber-to-the-Premise (FTTP)
▸ E-Line Services (EPL & EVPL)
▸ Enterprise Markets

Specifications

Complete list of fiber optic connector specifications [pg 117-123]

Standards	IEEE Std. 802.3, IEEE Std. 802.3ah, IEEE Std 802.1P, IEEE Std. 802.1Q
Data Rate	**Copper:** 10/100/1000 Mbps **Fiber:** 1000 Mbps
Filtering Address	8K MAC Addresses
Max Frame Size	10,240 bytes
Dimensions	**Width:** 3.25" [82 mm] **Depth:** 6.5" [165 mm] **Height:**1.0" [25 mm]
Power	**Input:** 100-240 VAC,1A **Output:** 12 VDC, 1.25A
Operating Temperature	0°C to 50°C
Operating Humidity	5-95% (non-condensing)
Shipping Weight	2.0 lbs. [0.90 kg]
Regulatory Compliance	EN55022 Class A, EN55024, UL60950, CE Mark
Warranty	Lifetime

*S3220-1040 and S3221-1040 have SGMII support for use with 10/100/1000BASE-T copper SFPs.

The ION 3220 Series of Network Interface Devices (NIDs) are a remotely managed product that offers IP or IP-Less management methods for secure delivery of Ethernet services for business and Mobile Backhaul applications. With MEF 9, 14 & 21 certification the ION 3220 Series ensures you are compliant with the latest standards. The ION 3220 Series is a 10/100/1000Mbps product with advance features including – IEEE 802.3ah Link OAM, VLAN, QoS, SSH/SSL, Jumbo Frame Support and bandwidth allocation.

Ordering Information

S3220-1013
S3220-1013-D (DMI Options)
  10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-SX 850nm MM (SC)
  [62.5/125 μm fiber: 220 m/722 ft.]
  [50/125 μm fiber: 550 m/1804 ft.]
  Link Budget: 8.5 dB

S3220-1014
S3220-1014-D (DMI Options)
  10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-LX 1310nm SM (SC)
  [10 km/6.2 mi.] Link Budget: 10.5 dB

S3220-1015
S3220-1015-D (DMI Options)
  10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-LX 1310nm SM (SC)
  [30 km/18.6 mi.] Link Budget: 15.0 dB

S3220-1017
  10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-ZX 1550nm SM (SC)
  [80 km/49.7 mi.] Link Budget: 21.0 dB

S3220-1035
  10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-ZX 1550nm SM (SC)
  [120 km/77.7 mi.] Link Budget: 27.0 dB

*S3220-1040
  10/100/1000BASE-T (RJ-45) **[100 m]**
to (1) 100/1000Base-X Open SFP Slot

*S3221-1040
  10/100/1000BASE-T (RJ-45) **[100 m]**
to (2) 100/1000Base-X Open SFP Slot

Single Fiber Products
Recommended use in pairs [pg 18]

S3220-1029-A1
S3220-1029-DA1 (DMI Options)
  10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-BX 1310nm TX/1490nm RX
  Bi-Di SM (SC)
  [20 km/12.4 mi.] Link Budget: 14.0 dB

S3220-1029-A2
S3220-1029-DA2 (DMI Options)
  10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-BX 1490nm TX/1310nm RX
  Bi-Di SM (SC)
  [20 km/12.4 mi.] Link Budget: 14.0 dB

S3220-1029-B1
  10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-BX 1310nm TX/1490nm RX
  Bi-Di SM (SC)
  [40 km/24.8 mi.] Link Budget: 20.0 dB

S3220-1029-B2
  10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-BX 1490nm TX/1310nm RX
  Bi-Di SM (SC)
  [40 km/24.8 mi.] Link Budget: 20.0 dB

*Note all units feature USB port for local management application.

Optional Accessories (sold separately)

SFP Modules [pg 98-104]

USB Cables
USBC-AM-BM-03
  USB 2.0 Cable A male to B male [3 ft. Gray]
USBC-AM-BM-06
  USB 2.0 Cable A male to B male [6 ft. Gray]

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| AUTO CROSS | AUTO NEG | LOOP BACK | FIELD UPGRADEABLE FIRMWARE | REMOTE FAULT DETECT | SINGLE FIBER | LAST GASP | BANDWIDTH ALLOCATION | REMOTE MGMT | NEW PRODUCT |

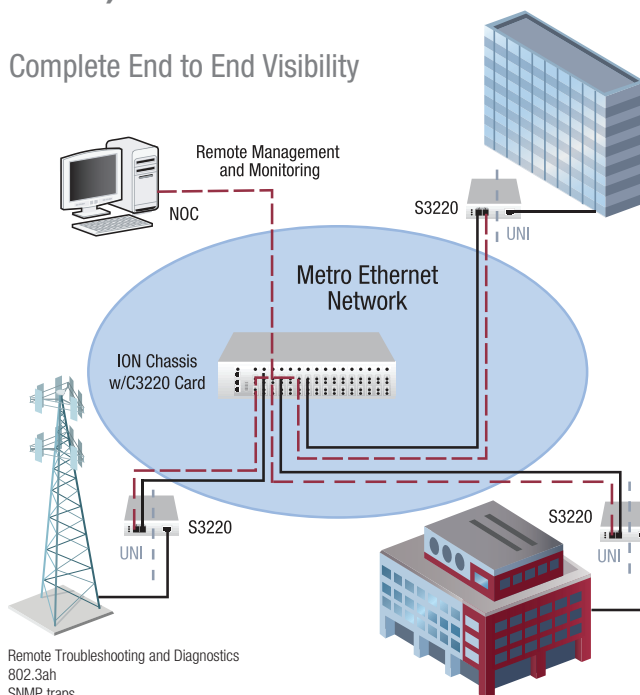**stand alone device for the ion platform**

S323x Series

Gigabit Ethernet

OAM/IP-Based Remotely Managed NID (Network Interface Device)

Features

▶ MEF 9, 14 & 21 certified
▶ 802.3ah Link OAM
▶ 802.1ag Services OAM
▶ ITU Y.1731
▶ 10K Jumbo Frame Support
▶ Two selectable Remote Management modes:

• IP-Based Remote Management

• In-Band Link (remote device managed by local peer) [pg 16]

▶ AutoCross™ [pg 15]
▶ Auto-Negotiation [pg 15]
▶ Pause [pg 16]
▶ Transparent Link Pass Through [pg 16]
▶ Far-End-Fault [pg 15]
▶ Remote Loopback [pg 17]
▶ Field Upgradeable Firmware [pg 17]
▶ IEEE 802.1p QoS packet classification
▶ IPv4 IP TOS, DiffDerv and IPv6 traffic class QoS classification
▶ IEEE 802.1q VLAN and double VLAN tagging with 4096 VIDs
▶ DHCP client
▶ SNTP
▶ TFTPt
▶ RADIUS client
▶ RMON counters for each port
▶ Bandwidth profiling [pg 17]
▶ DMI Optical Management
▶ Cable diagnostic function for copper ports
▶ SSH
▶ Telnet
▶ Command Line Interface (CLI)
▶ Web management
▶ Focal Point Management
▶ SNMP v1, v2c, and v3
▶ USB port for basic setup
▶ Management VLAN

The ION 3230 Series of Network Interface Devices (NIDs) are multi-service NIDs that provide SLA-assurance and advance fault management that is compliant with MEF and IEEE standards. The ION 3230 Series are designed for business Ethernet and Mobile Backhaul deployments. The ION S3230 Series are MEF 9, 14 & 21 certified. The ION 3230 Series is a 10/100/1000Mbps product with advance features including – IEEE 802.1ag Service OAM, IEEE 802.3ah Link OAM, ITU Y.1731 Performance Monitoring, VLAN, QoS, SSH/SSL, Jumbo Frame Support and bandwidth allocation.

Complete End to End Visibility

MEP or MIP — Transport Network — Fault Notification & Dying Gasp (OAM or SNMP)

S323x

S323x

The ION Platform w/C323x

Standard	Access	Core	Access	OAM
MEF & ITU-T				Service
802.1ag, Y.1731				Connectivity
IEEE				Link

Remote Troubleshooting and Diagnostics
802.3ah, 802.1ag, Y.1731, SNMP traps, Provider Visibility & Control

Applications

▶ Ethernet in the First Mile (EFM)
▶ Fiber-to-the-Premise (FTTP)
▶ E-Line Services (EPL & EVPL)
▶ Enterprise Markets

Specifications

Complete list of fiber optic connector specifications [pg 117-123]

Standards	IEEE Std. 802.3, IEEE Std. 802.3ah, 802.1ag, IEEE Std 802.1P, IEEE Std. 802.1Q
Data Rate	**Copper:** 10/100/1000 Mbps **Fiber:** 1000 Mbps
Filtering Address	8K MAC Addresses
Max Frame Size	10,240 bytes
Dimensions	**Width:** 3.25" [82 mm] **Depth:** 6.5" [165 mm] **Height:**1.0" [25 mm]
Power	**Input:** 100-240 VAC,1A **Output:** 12 VDC, 1.25A
Operating Temperature	0°C to 50°C
Altitude	0-10,000 ft.
Operating Humidity	5-95% (non-condensing)
Shipping Weight	2.0 lbs. [0.90 kg]
Regulatory Compliance	EN55022 Class A, EN55024, UL60950, CE Mark
Warranty	Lifetime

*S3230-1040 and S3231-1040 have SGMII support for use with 10/100/1000BASE-T copper SFPs.

Ordering Information

S3230-1013
S3230-1013-D (DMI Options)
   10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-SX 850nm MM (SC)
   [62.5/125 μm fiber: 220 m/722 ft.]
   [50/125 μm fiber: 550 m/1804 ft.]
   Link Budget: 8.5 dB

S3230-1014
S3230-1014-D (DMI Options)
   10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-LX 1310nm SM (SC)
   [10 km/6.2 mi.] Link Budget: 10.5 dB

S3230-1015
S3230-1015-D (DMI Options)
   10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-LX 1310nm SM (SC)
   [30 km/18.6 mi.] Link Budget: 15.0 dB

S3230-1017
   10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-ZX 1550nm SM (SC)
   [80 km/49.7 mi.] Link Budget: 21.0 dB

S3230-1035
   10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-ZX 1550nm SM (SC)
   [120 km/77.7 mi.] Link Budget: 27.0 dB

*****S3230-1040**
   10/100/1000BASE-T (RJ-45) **[100 m]**
to (1) 100/1000Base-X Open SFP Slot

*****S3231-1040**
   10/100/1000BASE-T (RJ-45) **[100 m]**
to (2) 100/1000Base-X Open SFP Slots

Single Fiber Products
Recommended use in pairs [pg 18]

S3230-1029-A1
S3230-1029-DA1 (DMI Options)
   10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-BX 1310nm TX/1490nm RX
   Bi-Di SM (SC)
   [20 km/12.4 mi.] Link Budget: 14.0 dB

S3230-1029-A2
S3230-1029-DA2 (DMI Options)
   10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-BX 1490nm TX/1310nm RX
   Bi-Di SM (SC)
   [20 km/12.4 mi.] Link Budget: 14.0 dB

S3230-1029-B1
   10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-BX 1310nm TX/1490nm RX
   Bi-Di SM (SC)
   [40 km/24.8 mi.] Link Budget: 20.0 dB

S3230-1029-B2
   10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-BX 1490nm TX/1310nm RX
   Bi-Di SM (SC)
   [40 km/24.8 mi.] Link Budget: 20.0 dB

*Note all units feature USB port for local management application.

Optional Accessories (sold separately)

SFP Modules [pg 98-104]

USB Cables
USBC-AM-BM-03
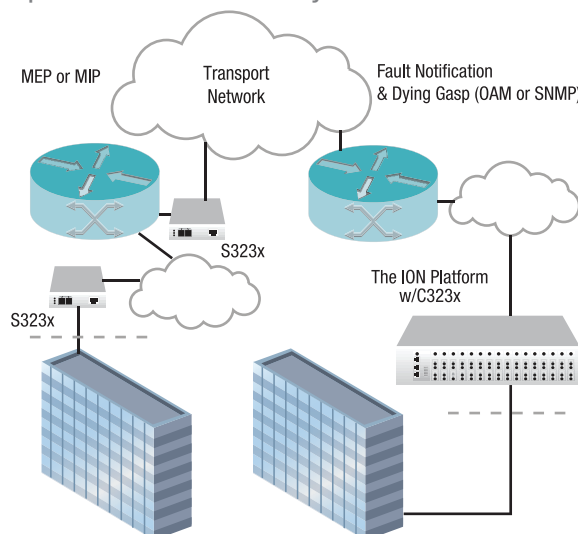   USB 2.0 Cable A male to B male [3 ft. Gray]
USBC-AM-BM-06
   USB 2.0 Cable A male to B male [6 ft. Gray]

The ION Platform

stand-alone device for the ion platform

S3240

Remotely Managed NID (Network Interface Device)

CARRIER ETHERNET ✓ MEF Certified Compliant™

Features

▶ MEF 9, 14 & 21 certified
▶ 802.3ah Link OAM
▶ 802.1ag Services OAM
▶ ITU Y.1731
▶ Redundant Power AC/DC
▶ Fanless
▶ 10K Jumbo Frame Support
▶ IP-Based Remote Management
▶ AutoCross™
▶ Auto-Negotiation
▶ Pause
▶ Remote Loopback
▶ Field Upgradeable Firmware
▶ IEEE 802.1p QoS packet classification
▶ IPv4 IP TOS, DiffDerv and IPv6 traffic class QoS classification
▶ IEEE 802.1q VLAN and double VLAN tagging with 4096 VIDs
▶ DHCP client
▶ SNTP
▶ TFTP
▶ RADIUS client
▶ RMON counters for each port
▶ Bandwidth profiling
▶ DMI Optical Management
▶ Cable diagnostic function for TP ports
▶ SSH
▶ Telnet
▶ Command Line Interface (CLI)
▶ Web management
▶ Focal Point Management
▶ SNMP v1 & v2c
▶ USB port for basic setup
▶ Management VLAN

Complete End to End Visibility

MEP or MIP · Transport Network · Fault Notification & Dying Gasp (OAM or SNMP)

S3240
S3240
S3240

Standard	Access	Core	Access	OAM
MEF & ITU-T				Service
802.1ag, Y.1731				Connectivity
IEEE				Link

Remote Troubleshooting and Diagnostics
802.3ah, 802.1ag, Y.1731, SNMP traps, Provider Visibility & Control

Specifications

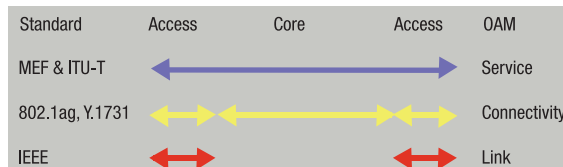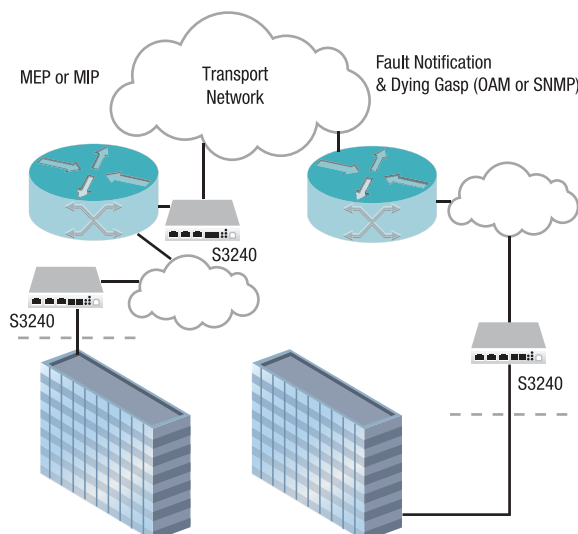|	
Standards	IEEE Std. 802.3, IEEE Std. 802.3ah, 802.1ag, IEEE Std 802.1P, IEEE Std. 802.1Q
Data Rate	**Copper:** 10/100/1000 Mbps **Fiber:** 100/1000 Mbps*
Filtering Address	8 K MAC Addresses
Max Frame Size	10,240 bytes
Dimensions	**Width:** 5.53" [140 mm] **Depth:** 6.5" [165 mm] **Height:** 1.75" [44 mm]
Power	**Inputs:** Redundant 18-57VDC 100-240VAC external power supply
Operating Temperature	-10°C to 65°C
Altitude	0-10,000 ft.
Operating Humidity	5-95% (non-condensing)
Shipping Weight	4.0 lbs. [1.81 kg]
Regulatory Compliance	EN55022 Class A, EN55024, UL60950, CE Mark
Warranty	Lifetime

*SFP Ports support SGMII for use with 10/100/1000BASE-T copper SFPs

Ordering Info

S3240
(3) 10/100/1000BASE-T (RJ-45) **[100 m]**
to (2) 100/1000Base-X Open SFP Slots

Optional Accessories (sold separately)

SFP Modules [pg 98-104]

Mounting Options

S3240-RMS
19" Rack Mount Kit for single S3240 in 1RU

S3240-RMD
19" Rack Mount Kit for (2) S3240s in 1RU

Applications

▶ Ethernet in the First Mile (EFM)
▶ Fiber-to-the-Premise (FTTP)
▶ E-Line Services
▶ Enterprise Markets

The S3240 of Network Interface Device (NID) is a multi-service NID that provide SLA-assurance and advance fault management that is compliant with MEF and IEEE standards. The S3240 is designed for business Ethernet and Mobile Backhaul deployments. The S3240 is MEF 9, 14 & 21 certified. The S3240 is a multi-port 10/100/1000Mbps product with advance features including – IEEE 802.1ag Service OAM, IEEE 802.3ah Link OAM, ITU Y.1731 Performance Monitoring, VLAN, QoS, SSH/SSL, Jumbo Frame Support and bandwidth allocation. The S3240 also offers multiple power inputs for redundancy and an extended operating temperature.

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Call us at 800.526.9267 or 952.941.7600

NEW PRODUCT

stand alone NID

S3280

OAM/IP-Based Remotely managed NID
(Network Interface Device)

Transition Networks' managed S3280 NID provides advanced packet performance metering and service creation directly at customer premises and cell sites. The S3280 is designed for business Ethernet and Mobile Backhaul deployments.

The S3280 is a multi-service NID that provides SLA-assurance and advanced fault management that is certified to MEF standards. It delivers IEEE 802.1ag Service OAM, ITU Y.1731 Performance Monitoring and 802.3ah Link OAM.

The S3280 supports advance features such as IPv4/6, VLANs, QoS, bandwidth allocation, ring protection, jumbo frames and numerous security features.

The S3280 can be managed via Web, CLI and SNMP (v1, v2c & v3). The product also supports SSL/SSH, RADIUS and Management VLAN.

The S3280 offers multiple power inputs for redundancy and DC inputs for extended operating temperature in extreme environments.

The SFP ports are triple speed and support 100Mbps, 1000Mbps or SGMII SFPs. CWDM and Bi-Di SFPs are also supported , allowing for flexible network architectures.

Features

- 4 x 10/100/1000Mbps Base–T ports
  4 x 100/1000Mbps SFP ports
  Any port can be network or client
- SNMP v1, v2c, and v3
- IPv6 and IPv4 support
- VLAN (802.1Q) with Q-in-Q (C-Tag / S-Tag)
- RMON and Syslog
- OAM Support:
  - IEEE 802.3ah Link OAM.
  - IEEE 802.1ag Service OAM and ITU Y.1731 Performance Monitoring
- Ring Protection:
  - G.8032
  - STP
  - RSTP
  - MSTP
- 1588v2
- SyncE (S3280-S model)
- Redundant DC power (18-57VDC) via power block or AC power via barrel connector
- Jumbo Frame Support (9.6K)
- -40°C to 75°C operating temperature
- Fan-less design

Applications

- Mobile Backhaul
- Business Ethernet delivery
- Ethernet First Mile (EFM)
- Fiber to the Premise (FTTP)
- EPL & EVPL services
- Enterprise markets
- SLA enforcement with advanced diagnostic tools
- Migration to Packet Switched Networks
- QoS for differentiated services

Specifications

Standards	IEEE 802.3 for 10Base-T IEEE 802.3u for 100Base-TX IEEE 802.3z for 1000Base-X IEEE 802.3ab for 1000Base-T IEEE 802.3x for Flow control IEEE 802.3ad for LACP (Link Aggregation Control Protocol) IEEE 802.1D for STP (Spanning Tree Protocol) IEEE 802.1p for COS (Class of Service) IEEE 802.1Q for VLAN Tagging IEEE 802.1w for RSTP (Rapid Spanning Tree Protocol) IEEE 802.1s for MSTP (Multiple Spanning Tree Protocol) IEEE 802.1x for Authentication IEEE 802.1AB for LLDP (Link Layer Discovery Protocol) IEEE 802.3ah Link OAM IEEE 802.1ag SOAM FM IEEE 1588-2008 (v2) Precision Time Protocol (PTP) ITU G.8261 Synchronous Ethernet ITU Y.1731 PM
Maximum MAC Addresses	8K
Maximum Frame Size	9,600 bytes (9.6K)
Data Rate	Copper ports (RJ-45): 10/100/1000 Mbps SFP ports (empty): 100/1000 Mbps or SGMII
Status LEDs	Power, Port Activity and Port Duplex
Dimensions	**Width:** 9.775" [248.23 mm] **Depth:** 6.5" [165 mm] **Height:** 1.75" [44.45 mm]
Input Power	AC: 12 VDC via barrel connector using 100-240VAC Redundant DC: 18-57VDC via terminal block
Environment	-20°C to +65°C Long term operating temperature -40°C to +75°C Short term operating temperature 5%– 95% humidity non-condensing -40°C to +85°C storage temperature
Safety Compliance	UL listed, CE, EN55022 Class A, EN55024
Warranty	Lifetime

Ordering Information

S3280
(4) 10/100/1000Mbps RJ45 ports with (4) 100/1000Mbps SFP ports.
Includes 1588v2

S3280-S
(4) 10/100/1000Mbps RJ45 ports with (4) 100/1000Mbps SFP ports.
Includes 1588v2 & SyncE
Mounting Options

S3280-19RM
19" Rack Mount Kit for S3280 + S3280S

Software Features

- E-LINE (EPL/EVPL) support
- UNI or NNI configuration
- TOS/Diffserv
- Quality of Service (802.1p): 8 queues; strict priority support, shaping, policing, P-bit and DSCP
- IGMP v2/v3
- Management via CLI, Telnet, SSH, SSL, SNMPv1, v2c & v3
- Port configuration, status, statistics and monitoring
- RADIUS and ACL
- Remote backup / restore of configuration in human readable format
- Remote firmware upgrades
- Alarms via Syslog & SNMP
- Remote loopbacks
- L2CP
- LLDP
- Diagnostic Monitoring Interface – SFF-8472
- Dying/Last Gasp
- Port Mirroring
- Link Aggregation Control Protocol (LACP)

CARRIER ETHERNET *

MEF Certified Compliant ™

* MEF Certification Pending

LOOP BACK NEW PRODUCT

stand-alone device for the ion platform

S6010 Series

T1/E1 to Fiber Device

The T1/E1 copper to device provides a solution for those users that need to extend T1/E1 connections over fiber.
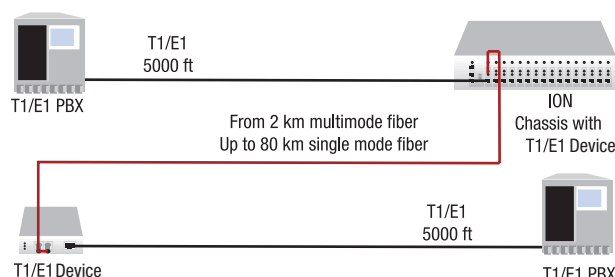
The T1/E1 supports Small Form Pluggable (SFP) transceivers to support a variety of fiber types, distances and wavelengths to provide maximum flexibility across a variety of network topologies. The use of Coarse Wave Division Multiplexing (CWDM) SFPs can be utilized to further increase the bandwidth capacity of the fiber infrastructure.

The T1/E1 device must be used in pairs. A typical installation will include a chassis card installed in the ION Platform locally and a stand-alone device installed at the remote location.

Features

‣ Remote in-band management
‣ Local or Remote Loopbacks - Copper or Fiber
‣ Switch selectable for T1 or E1
‣ Remote firmware upgrade
‣ LEDs for immediate visual status
‣ Supports dual or single fiber
‣ Supports multimode and single mode fiber at a variety of distances
‣ Supports CWDM SFPs
‣ SNMP management when used with ION chassis and management module
‣ Remote standalone can be managed by local peer

Application Diagram

T1/E1 5000 ft

T1/E1 PBX

From 2 km multimode fiber
Up to 80 km single mode fiber

ION Chassis with T1/E1 Device

T1/E1 5000 ft

T1/E1 Device

T1/E1 PBX

Specifications

Standards	ANSI T1.102, T1.402 and T1.408, ITU I.431, G.703. G.736, G.775 and G.823, ETSI 300-166, 300-233 and TBR12/12
Copper Connectors	RJ-48, BNC
Fiber Connectors	**SFP:** LC connector Uses standard 100BASE-X/OC-3 SFP **Fixed Optics:** ST or SC connector
Data Rates	T1 = 1.544 Mbit/s, E1 = 2.048 Mbit/s
Status LED	Power, Signal Detect Copper, Signal Detect Fiber
Dimensions	**W:** 3.25" [82 mm]; **D:** 6.5" [165 mm]; **H:** 1.0" [25 mm]
Power Consumption	2.6 Watts
Power	**Input:** 100-240 VAC **Output:** 12 VDC
Operating Temp	-10°C to 65°C
Altitude	0-10,000 Feet
Operating Humidity	5-95% (non-condensing)
Shipping Weight	2.0 lbs. [0.90 kg]
Regulatory Compliance	CISPR/EN55022 Class A; FCC Class A; CE Mark, UL60950
MTBF w/Power Supply	Greater than 41,660 hours (MIL-HDBD-217F) Greater than 114,580 hours (Bellcore)
MTBF w/o Power Supply	Greater than 250,000 hours (MIL-HDBD-217F) Greater than 687,000 hours (Bellcore)
Warranty	Lifetime

Ordering Information

S6010-1011
Twisted Pair (RJ-48) [1.5 km/0.9 mi.]
to 1300nm multimode (ST)
[2 km/1.2 mi.] Link Budget: 11.0 dB

S6010-1013
Twisted Pair (RJ-48) [1.5 km/0.9 mi.]
to 1300nm multimode (SC)
[2 km/1.2 mi.] Link Budget: 12.0 dB

S6010-1014
Twisted Pair (RJ-48) [1.5 km/0.9 mi.]
to 1310nm single mode (SC)
[20 km/12.4 mi.] Link Budget: 16.0 dB

S6010-1015
Twisted Pair (RJ-48) [1.5 km/0.9 mi.]
1310nm single mode (SC)
[40 km/24.9 mi.] Link Budget: 29.0 dB

S6010-1016
Twisted Pair (RJ-48) [1.5 km/0.9 mi.]
to 1310nm single mode (SC)
[60 km/37.3 mi.] Link Budget: 32.0 dB

S6010-1017
Twisted Pair (RJ-48) [1.5 km/0.9 mi.]
to 1550nm single mode (SC)
[80 km/49.7 mi.] Link Budget: 29.0 dB

S6010-1040
Twisted Pair (RJ-48) [1.5 km/0.9 mi.]
to SFP slot (empty)

S6010-3040
(2) Coax (BNC)
to SFP slot (empty)

Single Fiber Products
Recommended use in pairs

S6010-1029-A1
Twisted Pair (RJ-48) [1.5 km/0.9 mi.]
to 1310nm TX /1550nm RX single fiber SM (SC)
[20 km/12.4 mi.] Link Budget: 19.0 dB

S6010-1029-A2
Twisted Pair (RJ-48) [1.5 km/0.9 mi.]
to 1550nm TX /1310nm RX single fiber SM (SC)
[20 km/12.4 mi.] Link Budget: 19.0 dB

S6010-1029-B1
Twisted Pair (RJ-48) [1.5 km/0.9 mi.]
to 1310nm TX /1550nm RX single fiber SM (SC)
[40 km/24.9 mi.] Link Budget: 25.0 dB

S6010-1029-B2
Twisted Pair (RJ-48) [1.5 km/0.9 mi.]
to 1550nm TX /1310nm RX single fiber SM (SC)
[40 km/24.9 mi.] Link Budget: 25.0 dB

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T1/E1 to Fiber

NEW PRODUCT

stand-alone device

S6110 Series

4xT1/E1/J1

The ION 4xT1/E1/J1 copper to fiber Transport Mux provides a solution for those users that need to extend multiple T1/E1 connections over fiber.
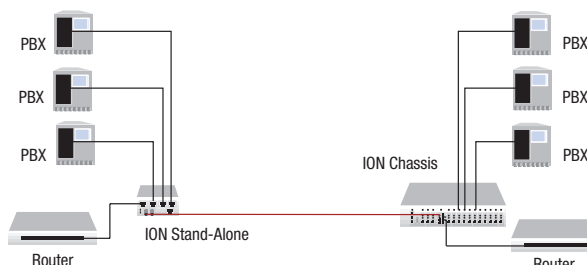
The ION 4xT1/E1/J1 supports Small Form Pluggable (SFP) transceivers to support a variety of fiber types, distances and wavelengths to provide maximum flexibility across a variety of network topologies.

The use of Coarse Wave Division Multiplexing (CWDM) SFPs can be utilized to further increase the bandwidth capacity of the fiber infrastructure.

The ION 4xT1/E1/J1 Transport Mux must be used in pairs. A typical installation will include a chassis card installed in the ION Platform locally and a stand-alone device installed at the remote location.

Features

▸ 4 x RJ-48 copper interfaces
  1 fiber interface (fixed or SFP)
  2 SFP ports on S6111-1040 model
▸ Loopback via test set
▸ Local and remote loopbacks
▸ LEDs for device status and troubleshooting
▸ Settings for line code, line build out, loopbacks and Alarm Indication Signal (AIS)
▸ Access to complete status and configuration on local and remote device
▸ Remote firmware upgrade
▸ Remote management
▸ Extended operating temperature

Applications

▸ T1/E1/J1 extension over fiber
▸ Mobile Backhaul
▸ Business customers

Hardware and Performance Specifications

Complete list of fiber optic connector specifications [pg 117-123]

Standards	ANSI T1.102, T1.403 and T1.408 ITU I.431, G.703,G.736, G.775 and G.823 ETSI 300-166, 300-233 and TBR 12/13 AT&T Pub 62411
Switches	Numerous switch settings for line coding, line build out, loopback and AIS
Data Rate	Copper ports (RJ-48): T1(J1) = 1.544Mb/s, E1 = 2.048Mb/s SFP port(s) (empty): 100BASE-X/OC-3
Status LEDs	Power, Port Status, Loopback and AIS
Dimensions	**Width:** 3.7" [94 mm] **Depth:** 6.5" [165 mm] **Height:** 1.8" [46 mm]
Input Power	AC: 12 VDC via barrel connector using 100-240VAC, UL listed power supply
Power Consumption	6W max for dual fiber model, 5.5W max for single fiber model
Environment	-10°C to +65°C operating temperature 5%– 95% humidity non-condensing -40°C to +85°C storage temperature
Safety	EN55022 Class A, EN55024, CE mark
Shipping Weight	2 lbs. (0.90 kg)
Warranty	Lifetime

PBX
PBX
PBX

Router

ION Stand-Alone

ION Chassis

PBX
PBX
PBX

Router

Ordering Information

Complete list of fiber optic connector specifications [pg 117-123]

S6110-1011
1300nm multimode (ST)
[2 km/1.2 mi.] Link Budget: 11.0 dB
to   (4) RJ-48 **[1.5 km/0.9 mi.]**

S6110-1013
1300nm multimode (SC)
[2 km/1.2 mi.] Link Budget: 11.0 dB
to   (4) RJ-48 **[1.5 km/0.9 mi.]**

S6110-1014
1310nm single mode (SC)
[20 km/12.4 mi.]
Link Budget: 16.0 dB
to   (4) RJ-48 **[1.5 km/0.9 mi.]**

S6110-1015
1310nm single mode (SC)
[40 km/24.9 mi.]
Link Budget: 29.0 dB
to   (4) RJ-48 **[1.5 km/0.9 mi.]**

S6110-1016
1310nm single mode (SC)
[60 km/37.3 mi.]
Link Budget: 32.0 dB
to   (4) RJ-48 **[1.5 km/0.9 mi.]**

S6110-1017
1550nm single mode (SC)
[80 km/49.7 mi.]
Link Budget: 29.0 dB
to   (4) RJ-48 **[1.5 km/0.9 mi.]**

S6110-1035
1550nm single mode (SC)
[120 km/74.6 mi.]
Link Budget: 36.0 dB
to   (4) RJ-48 **[1.5 km/0.9 mi.]**

S6110-1040
1 SFP port (Empty)
to   (4) RJ-48 **[1.5 km/0.9 mi.]**

S6111-1040
2 SFP ports (Empty)
to   (4) RJ-48 **[1.5 km/0.9 mi.]**

Single Fiber Products
Recommended use in pairs [pg 18]

S6110-1029-A1
1310nm TX/1550nm RX single fiber single mode (SC)
[20 km/12.4 mi.] Link Budget: 19.0 dB
to   (4) RJ-48 **[1.5 km/0.9 mi.]**

S6110-1029-A2
1550nm TX/1310nm RX single fiber single mode (SC)
[20 km/12.4 mi.] Link Budget: 19.0 dB
to   (4) RJ-48 **[1.5 km/0.9 mi.]**

S6110-1029-B1
1310nm TX/1550nm RX single fiber single mode (SC)
[40 km/24.9 mi.] Link Budget: 25.0 dB
to   (4) RJ-48 **[1.5 km/0.9 mi.]**

S6110-1029-B2
1550nm TX/1310nm RX single fiber single mode (SC)
[40 km/24.9 mi.] Link Budget: 25.0 dB
to   (4) RJ-48 **[1.5 km/0.9 mi.]**

Optional Accessories (sold separately)
SFP Modules

Wide Input (24 - 60VDC) Power Supplies
SPS-2460-SA
Stand-Alone Power Supply

Mounting Brackets
WMBL
Wall Mount Bracket 4.0" [102 mm]

NEW PRODUCT

The ION Platform

stand-alone device

S6120 Series

4xT1/E1/J1 + 10/100 Ethernet Transport Mux

The ION 4xT1/E1/J1 copper to fiber device provides a solution for those users that need to extend multiple T1/E1 connections and 10/100Mbps Ethernet over fiber.
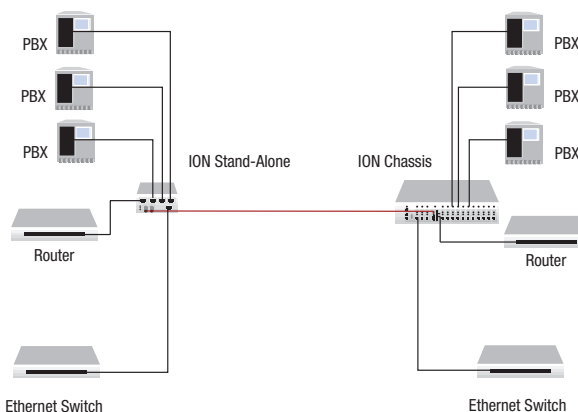
The ION 4xT1/E1/J1 supports Small Form Pluggable (SFP) transceivers to support a variety of fiber types, distances and wavelengths to provide maximum flexibility across a variety of network topologies.

The use of Coarse Wave Division Multiplexing (CWDM) SFPs can be utilized to further increase the bandwidth capacity of the fiber infrastructure.

The ION 4xT1/E1/J1 device must be used in pairs. A typical installation will include a chassis card installed in the ION Platform locally and a stand-alone device installed at the remote location.

Features

▸ 4 x RJ-48 copper interfaces
  1 fiber interface (fixed or SFP)
  2 SFP ports on S6121-1040 model
  1 RJ-45 10/100Mbps Ethernet port
▸ AutoCross (auto MDI/MDI-X on Ethernet port)
▸ Pause (Flow Control) on Ethernet port
▸ Loopback via test set
▸ Local and remote loopbacks
▸ LEDs for device status and troubleshooting
▸ Settings for line code, line build out, loopbacks and Alarm Indication Signal (AIS)
▸ Access to complete status and configuration on local and remote device
▸ Remote firmware upgrade
▸ Remote management
▸ Extended operating temperature

Applications

▸ T1/E1/J1 extension over fiber
▸ Mobile Backhaul
▸ Business customers

PBX — PBX — PBX — ION Stand-Alone — Router — Ethernet Switch

ION Chassis — PBX — PBX — PBX — Router — Ethernet Switch

Hardware and Performance Specifications

Complete list of fiber optic connector specifications [pg 117-123]

Standards	ANSI T1.102, T1.403 and T1.408 ITU I.431, G.703, G.736, G.775 and G.823 ETSI 300-166, 300-233 and TBR 12/13 AT&T Pub 62411 IEEE 802.3™-2008
Switches	Numerous switch settings for line coding, line build out, loopback and AIS
Data Rate	Copper ports (RJ-48): T1(J1) = 1.544Mb/s, E1 = 2.048Mb/s Ethernet port (RJ-45): 10/100Mbps SFP port(s) (empty): 100BASE-X/OC-3
Status LEDs	Power, Port Status, Loopback and AIS
Dimensions	**Width:** 3.7" [94 mm] **Depth:** 6.5" [165 mm] **Height:** 1.8" [46 mm]
Power Consumption	6W max for dual fiber model, 5.5W max for single fiber model
Input Power	AC: 12 VDC via barrel connector using 100-240VAC, UL listed power supply
Environment	-10°C to +65°C operating temperature 5%– 95% humidity non-condensing -40°C to +85°C storage temperature
Safety Compliance	EN55022 Class A, EN55024, CE mark
Shipping Weight	2 lbs. (0.45 kg)
Warranty	Lifetime

to   (4) RJ-48 [1.5 km/0.9 mi.]
      plus 10/100BASE-TX (RJ-45) [100m]
Optional Accessories (sold separately)
SFP Modules

Wide Input (24 - 60VDC) Power Supplies
SPS-2460-SA
   Stand-Alone Power Supply
Mounting Brackets
WMBL
   Wall Mount Bracket 4.0" [102 mm]

Ordering Information

Complete list of fiber optic connector specifications [pg 117-123]

S6120-1011
   1300nm multimode (ST)
   [2 km/1.2 mi.] Link Budget: 11.0 dB
to (4) RJ-48 [1.5 km/0.9 mi.]
   plus 10/100BASE-TX (RJ-45) [100m]

S6120-1013
   1300nm multimode (SC)
   [2 km/1.2 mi.] Link Budget: 11.0 dB
to (4) RJ-48 [1.5 km/0.9 mi.]
   plus 10/100BASE-TX (RJ-45) [100m]

S6120-1014
   1310nm single mode (SC)
   [20 km/12.4 mi.] Link Budget: 16.0 dB
to (4) RJ-48 [1.5 km/0.9 mi.]
   plus 10/100BASE-TX (RJ-45) [100m]

S6120-1015
   1310nm single mode (SC)
   [40 km/24.9 mi.] Link Budget: 29.0 dB
to (4) RJ-48 [1.5 km/0.9 mi.]
   plus 10/100BASE-TX (RJ-45) [100m]

S6120-1016
   1310nm single mode (SC)
   [60 km/37.3 mi.] Link Budget: 32.0 dB
to (4) RJ-48 [1.5 km/0.9 mi.]
   plus 10/100BASE-TX (RJ-45) [100m]

S6120-1017
   1550nm single mode (SC)
   [80 km/49.7 mi.] Link Budget: 29.0 dB
to (4) RJ-48 [1.5 km/0.9 mi.]
   plus 10/100BASE-TX (RJ-45) [100m]

S6120-1035
   1550nm single mode (SC)
   [120 km/74.6 mi.] Link Budget: 36.0 dB
to (4) RJ-48 [1.5 km/0.9 mi.]
   plus 10/100BASE-TX (RJ-45) [100m]

S6120-1040
   1 SFP port (Empty)
to (4) RJ-48 [1.5 km/0.9 mi.]
   plus 10/100BASE-TX (RJ-45) [100m]

S6121-1040
   2 SFP ports (Empty)
to (4) RJ-48 [1.5 km/0.9 mi.]
   plus 10/100BASE-TX (RJ-45) [100m]

Single Fiber Products
Recommended use in pairs [pg 18]

S6120-1029-A1
   1310nm TX/1550nm RX single fiber SM
   (SC) **[20 km/12.4 mi.] LB: 19.0 dB**
to (4) RJ-48 [1.5 km/0.9 mi.]
   plus 10/100BASE-TX (RJ-45) [100m]

S6120-1029-A2
   1550nm TX/1310nm RX single fiber SM
   (SC) **[20 km/12.4 mi.] LB: 19.0 dB**
to (4) RJ-48 [1.5 km/0.9 mi.]
   plus 10/100BASE-TX (RJ-45) [100m]

S6120-1029-B1
   1310nm TX/1550nm RX single fiber SM
   (SC) **[40 km/24.9 mi.] LB: 25.0 dB**
to (4) RJ-48 [1.5 km/0.9 mi.]
   plus 10/100BASE-TX (RJ-45) [100m]

S6120-1029-B2
   1550nm TX/1310nm RX single fiber SM
   (SC) **[40 km/24.9 mi.] LB: 25.0 dB**

LOOP BACK NEW PRODUCT

stand-alone device for the ion platform

S6210 Series

DS3 – T3/E3 Coax to Fiber Device

The DS3 – T3/E3 copper to fiber device provides a solution for those users that need to extend DS3 connections over fiber.
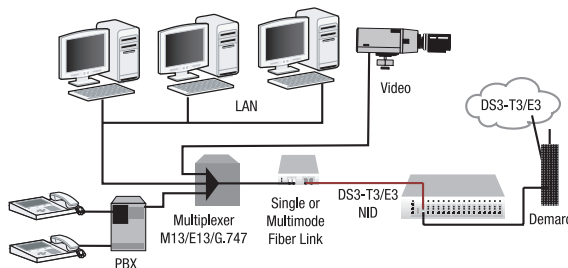
The DS3 – T3/E3s supports Small Form Pluggable (SFP) transceivers to support a variety of fiber types, distances and wavelengths to provide maximum flexibility across a variety of network topologies. The use of Coarse Wave Division Multiplexing (CWDM) SFPs can be utilized to further increase the bandwidth capacity of the fiber infrastructure.

The DS3 – T3/E3 device must be used in pairs. A typical installation will include a chassis card installed in the ION Platform locally and a stand-alone device installed at the remote location.

Integrate Voice & Data on Fiber Network

Video

LAN

DS3-T3/E3

DS3-T3/E3 NID

Demarc

Multiplexer M13/E13/G.747

Single or Multimode Fiber Link

PBX

Features

▸ AIS (Alarm Indication Signal)

▸ Coax Line Build Out

▸ Switch selectable for DS3/T3 or E3

▸ Remote firmware upgrade

▸ Loopback – Coax and Fiber

▸ LEDs for immediate visual status

▸ Supports dual or single fiber

▸ Supports multimode and single mode fiber at a variety of distances

▸ Supports CWDM SFPs

▸ SNMP management when used with ION chassis and management module

▸ Remote standalone can be managed by local peer

Specifications

Standards	ANSI, ITU-TS, ETSI, G.823 for jitter tolerance, G.755 for loss of signal
Coax Connectors	75 ohm coax
Fiber Connectors	**SFP:** LC connector Uses standard 100BASE-X/OC-3 SFP **Fixed Optics:** ST or SC connector
Data Rates	DS3/T3 = 44.7Mbps; E3 = 34.4Mbps
Status LEDs	Power, Coax link status, coax loop-back status, AIS on coax link; Fiber link status, fiber loop-back status, AIS on fiber link
Dimensions	**W:** 3.5" [82 mm]; **D:** 6.5" [165 mm]; **H:** 1.0" [25 mm]
Power Consumption	2.4 Watts
Power	**Input:** 100-240 VAC **Output:** 12 VDC
Operating Temp	-10°C to 65°C
Altitude	0-10,000 Feet
Operating Humidity	5-95% (non-condensing)
Shipping Weight	2.0 lbs. [0.90 kg]
Regulatory Compliance	CISPR/EN55022 Class A; FCC Class A; CE Mark, UL60950
MTBF w/Power Supply	Greater than 41,660 hours (MIL-HDBD-217F) Greater than 114,580 hours (Bellcore)
MTBF w/o Power Supply	Greater than 250,000 hours (MIL-HDBD-217F) Greater than 687,000 hours (Bellcore)
Warranty	Lifetime

Ordering Information

S6210-3011
(2) Coax (BNC)
to 1300nm multimode (ST)
[2 km/ 1.2 mi.] Link Budget: 11.0 dB

S6210-3013
(2) Coax (BNC)
to 1300nm multimode (SC)
[2 km/ 1.2 mi.] Link Budget: 11.0 dB

S6210-3014
(2) Coax (BNC)
to 1310nm single mode (SC)
[20 km/12.4 mi.] Link Budget: 16.0 dB

S6210-3015
(2) Coax (BNC)
to 1310nm single mode (SC)
[40 km/24.9 mi.] Link Budget: 29.0 dB

S6210-3016
(2) Coax (BNC)
to 1310nm single mode (SC)
[60 km/37.3 mi.] Link Budget: 32.0 dB

S6210-3017
(2) Coax (BNC)
to 1550nm single mode (SC)
[80 km/49.7 mi.] Link Budget: 29.0 dB

S6210-3040
(2) Coax (BNC)
to SFP slot (empty)

Single Fiber Products
Recommended use in pairs [pg 18]

S6210-3029-A1
(2) Coax (BNC)
to 1310nm TX/1550nm RX single fiber
single mode (SC)
[20 km/12.4 mi.] Link Budget: 19.0 dB

S6210-3029-A2
(2) Coax (BNC)
to 1550nm TX/1310nm RX single fiber
single mode (SC)
[20 km/12.4 mi.] Link Budget: 19.0 dB

S6210-3029-B1
(2) Coax (BNC)
to 1310nm TX/1550nm RX single fiber
single mode (SC)
[40 km/24.9 mi.] Link Budget: 25.0 dB

S6210-3029-B2
(2) Coax (BNC)
to 1550nm TX/1310nm RX single fiber
single mode (SC)
[40 km/24.9 mi.] Link Budget: 25.0 dB

adapter card for the ion platform

IONADP

Point System™ Adapter Card For The ION Platform

The IONADP is an adapter card that allows the ION Platform chassis to be backwards compatible with Point System™ modules. This adapter is designed to sit between a Point System™ module and the backplane of the ION chassis. The purpose of the IONADP is to lengthen the Point System™ module so it can be securely mounted in an ION chassis while also connecting to the backplane allowing the ION chassis to power the Point System™ module.

SNMP management of the Point System™ modules installed in the ION chassis is possible by using a Point System™ management module along with IONADP. The ION modules and the Point System™ modules are managed independently by their own respective management modules. The ION management module and the Point System™ management module would each require a unique IP address assigned to them, while Focal Point can be used to access the management information from each management module simultaneously.

The IONADP adapter card for allows the ION Platform to be backwards compatible with Point System™ slide-in-modules.

▸ Ease the migration from the Point System™ to ION Platform

▸ Deploy Point System™ cards in the ION chassis

▸ Legnthens a Point System™ card to match the size of the ION card

▸ Can be used with any Point System™ card

▸ Manage Point System™ cards in the ION chassis

▸ IONADP kit includes adapter card, bracket, and four screws.

Specifications

Dimensions	**Width:** 0.5" [12.7 mm] **Depth:** 1.25" [31.75 mm] **Height:** 2.90" [73.66 mm]
Environment	See chassis specifications
Shipping Weight	0.5 lbs. [0.22 kg]
Warranty	Lifetime

< 50 >   Call us at 800.526.9267 or 952.941.7600

accessories for the ion platform

ION Accessories

E-MCR-05
12-Slot Device Rack

RMS19-SA4-01
4-Slot Device Shelf

WMBL; WMBP; WMBV
Wall Mount Brackets

WMBV-E; WMBD
Wall Mount Brackets & Din Rail Brackets

WMBD-E; WMBD-F
DIN Rail Brackets

SPS-2460-SA
SPS-2460-PS
Wide Input Ethernet External DC Power Supplies

Stand-Alone DC Power Supply

Piggy-Back DC Power Supply Attached to Stand-Alone Device

Ordering Information

E-MCR-05 [pg 65]
  12-slot Device Rack

RMS19-SA4-01 [pg 65]
  4-slot Device Shelf

Ordering Information

WMBL [pg 66]
  4.0" [102 mm]
  Fits Stand-Alone Devices size 4.7"
  [119 mm] and ION Stand-Alone Devices

WMBP [pg 66]
  5.0" [127 mm]
  Fits Single or Dual Slot Point System™
  Chassis and single slot ION chassis

WMBV [pg 66]
  5.0" [127 mm]
  Vertical Mount
  Fits all Stand-Alone Devices;
  Single or Dual Slot Point System™
  Chassis

WMBV-E [pg 66]
  4.7" [119 mm]
  Extended Vertical Mount Fits all
  Stand-Alone Devices with piggyback
  power supply attached

WMBD [pg 66]
  5.0" [127 mm] DIN Rail Mount Bracket
  Fits all Stand-Alone Devices; Single or
  Dual Slot Point System™ Chassis

WMBD-E [pg 66]
  4.3" [109 mm] DIN Rail
  Mount Bracket (Extended)
  Fits all Stand-Alone Devices with
  piggyback power supply attached

WMBD-F [pg 66]
  3.3" [84 mm] DIN Rail Mount Bracket (flat)
  Fits all Stand-Alone Devices 3.25"
  [82 mm] wide

Ordering Information

SPS-2460-PS [pg 67]
  Piggy-Back
  For use with: Point System™
  Stand-Alone Devices and
  ION Stand-Alone Devices
  3.25" wide
  (SBFTF1011-100; SGETF1013-100, etc.)

SPS-2460-SA [pg 67]
  Stand-Alone
  For use with:
  All Stand-Alone Devices;
  Single-Slot Point System™ Chassis;
  Dual-Slot Point System™ Chassis,
  and ION Stand-Alone Devices

Chassis Specifications

1-Slot Chassis

external power

internal power

Ordering Information

CPSMC0100-200	1-Slot Point System™ Chassis with external power supply
CPSMC0100-210	1-Slot Point System™ Chassis with internal power supply
CPSMC0100-226	1-Slot Point System™ Chassis with (2) external power supplies

Note: The following slide-in-modules cannot be used with any of the 1-Slot Point System™ Chassis: C4TEF, CAPTF, CBFTF-120, CBFTF-140, CGFEB, or CTGFF.

1-Slot Chassis Specifications

Dimensions -200 model:	Width: 3.85" [98 mm] Depth: 5.67" [145 mm] Height: 1.06" [27 mm]
-210 model:	Width: 6.1" [155 mm] Depth: 5.88" [149 mm] Height: 1.5" [38 mm]
-226 model:	Width: 4.4" [113 mm] Depth: 5.67" [145 mm] Height:1.06" [27 mm]
Power -200 model:	External AC/DC included: wall mount 12 VDC, 0.8A unregulated
-210 model:	Internal AC/DC included: 12 VDC, 1.25A, unregulated
-226 model:	First External AC/DC included: 12 VDC, 1.25A, 100-240 VAC, 50/60 Hz, Regulated, UL Listed Second External AC/DC included: 12 VDC, 2.5A, 100-240 VAC, 50/60 Hz, Regulated, UL Listed
Environment	0-50°C operating; 5%-95% humidity, non-condensing; 0-10,000 ft. altitude
Shipping Weight	2.0 lbs. [0.90 kg]
Compliance -226 model:	UL Listed
-200, -210, -226 models:	EN55024; CISPR22/EN55022 Class A & B; FCC Class A & B; [Class B-compliant only when using Class B-compliant media converters.] CE Mark
Warranty	Lifetime

Optional Accessories (sold separately)

SPS-2460-SA [pg 67]	18-60 VDC; 17-30 VMRS input; external power supply; output 12.6 VDC; 1.0A max.
CPSRE1-190	19" Eack Mount Ears for CPSMC0100-210

Mounting Options

WMBD [pg 66]	DIN Rail Mount Bracket
WMBP [pg 66]	Wall Mount Bracket
WMBV [pg 66]	Vertical Wall Mount Bracket

2-Slot Chassis

Ordering Information

CPSMC0200-200	2-Slot Point System™ Chassis
CPSMC0200-210	2-Slot Point System™ Chassis with Last Gasp option
CPSMC0200-226	2-Slot Point System™ Chassis with (2) external power supplies

2-Slot Chassis Specifications

Slots	(2) slots for slide-in-modules
Dimensions	Width: 5.5" [140 mm] Depth: 5.7" [145 mm] Height: 2.2" [56 mm]
Power -200 & -210 models:	External AC/DC: 12 VDC 1.5 A
-226 models:	First External AC/DC included: 12 VDC, 1.25A, 100-240 VAC, 50/60 Hz, Regulated, UL Listed Second External AC/DC included: 12 VDC, 2.5A, 100-240 VAC, 50/60 Hz, Regulated, UL Listed
Environment	0-50°C; 5%-95% humidity, non-condensing; 0-10,000 ft. altitude
Shipping Weight	2.0 lbs. [0.90 kg]
Compliance -226 models:	UL Listed
-200, -210, -226 models:	EN55024; CISPR22/EN55022 Class A&B; FCC & CISPR Class A&B [Class B-compliant only when using Class B-compliant media converters.] CE Mark
Warranty	Lifetime

Optional Accessories (sold separately)

CPSMM-120 [page 54]	Single Slot Master Management Module
CPSMM-210 [page 54]	Single Slot Expansion Management Module
SPS-2460-SA [pg 67]	18-60 VDC; 17-30 VMRS input; external power supply; output 12.6 VDC; 1.0A max.
CPSRE2-190	19" Rack Mount Ears

Mounting Options

WMBD [pg 66]	DIN Rail Mount Bracket
WMBP [pg 66]	Wall Mount Bracket
WMBV [pg 66]	Vertical Wall Mount Bracket

8-Slot Chassis

Ordering Information

CPSMC0800-100	8-Slot Point System™ Chassis with (1) AC Power Supply
CPSMC0810-100	8-Slot Point System™ Chassis with (1) -48V power supply

8-Slot Chassis Specifications

Slots	(8) slots in front for slide-in-modules
Unit LEDs	Power and In-Use LED's for each power supply (with use of optional LED module)
Dimensions	Width: 17.0" [430 mm] Depth: 10.5" [267 mm] Height: 1.75" [45 mm]
Power	Universal Input 100-240V, 50/60 Hz, 3.0-1.5 A
Environment	0-40°C; humidity: 5%-95% non-condensing; 0-10,000 ft. altitude
Shipping Weight	8.0 lbs. [3.6 kg]
Compliance	UL Listed; EN60950; FCC & CISPR Class A; CE Mark
Warranty	Lifetime

Optional Accessories (sold separately)

CPSMM-120 [page 54]	Single Slot Master Management Module
CPSMM-200 [page 54]	Dual Slot Master Management Module
CPSMM-210 [page 54]	Single Slot Expansion Management Module
CPSMP-180	Redundant power supply 100-240 VAC (external)
CPSMP-190	Redundant -48V power supply (external)
CPSFP-200	Face Plate (required for all empty slots) [5 included with chassis]
CPSLD-100	LED power status panel
CPSRE-238	23" Rack Mount Ears (1 set)
WMBC-1RU	Wall Mount Bracket for 8-Slot Point System™ Chassis

Point System™ Chassis Options		
No. of Ports	Class	Redundant Power Option
19-Slot	Class A	CPSMP-205 (AC), CPSMP-210 (DC) [rear loading]
18-Slot	Class B*	CPSMP-205 (AC), CPSMP-210 (DC) [rear loading]
13-Slot	Class A	CPSMP-120 (AC), CPSMP-130 (48 VDC) CPSMP-140 (24 VDC) [front loading]
8-Slot	Class A	CPSMP-180 (AC), CPSMP-190 [rear DC connection]
2-Slot	Class B*	yes
1-Slot	Class B*	yes

*when using Class B compliant Slide-In-Modules

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Chassis Specifications

13-Slot Chassis

Ordering Information

CPSMC1300-100	13-Slot Point System™ Chassis with (1) AC Power Supply
CPSMC1310-100	13-Slot Point System™ Chassis with (1) 48V power supply
CPSMC1320-100	13-Slot Point System™ Chassis with (1) 24 VDC power supply

13-Slot Chassis Specifications

Slots modules	(13) slots in front for slide-in-
	(2) slots in front for power supplies
Unit LED	Power
Dimensions	**Width:** 17.0" [430 mm] **Depth:** 12.0" [305 mm] **Height:** 3.5" [89 mm]
Power	Universal Input 100-240V; 50/60 Hz; 3.0-1.5 A
Environment	0-50°C; humidity; 5%-95% non-condensing; 0-10,000 ft. altitude
Shipping Weight	15 lbs. [7.0 kg]
Compliance	UL Listed; EN55022 Class A; EN55024; EN61000; CE Mark
Warranty	Lifetime

Optional Accessories (sold separately)

CPSMM-120 [pg 54]	Single Slot Master Management Module
CPSMM-200 [pg 54]	Dual Slot Master Management Module
CPSMM-210 [pg 54]	Single Slot Expansion Management Module
CPSMP-120	Redundant power supply 120/240 VAC
CPSMP-130	Redundant -48V power supply
CPSMP-140	Redundant 24 VDC power supply
CPSFP-200	Face Plate (required for all empty slots) [10 included with chassis]
CPSRE-230	23" Rack Mount Ears (1 set)
WMBC-2RU	Wall mount bracket for 13-, 18- or 19-Slot Point System™ Chassis

	Rack Height	LEDs
	2U	Optional LED Module: Power, Link, Receive, Transmit
	2U	Power, Link, Receive, Transmit
	2U	Power
	1U	Optional LED Module: Power, Link, Receive, Transmit
	2.2" [56 mm]	First Power, Second Power
	1.0" [25 mm]	First Power, Second Power

18-Slot Chassis

Ordering Information

CPSMC1800-200	18-Slot Point System™ Chassis with (1) AC Power Supply
CPSMC1810-200	18-Slot Point System™ Chassis with (1) 48V power supply

18-Slot Chassis Specifications

Slots	(18) slots in front for slide-in-modules (2) slots in back for power supply modules
Unit LEDs	Power & In-Use LEDs for each installed power supply module
Dimensions	**Width:** 17.0" [430 mm] **Depth:** 14.3" [363 mm] **Height:** 3.5" [89 mm]
Power	Universal Input 100-240V; 50/60 Hz; 3.0-1.5 A, Dual power supplies can function in Instant Fail-Over Mode or Load Share Mode.
Environment	0 – 60°C*; 5% – 95% humidity non-condensing; 0 – 10,000 ft. altitude (*0 – 60°C when redundant power or fan module is used; 0 – 50°C if single power supply is used.)
Shipping Weight	17.5 lbs. [7.9 kg]
Compliance	CPSMC18x0-200: UL Listed, CE Mark, EN55022, EN55024, EN61000, FCC Class B, CISPR Class B and NEBS
Warranty	Lifetime

Optional Accessories (sold separately)

CPSMM-120 [pg 54]	Single Slot Master Management Module
CPSMM-200 [pg 54]	Dual Slot Master Management Module
CPSMM-210 [pg 54]	Single Slot Expansion Management Module *Note: To maintain FCC Class B rating, CPSMM-200 should be used.
CPSMP-205	Redundant power supply 120/240 VAC
CPSMP-210	Redundant -48V power supply
CPSFM-200	Fan Module
CPSFP-200	Face Plate (required for all empty slots) [15 included with chassis]
CPSRE-230	23" Rack Mount Ears (1 set)
WMBC-2RU	Wall mount bracket for 13-, 18- or 19-Slot Point System™ Chassis

19-Slot Chassis

Ordering Information

CPSMC1900-100	19-Slot Point System™ Chassis with (1) AC Power Supply
CPSMC1910-100	19-Slot Point System™ Chassis with (1) 48V power supply

19-Slot Chassis Specifications

Slots	(19) slots in front for slide-in-modules (2) slots in back for power supply modules
Unit LEDs	Power and In-Use LED's for each installed power supply module (with use of optional LED module)
Dimensions	**Width:** 17.0" [430 mm] **Depth:** 14.3" [363 mm] **Height:** 3.5" [89 mm]
Power	Universal Input 100-240V; 50/60 Hz; 3.0-1.5 A, Dual power supplies can function in Instant Fail-Over Mode or Load Share Mode.
Environment	0 – 60°C*; humidity: 5% – 95% non-condensing; 0 – 10,000 ft. altitude (*0 – 60°C when redundant power or fan module is used; 0 – 50°C if single power supply is used.)
Shipping Weight	17.5 lbs. [7.9 kg]
Compliance	UL Listed; EN60950; FCC & CISPR Class A; CE Mark
Warranty	Lifetime

Optional Accessories (sold separately)

CPSMM-120 [pg 54]	Single Slot Master Management Module
CPSMM-200 [pg 54]	Dual Slot Master Management Module
CPSMM-210 [pg 54]	Single Slot Expansion Management Module
CPSMP-205	Redundant power supply 120/240 VAC
CPSMP-210	Redundant -48V power supply
CPSFM-200	Fan Module
CPSFP-200	Face Plate (required for all empty slots) [15 included with chassis]
CPSLD-100	LED power status panel
CPSRE-230	23" Rack Mount Ears (1 set)
WMBC-2RU	Wall mount bracket for 13-, 18- or 19-Slot Point System™ Chassis

Point System™

Chassis Specifications

Point System™ Management Modules

Point System™

Management Modules Specifications

CPSMM-120

Single Slot Master Management Module

This device occupies a single slot in the Point System™ Chassis and supports all management features. The CPSMM-120 has a DB-9 serial interface for the CLI (command line interface) as well as a 10BASE-T RJ-45 interface for network management. The CPSMM-120 should be used when the Point System™ Chassis is intended to be used as a single device (when the user does not intend to stack multiple Point System™ Chassis together).

Specifications

Product Number	
CPSMM-120	Single Slot Master Management Module
Ports	DB-9 (x1), RJ-45 (x1)
LEDs	Power, Link, TX, RX
Storage Temp	-40 – 80°C
Operating Temp	See Chassis Specifications
Shipping Weight	1 lb. [0.45 kg]
Dimensions	**Width:** 0.86" [22 mm] **Depth:** 5.0" [127 mm] **Height:** 3.4" [86 mm]
Compliance	FCC & CISPR Class A; CE Mark
Warranty	Lifetime

Optional Accessories (sold separately)

Null Modem Configuration Cable

SC-NM-9F9F-06F
  6 ft Cable

SC-NM-9F9F-10F
  10 ft Cable

CPSMM-200

Dual Slot Master Management Module

The CPSMM-200 should be used when the user intends to manage multiple stacked chassis (up to 8 chassis per stack) via a single IP or if the application requires an FCC/CISPR Class B rating. This device occupies two slots in a Point System™ Chassis and will also fully support all management features. The CPSMM-200 has a DB-9 serial interface as well as a 10BASE-T interface similar to the CPSMM-120. However, it also includes two (2) additional RJ-45 ports ("in" and "out") to accommodate stacking of multiple Point System™ Chassis'. The CPSMM-200 also differs from the CPSMM-120 in that it is FCC/CISPR Class B rated.

Specifications

Product Number	
CPSMM-200	Dual Slot Master Management Module
Ports	DB-9 (x1), RJ-45 (x3)
LEDs	Power, Link, TX, RX
Storage Temp	-40 – 80°C
Operating Temp	See Chassis Specifications
Shipping Weight	2 lbs. [0.90 kg]
Dimensions	**Width:** 2.0" [51 mm] **Depth:** 5.0" [127 mm] **Height:** 3.4" [86 mm]
Compliance	FCC & CISPR Class B; CE Mark
Warranty	Lifetime

Optional Accessories (sold separately)

Null Modem Configuration Cable

SC-NM-9F9F-06F
  6 ft Cable

SC-NM-9F9F-10F
  10 ft Cable

CPSMM-210

Single Slot Expansion Management Module

This device, used in conjunction with the CPSMM-200 (or CPSMM-120 when inserted in the same chassis) management module, allows the user to manage up to eight Point System™ Chassis together in a "virtual cabinet". This brings the total number of cards managed by a single IP to 143. The CPSMM-210 has two RJ-45 ports ("in" and "out") used for stacking multiple Point System™ Chassis. The CPSMM-210 incorporates a self-healing bus so that the failure of any one module will not effect remaining modules in the stack. The CPSMM-210 should be used when the user has a requirement to stack multiple chassis.

Specifications

Product Number	
CPSMM-210	Single Slot Expansion Management Module: Used in conjunction with CPSMM-120 or CPSMM-200
Ports	RJ-45 (x2)
LEDs	Power, Link
Storage Temp	-40 – 80°C
Operating Temp	See Chassis Specifications
Shipping Weight	1 lb. [0.45 kg]
Dimensions	**Width:** .86" [22 mm] **Depth:** 5.0" [127 mm] **Height:** 3.4" [86 mm]
Compliance Mark	FCC & CISPR Class B; CE
Warranty	Lifetime

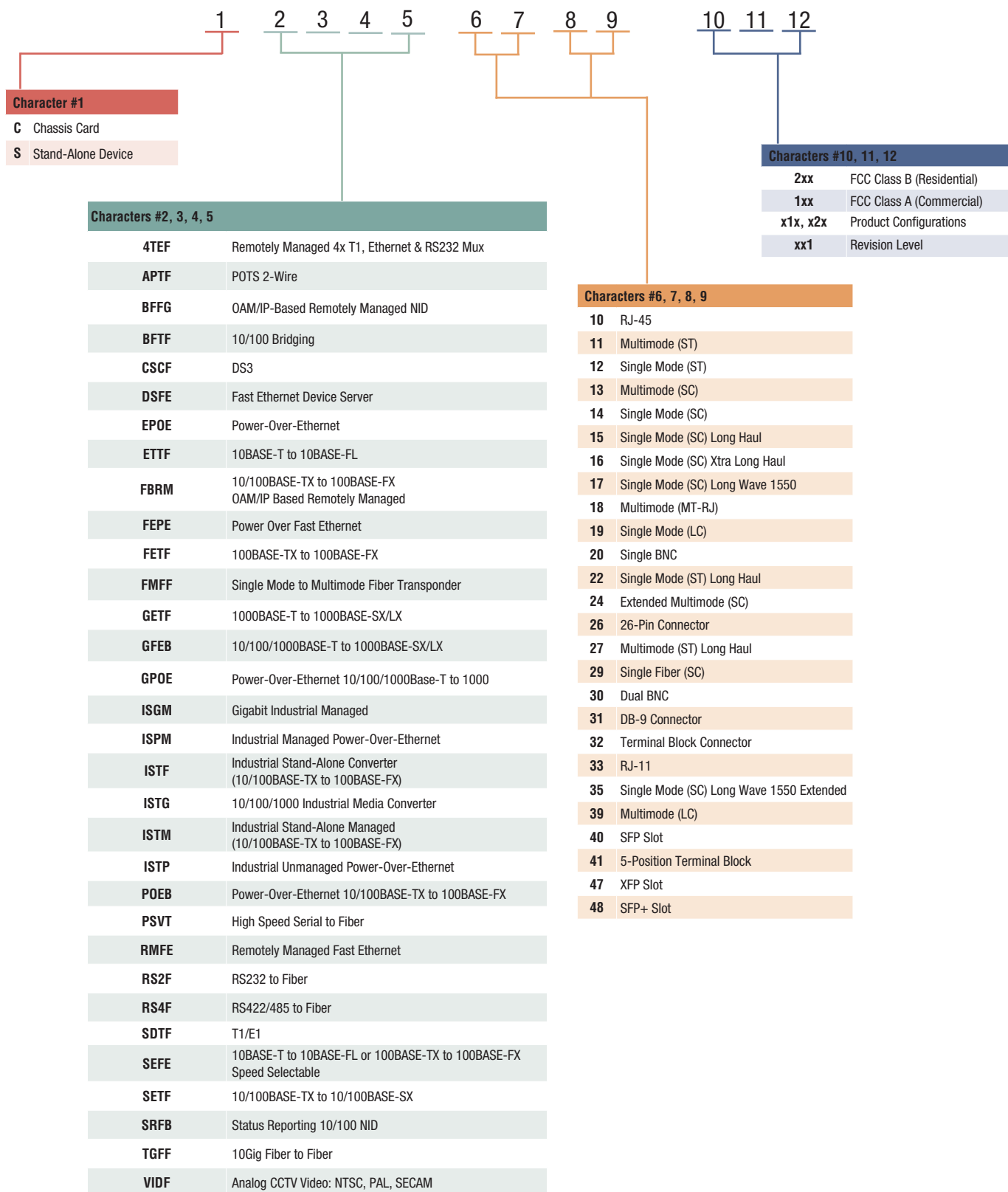**Optional Accessories** (sold separately)

Null Modem Configuration Cable

SC-NM-9F9F-06F
  6 ft Cable

SC-NM-9F9F-10F
  10 ft Cable

point system™ Part Number Key

| 1 | 2 3 4 5 | 6 7 8 9 | 10 11 12 |

Character #1

| C | Chassis Card |
| S | Stand-Alone Device |

Characters #2, 3, 4, 5

4TEF	Remotely Managed 4x T1, Ethernet & RS232 Mux
APTF	POTS 2-Wire
BFFG	OAM/IP-Based Remotely Managed NID
BFTF	10/100 Bridging
CSCF	DS3
DSFE	Fast Ethernet Device Server
EPOE	Power-Over-Ethernet
ETTF	10BASE-T to 10BASE-FL
FBRM	10/100BASE-TX to 100BASE-FX OAM/IP Based Remotely Managed
FEPE	Power Over Fast Ethernet
FETF	100BASE-TX to 100BASE-FX
FMFF	Single Mode to Multimode Fiber Transponder
GETF	1000BASE-T to 1000BASE-SX/LX
GFEB	10/100/1000BASE-T to 1000BASE-SX/LX
GPOE	Power-Over-Ethernet 10/100/1000Base-T to 1000
ISGM	Gigabit Industrial Managed
ISPM	Industrial Managed Power-Over-Ethernet
ISTF	Industrial Stand-Alone Converter (10/100BASE-TX to 100BASE-FX)
ISTG	10/100/1000 Industrial Media Converter
ISTM	Industrial Stand-Alone Managed (10/100BASE-TX to 100BASE-FX)
ISTP	Industrial Unmanaged Power-Over-Ethernet
POEB	Power-Over-Ethernet 10/100BASE-TX to 100BASE-FX
PSVT	High Speed Serial to Fiber
RMFE	Remotely Managed Fast Ethernet
RS2F	RS232 to Fiber
RS4F	RS422/485 to Fiber
SDTF	T1/E1
SEFE	10BASE-T to 10BASE-FL or 100BASE-TX to 100BASE-FX Speed Selectable
SETF	10/100BASE-TX to 10/100BASE-SX
SRFB	Status Reporting 10/100 NID
TGFF	10Gig Fiber to Fiber
VIDF	Analog CCTV Video: NTSC, PAL, SECAM

Characters #6, 7, 8, 9

10	RJ-45
11	Multimode (ST)
12	Single Mode (ST)
13	Multimode (SC)
14	Single Mode (SC)
15	Single Mode (SC) Long Haul
16	Single Mode (SC) Xtra Long Haul
17	Single Mode (SC) Long Wave 1550
18	Multimode (MT-RJ)
19	Single Mode (LC)
20	Single BNC
22	Single Mode (ST) Long Haul
24	Extended Multimode (SC)
26	26-Pin Connector
27	Multimode (ST) Long Haul
29	Single Fiber (SC)
30	Dual BNC
31	DB-9 Connector
32	Terminal Block Connector
33	RJ-11
35	Single Mode (SC) Long Wave 1550 Extended
39	Multimode (LC)
40	SFP Slot
41	5-Position Terminal Block
47	XFP Slot
48	SFP+ Slot

Characters #10, 11, 12

2xx	FCC Class B (Residential)
1xx	FCC Class A (Commercial)
x1x, x2x	Product Configurations
xx1	Revision Level

point system™ slide-in-NID

CSRFB10xx-10x

10/100 Bridging

Remotely Managed 10/100 Bridging NID (Network Interface Device)

Ideal for both Enterprise and Service Provider applications where entry level management information is needed on both the local and the remote device. This management information is accessible through the local unit installed in a managed Point System™ Chassis [pg 31-32].
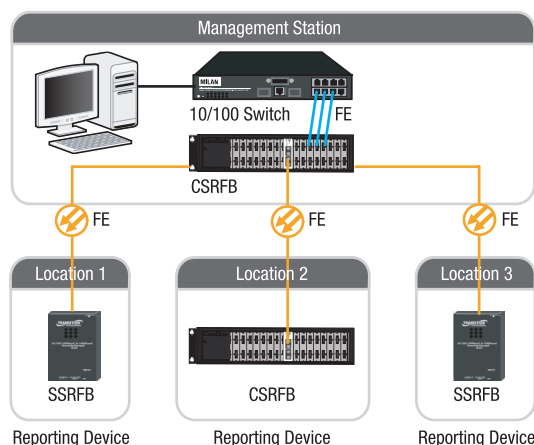
Devices should be used in pairs with the remotely managed device being another chassis card (CSRFB10xx-100) or stand-alone unit (SSRFB10xx-100).

▸ **Integrate fiber** into 10/100 copper environments

▸ **Remote Mangement** Local managed unit receives status updated from remote unit

▸ **Remote Loopback** assists in identifying network problems [pg 17]

▸ **Bandwidth Control** Independent ingress rate limiting on both ports

Features

▸ Auto-Negotiation [pg 15]

▸ AutoCross™ [pg 15]

▸ Far-End-Fault (FEF) [pg 15]

▸ Transparent Link Pass Through [pg 16]

▸ Bandwidth Allocation [pg 17]

▸ Loopback [pg 17]

▸ Last Gasp [pg 18]

▸ Remote Management [pg 16]

▸ Automatic Link Restoration [pg 17]

▸ Link Test

▸ Field Upgradeable Firmware [pg 17]

Remote Status Reporting Conversion

Management Station

10/100 Switch | FE

CSRFB

FE | FE | FE

Location 1 | Location 2 | Location 3

SSRFB | CSRFB | SSRFB

Reporting Device | Reporting Device | Reporting Device

Specifications

Complete list of fiber optic connector specifications [pg 117-123]

Standards	IEEE Std. 802.3, TS-1000 OAM v2
Data Rate	**Copper:** 10/100 Mbps **Fiber:** 100 Mbps
Filtering Addresses	1K MAC addresses
RAM Buffers	256K
Max Frame Size	1916 bytes untagged 1914 bytes tagged
Switches	**SW1:** TP Auto-Negotiation **SW2:** TP Duplex with Auto-Negotiation Off **SW3:** TP Speed with Auto-Negotiation Off **SW4:** Fiber Duplex **SW5:** Link Pass Through **SW6:** Mode: Terminal or Center
Status LEDs	Power TP Duplex/Link/Activity TP 10 Mbps/100 Mbps Fiber Link/Activity Fiber Duplex
Dimensions	**Width:** 0.86" [22 mm] **Depth:** 5.0" [127 mm] **Height:** 3.4" [86 mm]
Power Consumption	3.4 Watts
Environment	See chassis specifications [pg 52]
Shipping Weight	2 lbs. [.90 kg]
Regulatory Compliance	EN55022 Class A, EN55024; CE Mark
Warranty	Lifetime

Ordering Information

Complete list of fiber optic connector specifications [pg 117-123]

CSRFB1011-100
10/100Base-TX (RJ-45) **[100 m/328 ft.]**
to 100Base-FX 1300nm MM ST
[2 km/1.2 mi.] Link Budget: 11.0 dB

CSRFB1013-100
10/100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1300nm MM (SC)
[2 km/1.2 mi.] Link Budget: 11.0 dB

CSRFB1014-100
10/100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1310nm SM (SC)
[20 km/12.4 mi.] Link Budget: 16.0 dB

CSRFB1040-100
10/100BASE-TX (RJ-45) **[100 m/328 ft.]**
to SFP slot (empty)

Single Fiber Products
Recommended use in pairs [pg 18]

CSRFB1029-100
10/100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1310nm TX/1550nm RX
Bi-Di SM (SC)
[20 km/12.4 mi.] Link Budget: 19.0 dB

CSRFB1029-101
10/100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1550nm TX/1310nm RX
Bi-Di SM (SC)
[20 km/12.4 mi.] Link Budget: 19.0 dB

CSRFB1029-102
10/100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1310nm TX/1550nm RX
Bi-Di SM (SC)
[40 km/24.9 mi.] Link Budget: 25.0 dB

CSRFB1029-103
10/100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1550nm TX/1310nm RX
Bi-Di SM (SC)
[40 km/24.9 mi.] Link Budget: 25.0 dB

Optional Accessories (sold separately)

SFP Modules [pg 98-104]

point system™ slide-in-module network interface device

CFBRM10xx-1xx

10/100 Bridging

OAM/IP-Based Remotely Managed NID
(Network Interface Device)

The xFBRM family of Network Interface Devices (NIDs) is a remotely managed product that offers IP or IP-Less management methods for secure delivery of Ethernet services for business and Mobile Backhaul applications. With MEF 9 & 14 certification the xFBRM family ensures you are compliant with the latest standards. The xFBRM is a 10/100Mbps product with advance features including – IEEE 802.3ah Link OAM, VLAN, QoS, and Bandwidth Allocation.

Remotely Managed 10/100 NID
IP or OAM Management

Fiber Edge Switch

Copper Edge Switch

19-slot Point System™ Chassis with CFBRM1xxx Cards

NID

NID

Enterprise LAN

Enterprise LAN

Features

▸ MEF 9 & MEF 14 Carrier Ethernet Certification

▸ Two Remote Management modes:
  • IP-Based Remote Management [pg 16]
  • In-Band Link OAM 802.3ah
    (remote device managed by local peer)

▸ SNMP v1

▸ AutoCross™ [pg 15]

▸ Auto-Negotiation [pg 15]

▸ Pause [pg 16]

▸ Transparent Link Pass Through [pg 16]

▸ Far-End-Fault [pg 15]

▸ Remote Loopback [pg 17]

▸ IEEE 802.1p QoS packet classification with 4 egress queues

▸ IPv4 IP TOS and DiffServ QoS classification, IPv6 Traffic class

▸ IEEE 802.1q VLAN

▸ Static MAC, 64 entries

▸ Double VLAN tagging (C-tag/S-tag) (Q-in-Q)

▸ RADIUS client

▸ RMON counters for each port

▸ Bandwidth Allocation per port [pg 17]

▸ DMI Optical Management

▸ USB port for basic setup

▸ Cable diagnostic function for TP ports

▸ 8K MAC addresses

▸ Field Upgradeable Firmware [pg 17]

Applications

▸ Ethernet in the First Mile (EFM)

▸ Fiber to the Premise (FTTP), E-Line and E-LAN

▸ Enterprise markets

Specifications

Complete list of fiber optic connector specifications [pg 117-123]

Standards	IEEE Std. 802.3, IEEE Std. 802.3ah, IEEE Std. 802.1P, IEEE Std. 802.1Q
Data Rate	**Copper:** 10/100 Mbps **Fiber:** 100 Mbps
Filtering Addresses	8K MAC Addresses
Max Frame Size	1628 bytes
Dimensions	**Width:** 0.86" [22 mm] **Depth:** 5.0" [127 mm] **Height:** 3.4" [86 mm]
Power Consumption	5.1 Watts
Environment	See chassis specifications
Shipping Weight	1 lb. [0.45 kg]
Regulatory Compliance	EN55024, FCC Class A, CE Mark
Warranty	Lifetime

Ordering Information

Complete list of fiber optic connector specifications [pg 117-123]

CFBRM1011-100
CFBRM1011-110 (DMI model)
  10/100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1300nm MM (ST)
  [2 km/1.2 mi.] Link Budget: 11.0 dB

CFBRM1013-100
CFBRM1013-110 (DMI model)
  10/100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1300nm MM (SC)
  [2 km/1.2 mi.] Link Budget: 11.0 dB

CFBRM1014-100
CFBRM1014-110 (DMI model)
  10/100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-LX10 1310nm SM (SC)
  [10 km/6.2 mi.] Link Budget: 10.5 dB

CFBRM1015-100
CFBRM1015-110 (DMI model)
  10/100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1310nm SM (SC)
  [40 km/24.8 mi.] Link Budget: 26.0 dB

CFBRM1016-100
  10/100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1310nm SM (SC)
  [60 km/37.3 mi.] Link Budget: 29.0 dB

CFBRM1017-100
  10/100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1550nm SM (SC)
  [80 km/49.7 mi.] Link Budget: 29.0 dB

CFBRM1035-100
  10/100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1550nm SM (SC)
  [120 km/74.6 mi.] Link Budget: 36.0 dB

CFBRM1040-100
  10/100BASE-TX (RJ-45) **[100 m/328 ft.]**
to SFP slot (empty)

Single Fiber Products
Recommended use in pairs [pg 18]

CFBRM1029-100
CFBRM1029-110 (DMI model)
  10/100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-BX-U 1310nm TX/1550nm RX
  Bi-Di single mode (SC)
  [20 km/12.4 mi.] Link Budget: 19.0 dB

CFBRM1029-101
CFBRM1029-111 (DMI model)
  10/100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-BX-D 1550nm TX/1310nm RX
  Bi-Di SM (SC)
  [20 km/12.4 mi.] Link Budget: 19.0 dB

CFBRM1029-102
  10/100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1310nm TX/1550nm RX
  Bi-Di SM (SC)
  [40 km/24.8 mi.] Link Budg et: 25.0 dB

CFBRM1029-103
  10/100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1550nm TX/1310nm RX
  Bi-Di SM (SC)
  [40 km/24.8 mi.] Link Budget: 25.0 dB

Note: all units feature USB port for local management application.

Optional Accessories (sold separately)

SFP Modules [pg 98-104]

USB Cables

USBC-AM-BM-03
USB 2.0 Cable A male to B male [3 ft. Gray]

USBC-AM-BM-06
USB 2.0 Cable A male to B male [6 ft. Gray]

Point System™

OAM/IP-Based Remotely Managed 10/100BASE-TX to 100BASE-X

AUTO CROSS | AUTO NEG | PAUSE | LINK PASS THRU | FAR END FAULT | LOOP BACK | BANDWIDTH ALLOCATION | FIELD UPGRADEABLE FIRMWARE | REMOTE MGMT | AUTO LINK RESTORE | SINGLE FIBER | LAST GASP

point system™ slide-in-module network interface device

CBFFG10xx-1xx

OAM/IP-Based Remotely Managed NID (Network Interface Device)

CARRIER ETHERNET ✓ **MEF** Certified Compliant ™

The xBFFG family of Network Interface Devices (NIDs) is a remotely managed product that offers IP or IP-Less management methods for secure delivery of Ethernet services for business and Mobile Backhaul applications. With MEF 9 & 14 certification the xBFFG family ensures you are compliant with the latest standards. The xBFFG is a 10/100/1000Mbps product with advance features including – IEEE 802.3ah Link OAM, VLAN, QoS, Bandwidth Allocation and Jumbo Frame Support.

Features

▶ 10K Jumbo Frame Support

▶ MEF 9 & MEF 14 Carrier Ethernet Certification

▶ Two selectable remote management modes:
  • IP-Based Remote Management [pg 16]
  • In-Band Link OAM 802.3ah (remote device managed by local peer)

▶ SNMP v1

▶ AutoCross™ [pg 15]

▶ Auto-Negotiation [pg 15]

▶ Pause [pg 16]

▶ Transparent Link Pass Through [pg 16]

▶ Far-End-Fault [pg 15]

▶ Remote Loopback [pg 17]

▶ IEEE 802.1p QoS packet classification with 4 egress queues

▶ IPv4 IP TOS and DiffServ QoS classification, IPv6 Traffic class

▶ IEEE 802.1q VLAN

▶ Static MAC, 64 entries

▶ Double VLAN tagging (C-tag/S-tag)

▶ Selectable Ethertype for S-Tag when using Double VLAN Tagging 0x8100, 0x9100 or 0x88A8

▶ RADIUS client

▶ RMON counters for each port

▶ Bandwidth Allocation per port [pg 17]

▶ DMI Optical Management

▶ USB port for basic setup

▶ Cable diagnostic function for TP ports

▶ 8K MAC addresses

▶ Field Upgradeable Firmware [pg 17]

Remotely Managed 10/100/1000 NID

Central Office
Fiber Edge Switch
19-slot Point System™ Chassis with CBFFG1xxx Cards

IP-Based Management
Enterprise Switch
NID
Enterprise LAN

OAM Remote Management
Enterprise Switch
NID
Enterprise LAN

▶ Applications:
  • Ethernet in the First Mile (EFM)
  • Fiber to the Premise (FTTP), E-Line and E-LAN
  • Enterprise markets

Specifications

Complete list of fiber optic connector specifications [pg 117-123]

Standards	IEEE Std. 802.3, IEEE Std. 802.3ah, IEEE Std. 802.1P, IEEE Std. 802.1Q
Data Rate	**Copper:** 10/100/1000 Mbps **Fiber:** 1000 Mbps
Filtering Addresses	8K MAC Addresses
Max Frame Size	10,240 bytes
Dimensions	**Width:** 0.86" [22 mm] **Depth:** 5.0" [127 mm] **Height:** 3.4" [86 mm]
Power Consumption	5.1 Watts
Environment	See chassis specifications
Shipping Weight	1 lb. [0.45 kg]
Regulatory Compliance	EN55024, FCC Class A, CE Mark
Warranty	Lifetime

*CBFFG1040-105 and CBFFG4040-105 have SGMII support for use with 10/100/1000BASE-T copper SFPs.

Ordering Information

Complete list of fiber optic connector specifications [pg 117-123]

CBFFG1013-105
CBFFG1013-115 (DMI Options)
  10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-SX 850nm MM (SC)
  [62.5/125 µm fiber: 220 m/722 ft.]
  [50/125 µm fiber: 550 m/1804 ft.]
  Link Budget: 7.5 dB

CBFFG1014-105
CBFFG1014-115 (DMI Options)
  10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-LX 1310nm SM (SC)
  [10 km/6.2 mi.] Link Budget: 10.5 dB

CBFFG1015-105
CBFFG1015-115 (DMI Options)
  10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-LX 1310nm SM (SC)
  [25 km/15.5 mi.] Link Budget: 15.0 dB

CBFFG1017-105
  10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-X 1550nm SM (SC)
  [65 km/40.4 mi.] Link Budget: 21.0 dB

CBFFG1024-105
  10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-LX 1310nm Extended MM (62.5/125 µm fiber only) (SC)
  [2 km/1.2 mi.] Link Budget: 7.0 dB

CBFFG1035-105
  10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-X 1550nm SM (SC)
  [120 km/77.7 mi.] Link Budget: 27.0 dB

*CBFFG1040-105
  10/100/1000BASE-T (RJ-45) **[100 m]**
to 100/1000BASE-X SFP Slot (empty)

*CBFFG4040-105
  100/1000BASE-X SFP Slot (empty)
to 100/1000BASE-X SFP Slot (empty)

Single Fiber Products
Recommended use in pairs [pg 18]

CBFFG1029-105
CBFFG1029-115 (DMI Options)
  10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-BX-U 1310nm TX/1490nm RX Bi-Di SM (SC)
  [20 km/12.4 mi.] Link Budget: 14.0 dB

CBFFG1029-106
CBFFG1029-116 (DMI Options)
  10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-BX-D 1490nm TX/1310nm RX Bi-Di SM (SC)
  [20 km/12.4 mi.] Link Budget: 14.0 dB

CBFFG1029-107
  10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-LX 1310nm TX/1490nm RX Bi-Di SM (SC)
  [40 km/24.8 mi.] Link Budget: 20.0 dB

CBFFG1029-108
  10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-LX 1490nm TX/1310nm RX Bi-Di SM (SC)
  [40 km/24.8 mi.] Link Budget: 20.0 dB

Optional Accessories (sold separately)

SFP Modules [pg 98-104]

USB Cables

USBC-AM-BM-03
  USB 2.0 Cable A male to B male [3 ft. Gray]

USBC-AM-BM-06
  USB 2.0 Cable A male to B male [6 ft. Gray]

point system™ slide-in-transponder

CFMFF4040-100

SFP Fiber Transponder

Ethernet

These transponders offer an excellent up-grade path for networks. Today's Fast Ethernet applications can be upgraded to Gigabit speeds tomorrow with a simple SFP swap. The transponder remains installed, managed and fully operational at any of these speeds.
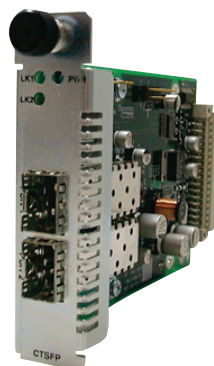
Using two similar data rate SFP modules allows for seamless connectivity between different wavelengths or fiber modes for speeds up to 2.5Gbps. Protocol independence allows for use in broad range of applications including Fast and Gigabit Ethernet, FDDI, ESCON, SONET OC-3, OC-12, OC-48 and Fibre Channel.

Digital diagnostics provide vital information about the state of your optical connection.

▸ Universal platform to accommodate any optical conversion options available via SFP interfaces

▸ Provides wavelength conversion while maintaining the same data rate

▸ (2) SFP Slots for SFP interfaces

▸ Protocol Transparency

Ordering Information

CFMFF4040-100
    SFP Slot (empty) to SFP Slot (empty)

Optional Accessories (sold separately)

SFP Modules [pg 98-104]

Features

▸ CWDM and DWDM SFP-ready platform allowing for cost-effective transponder functionality

▸ Link Pass Through [pg 16]

▸ DMI, Digital diagnostics per SFF-8472

▸ Automatic Link Restoration [pg 17]

▸ Field Upgradeable Firmware [pg 17]

▸ Can be used with any Point System™ Chassis [pg 52-53]

▸ Optical Intrusion Detection

Monitor the physical layer of optical networks for signal strength degradation. The user can specify the threshold for sudden signal strength deterioration. Such a change often indicates a physical intrusion or fiber damage.

Service Provider Application

CWDM Mux/Edge Switch

CWDM 1310 to 1550nm

CFMFF4040-100 Chassis Cards

Up to 19 Connections

SFMFF4040-100

Single Mode 1310nm

Router

Multimode 850nm

SFMFF4040-100

Router

Multimode 850nm

Enterprise Application

Router

Multimode 850nm

SFMFF4040-100

Single Mode 1310nm or any CWDM 1310 to 1550nm

Switch

Specifications

Standards	Multi-Source Agreement (MSA); Small Form Factor Pluggable (SFP) Status
LEDs	**LK1:** Link on Port 1 **LK2:** Link on Port 2 **PWR:** Power
Dimensions	**Width:** 0.86" [22 mm] **Depth:** 5.0" [127 mm] **Height:** 3.4" [86 mm]
Power Consumption	2 Watts with TN-SFP-xx modules installed
Environment	See chassis specifications
Regulatory Compliance	FCC Class A; EN55024 (CISPR 22) Class A; ICES-003; CIS-PRB; CE Mark
Warranty	Lifetime

Point System™

Fiber Transponder with SFP slots

LINK PASS THRU | AUTO LINK RESTORE | LOOP BACK | **NEW PRODUCT**

point system™ slide-in-fiber transponder

CTGFFxxxx-100

10 Gigabit Ethernet Fiber Transponder Module

The Transition Networks' fiber transponder is a two-port 10G device, supporting a variety of XFP and SFP+ modules allowing network designers to utilize the module to meet their network requirements.
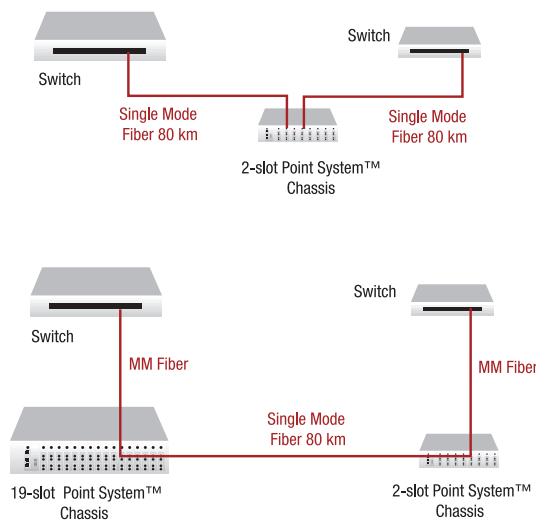
The 10G transponder can use either Transition Networks' or third party MSA compatible 10G XFP or SFP+ modules including support for the following standards; 10GBase-SR, 10GBase-LR, 10GBase-ER, 10GBase-LRM, and 10GBase-ZR.

This transponder provides 3R (reamplify, reshape, and retime) optical signal regeneration.

Features

▶ Supports 10 Gigabit Ethernet Fiber to Fiber full duplex conversion

▶ LED Link Status Indicators

▶ Link Pass Through [pg 16]

▶ Auto Link Restore [pg 17]

▶ Loopback [pg 17]

▶ Supports +5V, +3.3V, and +1.8V MSA compliant XFP modules

▶ Supports 3R (Reamplify, Reshape, and Retime) optical signal regeneration

▶ For use in all Point System™ Chassis' except for the 1-Slot Chassis

▶ Manageable when installed in a managed Point System™ Chassis

▶ Supports 10GBase-Cx4 modules in the CTGFF4747-100

10 Gigabit Ethernet Fiber Transponder Application

Switch

Switch

Single Mode Fiber 80 km

Single Mode Fiber 80 km

2-slot Point System™ Chassis

Switch

Switch

MM Fiber

MM Fiber

Single Mode Fiber 80 km

19-slot Point System™ Chassis

2-slot Point System™ Chassis

Specifications

Standards	IEEE Std. 802.3ae, IEEE 802.3ak, IEEE 802.3ag, IEEE 802.3, IEEE 802.3x, Multisource Agreement (MSA) XFP and SFP+
Data Rate	10 Gbps
Status LED	PWR (power): GREEN- power on 1LNK- fiber #1 link: GREEN- On link 1ACT- fiber #1 activity/fault: GREEN- BLINK activity, YELLOW- Fault 2LNK- fiber #2 link: GREEN- On link 2ACT- fiber #2 activity/fault: GREEN- BLINK activity, YELLOW- Fault
DIP Switches SW1- Port 1 mode SW2- Port 2 mode SW3- LPT SW4-	 **UP:** Limiting (xR); **DOWN:** Linear (LRM) **UP:** Limiting (xR); **DOWN:** Linear (LRM) **UP:** Enabled; **DOWN:** Disabled Interface loopback, forces each fiber to loop its RX to TX
Dimensions	**Width:** 1.72" [44 mm] **Depth:** 5.0" [127 mm] **Height:** 3.4" [86 mm]
Power Consumption	7 Watts
Environment	See chassis specifications
Shipping Weight	1 lb. [0.45 kg]
Regulatory Compliance	FCC Class A, EN55024 (CISPR22) Class A; CE Mark; EN55022 Class A
Warranty	Lifetime

Ordering Information

CTGFF4747-100
(2) Port 10GBase-xx open XFP to Open XFP

CTGFF4848-100
(2) Port 10GBase-xx open SFP+ to Open SFP+

Optional Accessories (sold separately)

SFP+ Modules

TN-10GSFP-LR1
10GBase-LR/LW, SFP+
w/ Digital Diagnostics (DMI) 1310 DFB nm
[10 km/6.2 mi.] Link Budget: 6.4 dB

TN-10GSFP-LR2
10GBase-LR/LW, SFP+
w/ Digital Diagnostics (DMI) 1310 DFB nm
[20 km/12.4 mi.] Link Budget: 11.4 dB

TN-10GSFP-LR4
10GBase-LR/LW, SFP+
w/ Digital Diagnostics (DMI) 1310 DFB nm
[40 km/24.8 mi.] Link Budget: 16.5 dB

TN-10GSFP-LR7
10GBase-LR/LW, SFP+
w/ Digital Diagnostics (DMI) 1310 DFB nm
[70 km/43.4 mi.] Link Budget: 25 dB

TN-10GSFP-SR
10GBase-LR/LW, SFP+
w/ Digital Diagnostics (DMI) 850 DFB nm

**[300/82/33 m; 985/269/108 ft.]
Link Budget: 2.6 dB**

XFP Modules

TN-XFP-SR
10GBase-SR/SW/10G Fibre Channel, XFP
w/ Digital Diagnostics (DMI) 850nm (LC)
**[62.5/125 uM: 33 m/108 ft.]
[50/125 uM with 500 MHZ-km: 269 ft.]
[50/125 uM: 300 m/985 ft.]
Modal dispersion 39.cB**

TN-XFP-LR1
10GBase-LR/LW/10G Fibre Channel, XFP
w/Digital Diagnostics (DMI) 1310nm (LC)
[10 km/6.2 mi.] Link Budget: 6.2 dB

TN-XFP-LR2
10GBase-LR/LW/10G Fibre Channel, XFP
w/ Digital Diagnostics (DMI) 1310nm (LC)
[20 km/12.4 mi.] Link Budget: 12.0 dB

TN-XFP-ER
10GBase-LR/ER/10G Fibre Channel, XFP
w/ Digital Diagnostics (DMI) 1310nm (LC)
[40 km/24.9 mi.] Link Budget: 16.5 dB

TN-XFP-ZR
10GBase-LR/ER/10G Fibre Channel, XFP
w/ Digital Diagnostics (DMI) 1550nm (LC)
[80 km/49.7 mi.] Link Budget: 23.0 dB

point system™ slide-in-module network interface device

CCSCF30xx-11x

DS3-T3/E3 and STS-1 Coax to Fiber Device

Integrate Voice & Data on Fiber Network

The DS3 – T3/E3 & STS-1 copper to fiber device provides a solution for those users that need to extend DS3 connections over fiber.
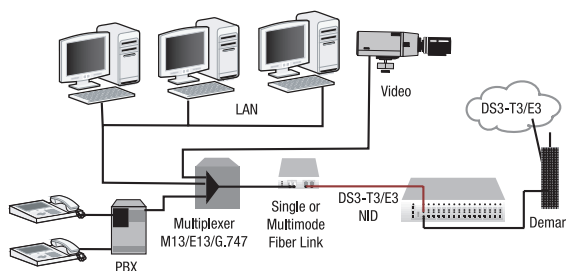
The DS3 – T3/Es & STS-1 supports Small Form Pluggable (SFP) transceivers to support a variety of fiber types, distances and wavelengths to provide maximum flexibility across a variety of network topologies. The use of Coarse Wave Division Multiplexing (CWDM) SFPs can be utilized to further increase the bandwidth capacity of the fiber infrastructure.

The DS3 – T3/E3 & STS-1 Device must be used in pairs*. A typical installation will include a chassis card installed in the Point System™ locally and a stand-alone device [SCSCF, pg 75] installed at the remote location.

Features

▶ AIS (Alarm Indication Signal)
▶ Coax Line Build Out
▶ Switch selectable for DS3/T3 or E3
▶ Loopback – Coax and Fiber [pg 17]
▶ LEDs for immediate visual status
▶ Supports dual or single fiber
▶ Supports multimode and single mode fiber at a variety of distances
▶ Supports CWDM SFPs
▶ SNMP management when used with Point System™ chassis and management module
▶ Field Upgradeable Firmware [pg 17] when used with Point System™ Chassis and management module

Specifications

Complete list of fiber optic connector specifications [pg 117-123]

Standards	ANSI, ITU-TS, ETSI, AT&T, G.703, G.921 & G.955
Coax Conectors	75 ohm coax **TX output** **RX input** min: +2.5 dBm min: -9.7dBm max: +9.1 dBm max: +10.5 dBm
Fiber Connectors	SFP: LC connector Uses standard 100BASE-X/OC-3 SFP
Data Rates	DS3/T3 = 44.7 Mbps; E3 = 34.4 Mbps; STS-1 = 51.8 Mbps
Status LED	Power, Coax link status, coax loop-back status, AIS on coax link; Fiber link status, fiber loop-back status, AIS on fiber link
Dimensions	Width: .87" [22 mm]; Depth: 5.0" [127 mm]; Height: 3.4" [86 mm]
Power Consumption	3.0 Watts
Environment	see chassis specifications
Shipping Weight	1.0 lbs. [0.45 kg]
Regulatory Compliance	CISPR/EN55022 Class A; FCC Class A; CE Mark
MTBF	Greater than 250,000 hours (MIL-HDBD-217F) Greater than 687,000 hours (Bellcore)
Warranty	Lifetime

Ordering Information

Complete list of fiber optic connector specifications [pg 117-123]

CCSCF3011-110
(2) Coax (BNC)
to 1300nm multimode (ST)
[2 km/ 1.2 mi.] Link Budget: 14.0 dB

CCSCF3013-110
(2) Coax (BNC)
to 1300nm multimode (SC)
[2 km/ 1.2 mi.] Link Budget: 14.0 dB

CCSCF3014-110
(2) Coax (BNC)
to 1310nm single mode (SC)
[20 km/12.4 mi.] Link Budget: 19.0 dB

CCSCF3015-110
(2) Coax (BNC)
to 1310nm single mode (SC)
[40 km/24.9 mi.] Link Budget: 29.0 dB

CCSCF3016-110
(2) Coax (BNC)
to 1310nm single mode (SC)
[60 km/37.3 mi.] Link Budget: 32.0 dB

CCSCF3017-110
(2) Coax (BNC)
to 1550nm single mode (SC)
[80 km/49.7 mi.] Link Budget: 29.0 dB

CCSCF3040-110
(2) Coax (BNC)
to SFP slot (empty)

Single Fiber Products
Recommended use in pairs [pg 18]

CCSCF3029-110
(2) Coax (BNC)
to 1310nm TX/1550nm RX single fiber
single mode (SC)
[20 km/12.4 mi.] Link Budget: 19.0 dB

CCSCF3029-111
(2) Coax (BNC)
to 1550nm TX/1310nm RX single fiber
single mode (SC)
[20 km/12.4 mi.] Link Budget: 19.0 dB

CCSCF3029-112
(2) Coax (BNC)
to 1310nm TX/1550nm RX single fiber
single mode (SC)
[40 km/24.9 mi.] Link Budget: 25.0 dB

CCSCF3029-113
(2) Coax (BNC)
to 1550nm TX/1310nm RX single fiber
single mode (SC)
[40 km/24.9 mi.] Link Budget: 25.0 dB

CCSCF3029-114
(2) Coax (BNC)
to 1310nm TX/1550nm RX single fiber
single mode (SC)
[60 km/37.3 mi.] Link Budget: 29.0 dB

CCSCF3029-115
(2) Coax (BNC)
to 1550nm TX/1310nm RX single fiber
single mode (SC)
[60 km/37.3 mi.] Link Budget: 29.0 dB

CCSCF3029-116
(2) Coax (BNC)
to 1310nm TX/1550nm RX single fiber
single mode (SC)
[80 km/49.7 mi.] Link Budget: 33.0 dB

CCSCF3029-117
(2) Coax (BNC)
to 1550nm TX/1310nm RX single fiber
single mode (SC)
[80 km/49.7 mi.] Link Budget: 32.0 dB

The CCSCF30xx-110 will only work with another CCSCF30xx-110 or SCSCF30xx110. The product does not work with a -10x model.

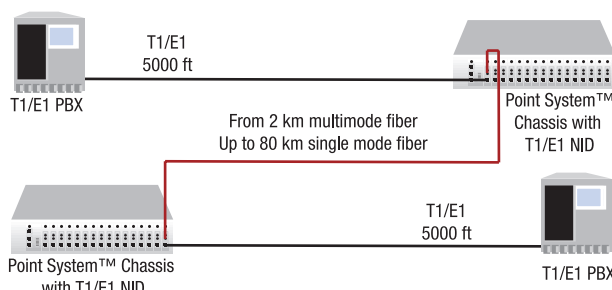**point system™ slide-in-module**

CSDTFx0xx-12x

T1/E1

Remotely Managed T1/E1 Device

Provide Campus Interconnects

With the exception of Ethernet, T1/E1 is one of the most common campus/metropolitan area networking interconnects. A copper to fiber conversion on the premise side of the T1/E1 makes it easier to integrate voice traffic, frame relay or IP type traffic on your fiber network.

T1/E1 PBX
T1/E1 5000 ft
From 2 km multimode fiber
Up to 80 km single mode fiber
Point System™ Chassis with T1/E1 NID

Point System™ Chassis with T1/E1 NID
T1/E1 5000 ft
T1/E1 PBX

Devices must be used in pairs. Typical installation will include a chassis card installed in the Point System™ locally and a stand-alone device [SSDTF, pg 76] installed at the remote location.

Specifications

Complete list of fiber optic connector specifications [pg 117-123]

Standards	ITU-T, ANSI, AT&T, ETSI
3-position Jumper	**Hardware:** NID mode is determined by 4-position switch settings **Software:** NID mode is determined by most recently saved on-board microprocessor settings
Status LEDs	**PWR (Power):** Steady green LED indicates connection to external AC power **SDC (Signal Detect/Copper):** On indicates twisted pair link is up **SDF (Signal Detect/Fiber):** On indicates fiber link is up
Dimensions	**Width:** 0.86" [22 mm] **Depth:** 5.0" [127 mm] **Height:** 3.4" [86 mm]
Power Consumption	6.0 Watts
Environment	See chassis specifications
Shipping Weight	1 lb. [0.45 kg]
Regulatory Compliance	CISPR/EN55022 Class A; FCC Class A; CE Mark
Warranty	Lifetime

Features

▶ Remote in-band management [pg 16]

▶ Local or Remote Loopbacks on copper or fiber in software mode

▶ Loopback switch facilitates local installation [pg 17]

▶ Converts the copper ports on T1/E1 devices, such as a PBX or T1/E1 Router, to multimode or single mode fiber

▶ Switch selectable RJ-48 connectors for T1 or E1

▶ Jitter attenuators optimize Bit Error Rate (BER) performance

▶ Network debug procedures make BER testing more convenient

▶ Built-in troubleshooting with the addition of a selectable TAOS (Transmit All Ones) switch on the fiber and copper interfaces allows the network engineer to test all T1/E1 equipment on that network segment and ensure the network link

▶ Dry Relay Contacts enable the device to be tied into a separate alarm circuit commonly found in a T1/E1 twisted pair environment. Contacts will be activated on loss of power or loss of fiber link.

▶ Field Upgradeable Firmware [pg 17]

▶ LED provides Alarm Indication Signal (AIS)

▶ Can be used with fractional T1/E1 circuits

Ordering Information

Complete list of fiber optic connector specifications [pg 117-123]

CSDTF1011-120
Twisted Pair (RJ-48) **[1.5 km/0.9 mi.]**
to 850nm multimode (ST)
[2 km/1.2 mi.] Link Budget: 13.5 dB

CSDTF1013-120
Twisted Pair (RJ-48) **[1.5 km/0.9 mi.]**
to 850nm multimode (SC)
[2 km/1.2 mi.] Link Budget: 13.5 dB

CSDTF1027-120
Twisted Pair (RJ-48) **[1.5 km/0.9 mi.]**
to 1300nm multimode (ST)
[5 km/3.1 mi.] Link Budget: 13.5 dB

CSDTF1012-120
Twisted Pair (RJ-48) **[1.5 km/0.9 mi.]**
1310nm single mode (ST)
[8 km/5 mi.] Link Budget: 7.0 dB

CSDTF1022-120
Twisted Pair (RJ-48) **[1.5 km/0.9 mi.]**
to 1310nm single mode (ST)
[15 km/9.3 mi.] Link Budget: 10.0 dB

CSDTF1014-120
Twisted Pair (RJ-48) **[1.5 km/0.9 mi.]**
to 1310nm single mode (SC)
[20 km/12.4 mi.] Link Budget: 16.0 dB

CSDTF1015-120
Twisted Pair (RJ-48) **[1.5 km/0.9 mi.]**
to 1310nm single mode (SC)
[40 km/24.9 mi.] Link Budget: 30.0 dB

CSDTF1016-120
Twisted Pair (RJ-48) **[1.5 km/0.9 mi.]**
to 1310nm single mode (SC)
[60 km/37.3 mi.] Link Budget: 33.0 dB

CSDTF1017-120
Twisted Pair (RJ-48) **[1.5 km/0.9 mi.]**
to 1550nm single mode (SC)
[80 km/49.7 mi.] Link Budget: 29.0 dB

Single Fiber Products
Recommended use in pairs [pg 18]

CSDTF1029-120
Twisted Pair (RJ-48) **[1.5 km/0.9 mi.]**
to 1310nm TX /1550nm RX single fiber SM (SC)
[20 km/12.4 mi.] Link Budget: 19.0 dB

CSDTF1029-121
Twisted Pair (RJ-48) **[1.5 km/0.9 mi.]**
to 1550nm TX /1310nm RX single fiber SM (SC)
[20 km/12.4 mi.] Link Budget: 19.0 dB

CSDTF1029-122
Twisted Pair (RJ-48) **[1.5 km/0.9 mi.]**
to 1310nm TX /1550nm RX single fiber SM (SC)
[40 km/24.9 mi.] Link Budget: 25.0 dB

CSDTF1029-123
Twisted Pair (RJ-48) **[1.5 km/0.9 mi.]**
to 1550nm TX /1310nm RX single fiber SM (SC)
[40 km/24.9 mi.] Link Budget: 25.0 dB

Point System™

T1/E1 Copper to Fiber With Remote Management

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Call us at 800.526.9267 or 952.941.7600

point system™ slide-in-module

C4TEF10xx-120

T1/E1

4x T1/E1/J1 Copper to Fiber Transport Mux

Features

▸ Loopbacks via Test Set
▸ Automatic Link Restoration [pg 17]
▸ Remote Management [pg 16]
▸ Local & Remote Loopback [pg 17]
▸ AIS/TAOS
▸ LEDs for each data port
▸ Settings for line code, line length local loopback or remote Loopback [pg 17]
▸ T1/E1/J1 mode settings
▸ Local (AUX) Management Interface
▸ Access to complete status information on local and remote device
▸ Field Upgradeable Firmware [pg 17]

Management Features

▸ Report local device status:
  • Port Status
  • Device settings & configuration
▸ Local command operations include:
  • Loopback Fiber & T1/E1 per channel
  • AIS TX on fiber on loss of copper link & AIS TX on copper on loss of fiber link [pg 17]
▸ Remote device status:
  • Port Status
  • Device settings & configuration
▸ Remote Commands:
  • Loopback Fiber & T1/E1 per channel
  • AIS TX on fiber on loss of copper link & AIS TX on copper on loss of fiber link

The product provides physical layer status monitoring and alarm classification functions for Telecom operators to manage their fiber optic network and reduce OPEX and maintenance costs.

Copper connections are compatible with G.703 and AMI/B8ZS/HDB3; while the optical connection will run at 155 Mbps. A hardware-based solution guarantees the constant bit rate of TDM transport without requiring traffic management.

Devices must be used in pairs. Typical installation will include a chassis card installed in the Point System™ locally and a stand-alone device [S4TEF] installed at the remote location.

▸ Low cost transport capability: (4) T1/E1/J1

▸ Target applications of the device include: FTTx, such as Fiber-to-the-Business, Fiber-to-the-Building, Fiber-to-the-MDU and Fiber-to-the-Home; Cell Tower backhaul

Application

Ordering Information

Complete list of fiber optic connector specifications [pg 117-123]

C4TEF1011-120
 1300nm multimode (ST)
 [2 km/1.2 mi.] Link Budget: 11.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**

C4TEF1013-120
 1300nm multimode (SC)
 [2 km/1.2 mi.] Link Budget: 11.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**

C4TEF1014-120
 1310nm single mode (SC)
 [20 km/12.4 mi.]
 Link Budget: 16.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**

C4TEF1015-120
 1310nm single mode (SC)
 [40 km/24.9 mi.]
 Link Budget: 26.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**

C4TEF1016-120
 1310nm single mode (SC)
 [60 km/37.3 mi.]
 Link Budget: 29.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**

C4TEF1017-120
 1550nm single mode (SC)
 [80 km/49.7 mi.]
 Link Budget: 29.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**

C4TEF1035-120
 1550nm single mode (SC)
 [120 km/74.6 mi.]
 Link Budget: 36.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**

*C4TEF1040-120
 1 SFP port (Empty)
to (4) RJ-48 **[1.5 km/0.9 mi.]**

*C4TEF1040-140
 2 SFP ports (Empty)
to (4) RJ-48 **[1.5 km/0.9 mi.]**

Single Fiber Products
Recommended use in pairs [pg 18]

C4TEF1029-120
 1310nm TX/1550nm RX single fiber single mode (SC)
 [20 km/12.4 mi.] Link Budget: 19.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**

C4TEF1029-121
 1550nm TX/1310nm RX single fiber single mode (SC)
 [20 km/12.4 mi.] Link Budget: 19.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**

C4TEF1029-122
 1310nm TX/1550nm RX single fiber single mode (SC)
 [40 km/24.9 mi.] Link Budget: 25.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**

C4TEF1029-123
 1550nm TX/1310nm RX single fiber single mode (SC)
 [40 km/24.9 mi.] Link Budget: 25.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**

Specifications

Complete list of fiber optic connector specifications [pg 117-123]

Standards	Ethernet interface: IEEE 802.3™-2008 TDM interfaces: ANSI T1.102, T1.403 and T1.408 ITU I.431, G.703,G.736, G.775 and G.823 ETSI 300-166, 300-233 and TBR 12/13 AT&T Pub 62411
Switches	Numerous switch settings for line coding, line buildout, loopback (per port), AIS setting
Jumper	**Hardware:** device mode is determined by DIP switch settings **Software:** device mode is controlled by the most recently saved, on-board microprocessor settings
Dimensions	**Width:** 1.72" [44 mm] **Depth:** 5.0" [127 mm] **Height:** 3.4" [86 mm]
Power Consumption	3.6 Watts
Environment	See chassis specifications
Shipping Weight	1 lb. [0.45 kg]
Regulatory Compliance	EN55022 Class A, EN55024, CE mark
Warranty	Lifetime

*Note: C4TEF cards cannot be used with the 1-Slot Point System™ Chassis.

* SFP port uses standard 100BASE-x/oc-3 SFP
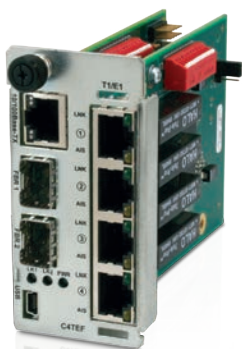
point system™ slide-in-module

C4TEF10xx-125
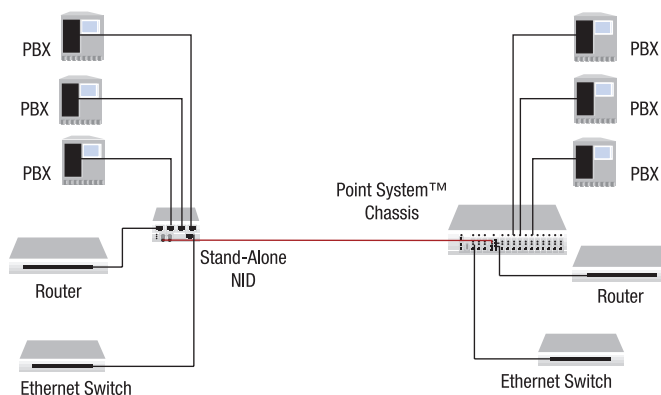
4x T1/E1/J1 + 10/100 Ethernet Transport Mux

Features

- Loopbacks via Test Set
- Auto-Negotiation for 10/100BASE-TX [pg 15]
- AutoCross™ (auto MDI/MDI-X) [pg 15]
- Transparent Link Pass Through for Ethernet [pg 16]
- Automatic Link Restoration [pg 17]
- Pause (Flow Control) [pg 16]
- Remote Management [pg 16]
- Local and Remote Loopback [pg 17]
- Remote Fiber Loss Signaling
- AIS/TAOS
- LEDs for each data port
- Settings for line code, line length, local loopback or remote loopback [pg 17]
- T1/E1/J1 mode settings
- Local (AUX) Management Interface
- Access to complete status information on local and remote device
- Field Upgradeable Firmware [pg 17]

- Low cost transport capability: (4) T1/E1/J1 and (1) Ethernet
- Target applications include: FTTx, such as Fiber-to-the-Business, Fiber-to-the-Building, Fiber-to-the-MDU, Fiber-to-the-Home and Cell tower backhaul.
- Copper connections compatible with G.703, AMI/B8ZS/HDB3, 10/100BASE-TX, and RS232 channel; while the optical connection runs at 155Mbps.
- TDM traffic is not mapped to Ethernet. A hardware-based solution guarantees the constant bit rate of TDM transport without requiring traffic management. Provides physical layer status monitoring and alarm classification functions for Telecom operators to manage their fiber optic network and reduce operation and maintenance costs.

Application

PBX

PBX

PBX

Router

Ethernet Switch

Stand-Alone NID

Point System™ Chassis

PBX

PBX

PBX

Router

Ethernet Switch

Management Features

- Report local device status:
  - Port Status
  - Device settings & configuration
- Local command operations include:
  - Loopback Fiber & T1/E1 per channel
  - AIS TX on fiber on loss of copper link & AIS TX on copper on loss of fiber link
  - Ethernet settings:
  - Auto-Negotiation Enable/Disable
  - Force speeds and modes on 10/100TX
- Remote device status:
  - Port Status
  - Device settings & configuration
- Remote Commands:
  - Loopback Fiber & T1/E1 per channel
  - AIS TX on fiber on loss of copper link & AIS TX on copper on loss of fiber link
  - Ethernet settings (Software Mode)
  - Force speeds and modes on 10/100TX
  - Enable/Disable: Auto-Negotiation; Link Pass Through; Flow Control; & AutoCross™

Specifications

Complete list of fiber optic connector specifications [pg 117-123]

Standards	Ethernet interface: IEEE 802.3™-2008 TDM interfaces: ANSI T1.102, T1.403 and T1.408 ITU I.431, G.703,G.736, G.775 and G.823 ETSI 300-166, 300-233 and TBR 12/13 AT&T Pub 62411
Switches	Numerous switch settings for line coding, line buildout, loopback (per port), AIS setting, Ethernet port settings: Auto-Negotiation, Force speed/duplex and enable Transparent Link Pass Through
Jumper	**Hardware:** mode is determined by DIP switch settings **Software:** mode is controlled by the most recently saved, on-board microprocessor setting
Dimensions	**Width:** 1.72" [44 mm] **Depth:** 5.0" [127 mm] **Height:** 3.4" [86 mm]
Power Consumption	3.6 Watts
Environment	See chassis specifications
Shipping Weight	1 lb. [0.45 kg]
Regulatory Compliance	EN55022 Class A, EN55024, CE mark
Warranty	Lifetime

*Note: C4TEF cards cannot be used with the 1-Slot Point System™ Chassis . Devices must be used in pairs. Typical installation will include a chassis card installed in the Point System™ locally and a stand-alone device [S4TEF] installed at the remote location.

* SFP port uses standard 100BASE-x/oc-3 SFP

Ordering Information

Complete list of fiber optic connector specifications [pg 117-123]

C4TEF1011-125
1300nm multimode (ST)
[2 km/1.2 mi.] Link Budget: 11.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**
plus 10/100BASE-TX (RJ-45) **[100m]**

C4TEF1013-125
1300nm multimode (SC)
[2 km/1.2 mi.] Link Budget: 11.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**
plus 10/100BASE-TX (RJ-45) **[100m]**

C4TEF1014-125
1310nm single mode (SC)
[20 km/12.4 mi.] Link Budget: 16.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**
plus 10/100BASE-TX (RJ-45) **[100m]**

C4TEF1015-125
1310nm single mode (SC)
[40 km/24.9 mi.] Link Budget: 26.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**
plus 10/100BASE-TX (RJ-45) **[100m]**

C4TEF1016-125
1310nm single mode (SC)
[60 km/37.3 mi.] Link Budget: 29.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**
plus 10/100BASE-TX (RJ-45) **[100m]**

C4TEF1017-125
1550nm single mode (SC)
[80 km/49.7 mi.] Link Budget: 29.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**
plus 10/100BASE-TX (RJ-45) **[100m]**

C4TEF1035-125
1550nm single mode (SC)
[120 km/74.6 mi.] Link Budget: 36.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**
plus 10/100BASE-TX (RJ-45) **[100m]**

*C4TEF1040-125
1 SFP port (Empty)
to (4) RJ-48 **[1.5 km/0.9 mi.]**
plus 10/100BASE-TX (RJ-45) **[100m]**

*C4TEF1040-145
2 SFP ports (Empty)
to (4) RJ-48 **[1.5 km/0.9 mi.]**
plus 10/100BASE-TX (RJ-45) **[100m]**

Single Fiber Products
Recommended use in pairs [pg 18]

C4TEF1029-125
1310nm TX/1550nm RX single fiber SM
(SC) **[20 km/12.4 mi.] LB: 19.0 dB**
to (4) RJ-48 **[1.5 km/0.9 mi.]**

C4TEF1029-126
1550nm TX/1310nm RX single fiber SM
(SC) **[20 km/12.4 mi.] LB: 19.0 dB**
to (4) RJ-48 **[1.5 km/0.9 mi.]**

C4TEF1029-127
1310nm TX/1550nm RX single fiber SM
(SC) **[40 km/24.9 mi.] LB: 25.0 dB**
to (4) RJ-48 **[1.5 km/0.9 mi.]**

C4TEF1029-128
1550nm TX/1310nm RX single fiber SM
(SC) **[40 km/24.9 mi.] LB: 25.0 dB**
to (4) RJ-48 **[1.5 km/0.9 mi.]**

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Call us at 800.526.9267 or 952.941.7600

mounting options

E-MCR-05

12-Slot Device Rack

Flexible Design for Growing Networks
Simplify your installation of Transition Networks' stand-alone devices with the 12-Slot Device Rack. This 19" rack-mountable unit supports up to twelve devices while the unique design allows for multiple connections, consolidated into a single device, making network connections easier and more efficient.

Space Saving Design
This device is powered by a single internal universal power supply; eliminating the need for the multiple power connections often associated with multiple device installations. The unit saves space in the wiring closet by providing a means for mounting (12) devices in (3) units of rack space while reducing the number of wall outlet power connections required.

Convenience
The devices are hot-swappable. They can also be removed from the rack, powered externally, and used as stand-alone units in new applications as your network needs change in the future.

Cost Effective
Easily rack mount the single-wide, 12 volt powered, Transition Networks' devices that you already own, or buy stand-alone units today and rack mount them in the future.

Includes
(12) univeral rack mount device brackets.

(Devices Sold Seperately)

Specifications

Dimensions	**Width:** 17.0" [432 mm] **Depth:** 15.0" [381 mm] **Height:** 4.75" [121 mm]
Power Supply	Universal, internal power supply; AC 85 – 264V, 47 – 63 Hz.
Environment	0 – 50°C, 10% – 90% humidity (non-condensing), 0 – 10,000 ft.
Shipping Weight	12 lbs. [5.2 kg]
Regulatory Compliance	UL Listed; C-UL Listed (Canada); CISPR/EN55022 Class A; FCC Class A; CE Mark
Warranty	Lifetime

Ordering Information

E-MCR-05
  12-Slot Device Rack

Optional Accessories (sold separately)

Mounting Options
RMBU
  Universal Rack Mount Bracket
  for Stand-Alone Devices

RMBM
  Rack Mount Bracket for Mini Devices

‣ 19" Rack-Mountable Chassis
‣ Securely houses up to (12) stand-alone devices with the use of universal device mounting brackets
‣ One AC power source will independently power up to (12) hot-swappable devices
‣ Supports any combination of single wide, 12 VDC powered, Transition Networks' devices

---

RMS19-SA4-01

4-Slot Device Shelf

Space Saving Design
Save rack space in low density deployments:
19" rack mount, 1RU high.

Flexible
Mix and match up to (4) Transition Networks stand-alone devices (excluding double-high models).

Non-Power Design
Don't pay for power supplies twice. This low cost design allows the use of the power supplies that ship with the device.

Power Cord Tie-Downs
Eliminates the accidental disconnection of power supplies from the devices.

Device Mounting Brackets
Securely mounts the devices to the shelf.

Includes
(4) univeral rack mount device brackets.

(Devices Sold Seperately)

‣ Rackmount up to (4) stand-alone devices in (1) convenient un-powered shelf.

Specifications

Dimensions	**Width:** 17.0" [432 mm] **Depth:** 6.0" [152 mm] **Height:** 1.75" [44 mm]
Shipping Weight	3 lbs. [1.35 kg]
Warranty	Lifetime

Ordering Information

RMS19-SA4-01
  4-Slot Device Shelf

Optional Accessories (sold separately)

Mounting Options
RMBU
  Universal Rack Mount Bracket
  for Stand-Alone Devices

RMBM
  Rack Mount Bracket for Mini Devices

wall mount brackets

Mounting Brackets

Stand-Alone Devices

Wall Mount Brackets are small simple "L-shaped" tabs that allow a single Transition Networks' device to be mounted anywhere needed. The brackets are sold in pairs and are available in several sizes and types to match the different sized devices and space requirements.

Din Rail Brackets allow stand-alone devices to be mounted to a Din Rail, common in industrial environments, in either a flat mount against the Din Rail or in a vertical mount in which the device mounts on its edge.

Specifications

Shipping Weight	1 lb. [0.45 kg]
Warranty	Lifetime

WMBL; WMBP; WMBS

WMBV; WMBD

RMBU

Ordering Information

WMBD
5.0" [127 mm] DIN Rail Mount Bracket
Fits all Stand-Alone Devices; Single or
Dual Slot Point System™ Chassis

WMBD-E
4.3" [109 mm] DIN Rail Mount Bracket
(Extended) Fits all Stand-Alone Devices
with piggyback power supply attached

WMBD-F
3.3" [84 mm] DIN Rail Mount Bracket (flat)
Fits all Stand-Alone Devices
3.25" [82 mm] wide

WMBD-FS
3.1" [79 mm] DIN Rail Mount Bracket
(flat, small) Fits Stand-Alone Devices
3.0" [76 mm] wide

WMBJ-V
2.75" [70 mm] Wall mount bracket kit for
Analog Video products including:
J/VD-TX-01xx
J/VD-MRX-01xx

WMBL
4.0" [102 mm]
Fits Stand-Alone Devices size 4.7"
[119 mm]

WMBP
5.0" [127 mm]
Fits Single or Dual Slot Point System™
Chassis

WMBS
3.2" [81 mm]
Fits Stand-Alone Devices size 3.9"
[99 mm]

WMBV
5.0" [127 mm]
Vertical Mount
Fits all Stand-Alone Devices;
Single or Dual Slot Point System™ Chassis

WMBV-E
4.7" [119 mm]
Extended Vertical Mount Fits all Stand-
Alone Devices with piggyback power sup-
ply attached

RMBU
Rackmount bracket for stand-alone
Devices, used with E-MCR-05 and
RMS19-SA4-01

NEW PRODUCT

stand-alone power supplies

SPS-2460-xx

Extended Temperature Power Supply

Accessories

SPS-2460-CC
Piggy-Back Power Supply

SPS-2460-SA
Stand-Alone Power Supply

SPS-2460-PS
Piggy-BacktPower Supply

Ordering Information

SPS-2460-CC
Piggy-Back
For use with: Non-Point System™
stand-alone devices
3.0" wide (E-TBT-FRL-05;
E-100BTX-FX-05; etc.)

SPS-2460-PS
Piggy-Back
For use with: Point System™
stand-alone devices 3.25" wide
(SBFTF1011-100; SGETF1013-100, etc.)

SPS-2460-SA
Stand-Alone
For use with: All stand-alone devices;
Single-Slot Point System™
Chassis; Dual-Slot Point System™ Chassis

Specifications

Input Voltage	24 – 60 VDC; 24 – 42VMRS
Isolation Voltage	(Dielectric withstand) Meets IEC 950 for one minute 1500 VAC: Output/Input 1500 VAC: Input/Safety GND 1500 VAC: Output/CASE
Output Voltage	12.25 VDC
Output Current	1.0A
Load Regulation	±5% at 10% load to full rated load
Over Load Protection (OLP)	When the average power rating exceeds 125%-150% of maximum power, output voltages reduced to a safe dissipation level; protects against short circuit of any output
No Load Protection	No damage to power supply when operating at no load
Transient Protection	No voltage spike at power-on, power-off, or power failure
Power Distribution	+12.25 VDC at 1.0A maximum
Power Consumption	3 Watts max. @ 24 VDC input, 12.25 VDC output
Efficiency	80% (typical)
Noise and Ripple	±40 mV peak-to-peak of output voltage (typical)
MTBF	Greater than 250,000 hours with typical load operating at 25°C temperature (calculated according to MIL-HDBK-217E)
Regulatory Compliance	CISPR/EN55022; Class A; FCC Class A
Dimensions **SPS-2460-SA:**	**Width:** 3.75" [95 mm] **Depth:** 3.1" [79 mm] **Height:** 1.0" [25 mm]
SPS-2460-CC:	**Width:** 4.5" [114 mm] **Depth:** 3.1" [79 mm] **Height:** 1.0" [25 mm]
SPS-2460-PS:	**Width:** 4.5" [114 mm] **Depth:** 3.4" [86 mm] **Height:** 1.0" [25 mm]
Shipping Weight	1 lb. [0.45 kg]
Environment	Operating: -20°C to +65°C Storage: -40°C to +85°C 5 – 95% non-condensing 0 – 10,000 ft.
Warranty	Lifetime

Transition Networks' wide input external power supplies allow you to provide a wide range of input voltages to power your stand-alone devices and chassis. Input voltages of 24 – 60 VDC and 24 – 42VRMS allow for installation of any of Transition's stand-alone devices in most industrial, telecom and commercial applications, as well as HVAC and building controlled environments.

Multiple form factors allow flexibility to meet your application. The stand-alone form factor can be used with all Transition stand-alone devices as well as the single-slot and dual-slot Point System™ Chassis. The piggy back form factor allows the power supply to attach directly to the device and eliminate the power cable commonly found between the power supply and the device. Once the piggy back supply is attached to the device, the combined assembly is much easier to wall mount or attach to Din Rail environments than using a separate supply.

stand-alone network interface device

SSRFB10xx-10x

10/100 Bridging

Remotely Managed 10/100 Bridging NID (Network Interface Device)

Ideal for both Enterprise and Service Provider applications where entry level management information is needed on both the local and the remote device. This management information is accessible through the local unit installed in a managed Point System™ Chassis as the remote stand-alone unit reports its current operating status back to a local unit.

Devices should be used in pairs with the remotely managed stand-alone unit used in conjunction with the managed chassis card CSRFB10xx-100.

▸ **Integrate fiber** into 10/100 copper environments

▸ **Remote Mangement** Remote stand-alone units report their status to local managed unit

▸ **Remote Loopback** assists in identifying network problems [pg 17]

▸ **Bandwidth Control** sets throughput to user's requirements

Features

▸ Auto-Negotiation [pg 15]

▸ AutoCross™ [pg 15]

▸ Far-End-Fault (FEF) [pg 15]

▸ Transparent Link Pass Through [pg 16]

▸ Bandwidth Allocation [pg 17]

▸ Loopback [pg 17]

▸ Last Gasp [pg 18]

▸ Remote Management [pg 16]

▸ Automatic Link Restore [pg 17]

▸ Link Test

Read Management Features

▸ Power
▸ Copper Link Status
▸ Copper Speed
▸ Copper Duplex
▸ Fiber Link Status
▸ Fiber Duplex
▸ Fiber Loop Back Status

Remote Status Reporting Conversion

Management Station

10/100 Switch   FE

CSRFB

FE   FE   FE

Location 1   Location 2   Location 3

SSRFB   CSRFB   SSRFB

Reporting Device   Reporting Device   Reporting Device

Specifications

Complete list of fiber optic connector specifications [pg 117-123]

Standards	IEEE Std. 802.3, TS-1000 OAM v2
Data Rate	**Copper:** 10/100 Mbps **Fiber:** 100 Mbps
Filtering Addresses	1K MAC addresses
RAM Buffers	256K
Max Frame Size	1916 bytes untagged 1914 bytes tagged
Switches	**SW1**: TP Auto-Negotiation **SW2**: TP Duplex with Auto-Negotiation Off **SW3**: TP Speed with Auto-Negotiation Off **SW4**: Fiber Duplex **SW5:** Link Pass Through **SW6:** Mode: Terminal or Center
Status LEDs	**PWR (Power)** **TP Duplex/Link/Activity** **TP 10 Mbps/100 Mbps** **Fiber Link/Activity** **Fiber Duplex**
Dimensions	**Width:** 3.25" [82 mm] **Depth:** 4.8" [122 mm] **Height:** 1.0" [25 mm]
Power Consumption	3.4 Watts
Environment	0 – 50 C; 5% - 95% humidity non-condensing; 0 – 10,000 ft. altitude
Power	External AC/DC required; 12 VDC 1.25A
Shipping Weight	2 lbs. [.90 kg]
Safety Compliance	Wall Mount Power Supply: UL Listed and CSA certified
Regulatory Compliance	EN55022 Class A, EN55024; CE Mark
Warranty	Lifetime

Ordering Information

Complete list of fiber optic connector specifications [pg 117-123]

SSRFB1011-100
10/100Base-TX (RJ-45) **[100 m/328 ft.]**
to 100Base-FX 1300nm MM ST
[2 km/1.2 mi.] Link Budget: 11.0 dB

SSRFB1013-100
10/100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1300nm MM (SC)
[2 km/1.2 mi.] Link Budget: 11.0 dB

SSRFB1014-100
10/100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1310nm SM (SC)
[20 km/12.4 mi.] Link Budget: 16.0 dB

SSRFB1040-100
10/100BASE-TX (RJ-45) **[100 m/328 ft.]**
to SFP slot (empty)

Single Fiber Products
Recommended use in pairs [pg 18]

SSRFB1029-100
10/100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1310nm TX/1550nm RX
Bi-Di SM (SC)
[20 km/12.4 mi.] Link Budget: 19.0 dB

SSRFB1029-101
10/100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1550nm TX/1310nm RX
Bi-Di SM (SC)
[20 km/12.4 mi.] Link Budget: 19.0 dB

SSRFB1029-102
10/100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1310nm TX/1550nm RX
Bi-Di SM (SC)
[40 km/24.9 mi.] Link Budget: 25.0 dB

SSRFB1029-103
10/100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1550nm TX/1310nm RX
Bi-Di SM (SC)
[40 km/24.9 mi.] Link Budget: 25.0 dB

Optional Accessories (sold separately)

SFP Modules [pg 98-104]

Wide Input (24 - 60 VDC) Power Supplies

SPS-2460-PS [pg 67]
Piggy Back Power Supply

SPS-2460-SA [pg 67]
Stand-Alone Power Supply

Mounting Options

E-MCR-05 [pg 65]
12-Slot Device Rack

RMS19-SA4-01 [pg 65]
4-Slot Device Shelf

WMBL [pg 66]
Wall Mount Bracket 4.0" [102 mm]

WMBV [pg 66]
Vertical Wall Mount Bracket 5.0" [127 mm]

WMBD [pg 66]
DIN Rail Bracket 5.0" [127 mm]

WMBD-F [pg 66]
DIN Rail Bracket (flat) 3.3" [84 mm]

AUTO CROSS   AUTO NEG   PAUSE   TRANSPARENT LINK PASS THRU   FAR END FAULT   LOOP BACK   BANDWIDTH ALLOCATION   FIELD UPGRADEABLE FIRMWARE   REMOTE MGMT   AUTO LINK RESTORE   SINGLE FIBER   LAST GASP

stand-alone network interface device

see also: **10/100 OAM/IP-Based Point System™ Slide-In-Modules [pg 57]**

SFBRM10xx-1xx

10/100 Bridging

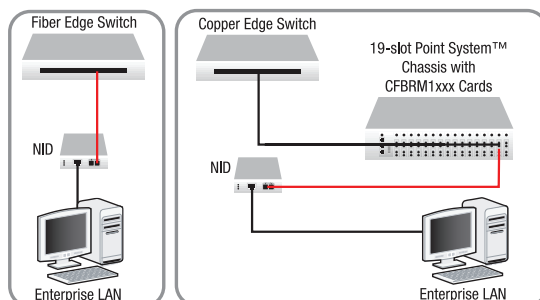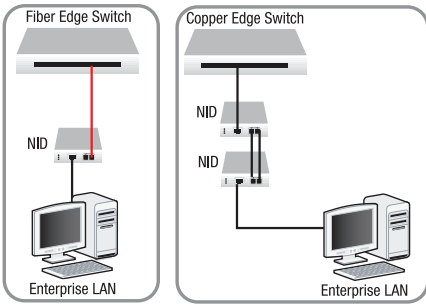## OAM/IP-Based Remotely Managed NID (Network Interface Device)

Features

‣ MEF 9 & MEF 14 Carrier Ethernet Certification

‣ Two remote management modes:
  • IP-Based Remote Management [pg 16]
  • In-Band Link OAM 802.3ah
    (remote device managed by local peer)

‣ SNMP v1

‣ AutoCross™ [pg 15]

‣ Auto-Negotiation [pg 15]

‣ Pause [pg 16]

‣ Transparent Link Pass Through [pg 16]

‣ Far-End-Fault [pg 15]

‣ Remote Loopback [pg 17]

‣ IEEE 802.1p QoS packet classification with 4 egress queues

‣ IPv4 IP TOS and DiffServ QoS classification, IPv6 Traffic class

‣ IEEE 802.1q VLAN

‣ Static MAC, 64 entries

‣ Double VLAN tagging (C-Tag/S-Tag) (Q-in-Q)

‣ RADIUS client

‣ RMON counters for each port

‣ Bandwidth Allocation per port [pg 17]

‣ DMI Optical Management on select models

‣ USB port for basic setup

‣ Cable diagnostic function for TP ports

‣ 8K MAC addresses

‣ Field Upgradeable Firmware [pg 17]

The xFBRM family of Network Interface Devices (NIDs) is a remotely managed product that offers IP or IP-Less management methods for secure delivery of Ethernet services for business and Mobile Backhaul applications. With MEF 9 & 14 certification the xFBRM family ensures you are compliant with the latest standards. The xFBRM is a 10/100Mbps product with advance features including – IEEE 802.3ah Link OAM, VLAN, QoS, and Bandwidth Allocation.

‣ Applications:
  • Ethernet in the First Mile (EFM)
  • Fiber to the Premise (FTTP), E-Line and E-LAN
  • Enterprise markets

Remotely Managed 10/100 NID

Central Office

Fiber Edge Switch   19-slot Point System™ Chassis with CFBRM10xx Cards

IP-Based Management   OAM Remote Management

Enterprise Switch   Enterprise Switch

IP Phone   IP Phone

100/1000 NID   100/1000 NID

Enterprise LAN   Enterprise LAN

Customer Premise Equipment (CPE)

Specifications

Complete list of fiber optic connector specifications [pg 117-123]

Standards	IEEE Std. 802.3, IEEE Std. 802.3ah, IEEE Std. 802.1P, IEEE Std. 802.1Q
Data Rate	**Copper:** 10/100 Mbps **Fiber:** 100 Mbps
Filtering Addresses	8K MAC Addresses
Max Frame Size	1628 bytes
Dimensions	**Width:** 3.25" [82 mm] **Depth:** 4.8" [122 mm] **Height:** 1.0" [25 mm]
Environment	0 – 50°C; 5% – 95% humidity non-condensing; 0 – 10,000 ft. altitude
Power	**Input:** 100-240 VAC, 1A **Output:** 12 VDC, 1.25A
Shipping Weight	2 lbs. [0.90 kg]
Regulatory Compliance	EN55024, FCC Class A, CE Mark, UL
Warranty	Lifetime

WMBD [pg 66]
  DIN Rail Bracket 5.0" [127 mm]

WMBL [pg 66]
  Wall Mount Bracket 4.0" [102 mm]
USB Cables

USBC-AM-BM-03
  USB 2.0 Cable A male to B male [3 ft. Gray]

USBC-AM-BM-06
  USB 2.0 Cable A male to B male [6 ft. Gray]

Ordering Information

SFBRM1011-100
SFBRM1011-110 (DMI model)
  10/100BASE-TX (RJ-45) **[100 m/328 ft.]** to 100BASE-FX 1300nm MM (ST)
  [2 km/1.2 mi.] Link Budget: 11.0 dB

SFBRM1013-100
SFBRM1013-110 (DMI model)
  10/100BASE-TX (RJ-45) **[100 m/328 ft.]** to 100BASE-FX 1300nm MM (SC)
  [2 km/1.2 mi.] Link Budget: 11.0 dB

SFBRM1014-100
SFBRM1014-110 (DMI model)
  10/100BASE-TX (RJ-45) **[100 m/328 ft.]** to 100BASE-LX10 1310nm SM (SC)
  [10 km/6.2 mi.] Link Budget: 10.5 dB

SFBRM1015-100
SFBRM1015-110 (DMI model)
  10/100BASE-TX (RJ-45) **[100 m/328 ft.]** to 100BASE-FX 1310nm SM (SC)
  [40 km/24.9 mi.] Link Budget: 26.0 dB

SFBRM1016-100
  10/100BASE-TX (RJ-45) **[100 m/328 ft.]** to 100BASE-FX 1310nm SM (SC)
  [60 km/37.3 mi.] Link Budget: 29.0 dB

SFBRM1017-100
  10/100BASE-TX (RJ-45) **[100 m/328 ft.]** to 100BASE-FX 1550nm SM (SC)
  [80 km/49.7 mi.] Link Budget: 29.0 dB

SFBRM1035-100
  10/100BASE-TX (RJ-45) **[100 m/328 ft.]** to 100BASE-FX 1550nm SM (SC)
  [120 km/74.6 mi.] Link Budget: 36.0 dB

SFBRM1040-100
  10/100BASE-TX (RJ-45) **[100 m/328 ft.]** to SFP slot (empty)

Single Fiber Products [pg 18]

SFBRM1029-100
SFBRM1029-110 (DMI model)
  10/100BASE-TX (RJ-45) **[100 m/328 ft.]** to 100BASE-BX-U 1310nm TX/1550nm RX
    Bi-Di single mode (SC)
  [20 km/12.4 mi.] Link Budget: 19.0 dB

SFBRM1029-101
SFBRM1029-111 (DMI model)
  10/100BASE-TX (RJ-45) **[100 m/328 ft.]** to 100BASE-BX-D 1550nm TX/1310nm RX
    Bi-Di SM (SC)
  [20 km/12.4 mi.] Link Budget: 19.0 dB

SFBRM1029-102
  10/100BASE-TX (RJ-45) **[100 m/328 ft.]** to 100BASE-FX 1310nm TX/1550nm RX
    Bi-Di SM (SC)
  [40 km/24.8 mi.] Link Budget: 25.0 dB

SFBRM1029-103
  10/100BASE-TX (RJ-45) **[100 m/328 ft.]** to 100BASE-FX 1550nm TX/1310nm RX
    Bi-Di SM (SC)
  [40 km/24.8 mi.] Link Budget: 25.0 dB

Note: all units feature USB port for local management application.

Optional Accessories (sold separately)

Wide Input (24 - 60 VDC) **Power Supplies**

SPS-2460-PS [pg 67]
  Piggy Back Power Supply

SPS-2460-SA [pg 67]
  Stand-Alone Power Supply

Mounting Options

E-MCR-05 [pg 65]
  12-Slot Media Converter Rack

RMS19-SA4-01 [pg 65]
  4-Slot Media Converter Shelf

Stand-Alone

OAM/IP-BASED Remotely Managed 10/100BASE-TX to 100BASE-X

stand-alone network interface device

SFBRM10xx-18x

10/100 Bridging

OAM/IP-Based NID (Network Interface Device) For Indoor and Protected Outdoor Applications

▸ Indoor/Protected Outdoor Applications (-40°C – 65°C)
  • Ethernet in the First Mile (EFM)
  • Fiber to the Premise (FTTP), E-Line and E-LAN
  • Enterprise markets

Remotely Managed 10/100 NID IP or OAM Management

Fiber Edge Switch / Copper Edge Switch / 19-slot Point System™ Chassis with CFBRM1xxx Cards / NID / Enterprise LAN

Features

▸ MEF 9 & MEF 14 Carrier Ethernet Certification
▸ Two Remote Management modes:
  • IP-Based Remote Management [pg 16]
  • In-Band Link OAM 802.3ah
    (remote device managed by local peer)
▸ SNMP v1
▸ AutoCross™ [pg 15]
▸ Auto-Negotiation [pg 15]
▸ Pause [pg 16]
▸ Transparent Link Pass Through [pg 16]
▸ Far-End-Fault [pg 15]
▸ Remote Loopback [pg 17]
▸ IEEE 802.1p QoS packet classification with 4 egress queues
▸ IPv4 IP TOS and DiffServ QoS classification, IPv6 Traffic class
▸ IEEE 802.1q VLAN
▸ Static MAC, 64 entries
▸ Double VLAN tagging (C-tag/S-tag)(Q-in-Q)
▸ RADIUS client
▸ RMON counters for each port
▸ Bandwidth Allocation per port [pg 17]
▸ DMI Optical Management
▸ USB port for basic setup
▸ Cable diagnostic function for TP ports
▸ 8K MAC addresses
▸ Field Upgradeable Firmware [pg 17]

Specifications

Complete list of fiber optic connector specifications [pg 117-123]

Standards	IEEE Std. 802.3, IEEE Std. 802.3ah, IEEE Std. 802.1P, IEEE Std. 802.1Q, IEEE Std. 802.1X
Data Rate	**Copper:** 10/100 Mbps **Fiber:** 100 Mbps
Filtering Addresses	8K MAC Addresses
Max Frame Size	1628 bytes
Dimensions	**Width:** 3.25" [82 mm] **Depth:** 4.8" [122 mm] **Height:** 1.0" [25 mm]
Environment	-40-65°C; 5%-95% humidity non-condensing; 0-10,000 ft. altitude
Power	**Input:** 100-240 VAC, 1A **Output:** 12 VDC, 1.25A
Shipping Weight	2 lbs. [0.90 kg]
Regulatory Compliance	EN55024, FCC Class A, CE Mark, UL
Warranty	Lifetime

Mounting Options

E-MCR-05 [pg 65]
  12-Slot Media Converter Rack

RMS19-SA4-01 [pg 65]
  4-Slot Media Converter Shelf

WMBD [pg 66]
  DIN Rail Bracket 5.0" [127 mm]

WMBL [pg 66]
  Wall Mount Bracket 4.0" [102 mm]

USB Cables

USBC-AM-BM-03
  USB 2.0 Cable A male to B male [3 ft. Gray]

USBC-AM-BM-06
  USB 2.0 Cable A male to B male [6 ft. Gray]

Ordering Information

Complete list of fiber optic connector specifications [pg 117-123]

SFBRM1011-180
SFBRM1011-190 (DMI model)
  10/100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1300nm MM (ST)
  [2 km/1.2 mi.] Link Budget: 11.0 dB

SFBRM1013-180
SFBRM1013-190 (DMI model)
  10/100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1300nm MM (SC)
  [2 km/1.2 mi.] Link Budget: 11.0 dB

SFBRM1014-180
SFBRM1014-190 (DMI model)
  10/100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-LX10 1310nm SM (SC)
  [10 km/6.2 mi.] Link Budget: 10.5 dB

SFBRM1015-180
  10/100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1310nm SM (SC)
  [40 km/24.9 mi.] Link Budget: 26.0 dB

SFBRM1016-180
  10/100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1310nm SM (SC)
  [60 km/37.3 mi.] Link Budget: 29.0 dB

SFBRM1017-180
  10/100BASE-TX (RJ-45)**[100 m/328 ft.]**
to 100BASE-FX 1550nm SM (SC)
  [80 km/49.7 mi.] Link Budget: 29.0 dB

SFBRM1035-180
  10/100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1550nm SM (SC)
  [120 km/74.6 mi.] Link Budget: 36.0 dB

SFBRM1040-180
  10/100BASE-TX (RJ-45)**[100 m/328 ft.]**
to SFP slot (empty)

Single Fiber Products [pg 18]

SFBRM1029-180
SFBRM1029-190 (DMI model)
  10/100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-BX-U 1310nm TX/1550nm
  RX Bi-Di single mode (SC)
  [20 km/12.4 mi.] Link Budget: 19.0 dB

SFBRM1029-181
SFBRM1029-191 (DMI model)
  10/100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-BX-D 1550nm TX/1310nm
  RX Bi-Di SM (SC)
  [20 km/12.4 mi.] Link Budget: 19.0 dB

SFBRM1029-182
  10/100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1310nm TX/1550nm
  RX Bi-Di SM (SC)
  [40 km/24.8 mi.] Link Budget: 25.0 dB

SFBRM1029-183
  10/100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1550nm TX/1310nm RX
  Bi-Di SM (SC)
  [40 km/24.8 mi.] Link Budget: 25.0 dB

Note: all units feature USB port for local management application.

Optional Accessories (sold separately)

Wide Input (24 - 60 VDC) Power Supplies

SPS-2460-PS [pg 67]
  Piggy Back Power Supply

SPS-2460-SA [pg 67]
  Stand-Alone Power Supply

✕ AUTO CROSS	= AUTO NEG	‖ PAUSE	TRANSPARENT LINK PASS THRU	FAR END FAULT	LOOP BACK	BANDWIDTH ALLOCATION	FIELD UPGRADEABLE FIRMWARE	REMOTE MGMT	AUTO LINK RESTORE	SINGLE FIBER	LAST GASP

stand-alone network interface device

SFBRM1040-140

10/100 Bridging

Redundant OAM/IP-Based Remotely Managed NID (Network Interface Device)

CARRIER ETHERNET
MEF Certified Compliant™

▸ Applications:
- Ethernet in the First Mile (EFM)
- Fiber to the Premise (FTTP), E-Line and E-LAN
- Enterprise markets

Remotely Managed 10/100 NID IP
or OAM Management

Features

▸ MEF 9 & MEF 14 Carrier Ethernet Certification
▸ Two remote management modes:
- IP-Based Remote Management [pg 16]
- In-Band Link OAM 802.3ah
  (remote device managed by local peer)
▸ SNMP v1
▸ AutoCross™ [pg 15]
▸ Auto-Negotiation [pg 15]
▸ Pause [pg 16]
▸ Transparent Link Pass Through [pg 16]
▸ Far-End-Fault [pg 15]
▸ Remote Loopback [pg 17]
▸ IEEE 802.1p QoS packet classification with 4 egress queues
▸ IPv4 IP TOS and DiffServ QoS classification, IPv6 Traffic class
▸ IEEE 802.1q VLAN
▸ Static MAC, 64 entries
▸ Double VLAN tagging (C-tag/S-tag)(Q-in-Q)
▸ RADIUS client
▸ RMON counters for each port
▸ Bandwidth Allocation per port [pg 17]
▸ DMI Optical Management
▸ USB port for basic setup
▸ Cable diagnostic function for TP ports
▸ 8K MAC addresses
▸ Field Upgradeable Firmware [pg 17]

Fiber Edge Switch — NID — Enterprise LAN
Copper Edge Switch — NID / NID — Enterprise LAN

Specifications

Complete list of fiber optic connector specifications [pg 117-123]

Standards	IEEE Std. 802.3, IEEE Std. 802.3ah, IEEE Std. 802.1P, IEEE Std. 802.1Q
Data Rate	**Copper:** 10/100 Mbps **Fiber:** 100 Mbps
Filtering Addresses	8K MAC Addresses
Max Frame Size	1628 bytes
Dimensions	**Width:** 3.4" [86 mm] **Depth:** 5.0" [127 mm] **Height:** 1.0" [25 mm]
Power Consumption	4.8 Watts
Power	Input 100-240VAC, 1A Output 12 VDC, 1.25A
Environment	0 – 50°C; 5% – 95% humidity non-condensing; 0 – 10,000 ft. altitude
Shipping Weight	2 lbs. [0.90 kg]
Regulatory Compliance	EN55024, FCC Class A, CE Mark, UL
Warranty	Lifetime

Ordering Information

Complete list of fiber optic connector specifications [pg 117-123]

SFBRM1040-140
10/100BASE-TX (RJ-45) **[100 m/328 ft.]** to (2) 100BASE-X SFP Slots (empty)

Note: unit features USB port for local management application.

Optional Accessories (sold separately)

SFP Modules [pg 98-104]

Wide Input (24 - 60 VDC) Power Supplies

SPS-2460-PS [pg 67]
Piggy Back Power Supply

SPS-2460-SA [pg 67]
Stand-Alone Power Supply

Mounting Options

E-MCR-05 [pg 65]
12-Slot Device Rack

RMS19-SA4-01 [pg 65]
4-Slot Device Shelf

WMBD [pg 66]
DIN Rail Bracket 5.0" [127 mm]

WMBL [pg 66]
Wall Mount Bracket 4.0" [102 mm]

USB Cables

USBC-AM-BM-03
USB 2.0 Cable A male to B male [3 ft. Gray]

USBC-AM-BM-06
USB 2.0 Cable A male to B male [6 ft. Gray]

see also: OAM/IP-Based Remotley Managed Point System™ Slide-In-Modules [pg 58]

stand-alone network interface device

SBFFG10xx-1xx

OAM/IP-Based Remotely Managed NID (Network Interface Device)

CARRIER ETHERNET
MEF Certified Compliant™

Features

▸ 10K Jumbo Frame Support
▸ MEF 9 & MEF 14 Carrier Ethernet Certification

▸ Two management modes:
  • IP-Based Remote Management [pg 16]
  • In-Band Link OAM 802.3ah
    (remote device managed by local peer)

▸ SNMP v1

▸ AutoCross™ [pg 15]

▸ Auto-Negotiation [pg 15]

▸ Pause [pg 16]

▸ Transparent Link Pass Through [pg 16]

▸ Far-End-Fault [pg 15]

▸ Remote Loopback [pg 17]

▸ IEEE 802.1p QoS packet classification with 4 egress queues

▸ IPv4 IP TOS and DiffServ QoS classification, IPv6 Traffic class

▸ IEEE 802.1q VLAN

▸ Static MAC, entries

▸ Double VLAN tagging (QinQ)

▸ Selectable Ethertype for S-TAG when using Double VLAN Tagging: 0x8100, 0x9100 or 0x88A8

▸ RADIUS client

▸ RMON counters for each port

▸ Bandwidth Allocation per port [pg 17]

▸ DMI Optical Management

▸ USB port for basic setup

▸ Cable diagnostic function for TP ports

▸ 8K MAC addresses

▸ Field Upgradeable Firmware [pg 17]

The xBFFG family of Network Interface Devices (NIDs) is a remotely managed product that offers IP or IP-Less management methods for secure delivery of Ethernet services for business and Mobile Backhaul applications. With MEF 9 & 14 certification the xBFFG family ensures you are compliant with the latest standards. The xBFFG is a 10/100/1000Mbps product with advance features including – IEEE 802.3ah Link OAM, VLAN, QoS, Bandwidth Allocation and Jumbo Frame Support.

Remotely Managed 10/100/1000 NID or OAM Management

Central Office

Fiber Edge Switch | 19-slot Point System™ Chassis with CBFFG1xxx Cards

IP-Based Management

Enterprise Switch

NID

Enterprise LAN

OAM Remote Management

Enterprise Switch

NID

Enterprise LAN

▸ Applications:
  • Ethernet in the First Mile (EFM)
  • Fiber to the Premise (FTTP), E-Line and E-LAN
  • Enterprise markets

Specifications

Complete list of fiber optic connector specifications [pg 117-123]

Standards	IEEE Std. 802.3, IEEE Std. 802.3ah, IEEE Std. 802.1P, IEEE Std. 802.1Q,
Data Rate	**Copper:** 10/100/1000 Mbps **Fiber:** 1000 Mbps
Filtering Addresses	8K MAC Addresses
Max Frame Size	10,240 bytes
Dimensions	**Width:** 3.25" [82 mm] **Depth:** 4.8" [122 mm] **Height:** 1.0" [25 mm]
Environment	0 – 50°C; 5% – 95% humidity non-condensing; 0 – 10,000 ft. altitude
Power	Input: 100-240 VAC, 1A Output: 12 VDC, 1.25A
Shipping Weight	2 lbs. [0.90 kg]
Regulatory Compliance	EN55024, FCC Class A, CE Mark, ul
Warranty	Lifetime

*SBFFG1040-105 and SBFFG4040-105 have SGMII support for use with 10/100/1000BASE-T copper SFPs.

WMBD [pg 66]
    DIN Rail Bracket 5.0" [127 mm]

WMBL [pg 66]
    Wall Mount Bracket 4.0" [102 mm]
USB Cables
USBC-AM-BM-03
    USB 2.0 Cable A male to B male [3 ft. Gray]
USBC-AM-BM-06
    USB 2.0 Cable A male to B male [6 ft. Gray]

Ordering Information

SBFFG1013-105
SBFFG1013-115 (DMI Options)
    10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-SX 850nm MM (SC)
    [62.5/125 μm fiber: 220 m/722 ft.]
    [50/125 μm fiber: 550 m/1804 ft.]
    Link Budget: 7.5 dB

SBFFG1014-105
SBFFG1014-115 (DMI Options)
    10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-LX 1310nm SM (SC)
    [10 km/6.2 mi.] Link Budget: 10.5 dB

SBFFG1015-105
SBFFG1015-115 (DMI Options)
    10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-LX 1310nm SM (SC)
    [25 km/15.5 mi.] Link Budget: 15.0 dB

SBFFG1017-105
    10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-X 1550nm SM (SC)
    [65 km/40.4 mi.] Link Budget: 21.0 dB

SBFFG1024-105
    10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-LX 1310nm Extended MM
    (62.5/125 μm fiber only) (SC)
    [2 km/1.2 mi.] Link Budget: 7.0 dB

SBFFG1035-105
    10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-X 1550nm SM (SC)
    [120 km/77.7 mi.] Link Budget: 27.0 dB

***SBFFG1040-105**
    10/100/1000BASE-T (RJ-45) **[100 m]**
to 100/1000BASE-X SFP Slot (empty)

***SBFFG4040-105**
    100/1000BASE-X SFP Slot (empty)
to 100/1000BASE-X SFP Slot (empty)

Single Fiber Products [pg 18]

SBFFG1029-105
SBFFG1029-115 (DMI Options)
    10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-BX-U 1310nm TX/1490nm RX
    Bi-Di SM (SC)
    [20 km/12.4 mi.] Link Budget: 14.0 dB

SBFFG1029-106
SBFFG1029-116 (DMI Options)
    10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-BX-D 1490nm TX/1310nm RX
    Bi-Di SM (SC)
    [20 km/12.4 mi.] Link Budget: 14.0 dB

SBFFG1029-107
    10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-LX 1310nm TX/1490nm RX
    Bi-Di SM (SC)
    [40 km/24.8 mi.] Link Budget: 20.0 dB

SBFFG1029-108
    10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-LX 1490nm TX/1310nm RX
    Bi-Di SM (SC)
    [40 km/24.8 mi.] Link Budget: 20.0 dB

Note: all units feature USB port for local management application

Optional Accessories (sold separately)

Wide Input (24 - 60 VDC) Power Supplies

SPS-2460-PS [pg 67]
    Piggy Back Power Supply

SPS-2460-SA [pg 67]
    Stand-Alone Power Supply

Mounting Options

E-MCR-05 [pg 65]
    12-Slot Media Converter Rack

RMS19-SA4-01 [pg 65]
    4-Slot Media Converter Shelf

< 72 >
Call us at 800.526.9267 or 952.941.7600

LINK PASS THRU   AUTO LINK RESTORE

stand-alone fiber transponder

SFMFF4040-100

Fiber Transponder

Small Form Factor Pluggable Conversion

▸ Universal platform to accommodate any optical conversion options available via SFP interfaces

▸ SFP Multi-rate Transponder

▸ Provides wavelength conversion while maintaining the same data rate

▸ Protocol Transparency

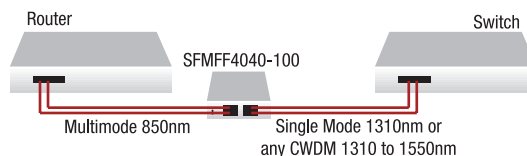These transonders offer an excellent upgrade path for networks. Today's Fast Ethernet applications can be upgraded to Gigabit speeds tomorrow with a simple SFP swap. The device remains installed, managed and fully operational at any of these speeds.

Using two similar data rate SFP modules allows for seamless connectivity between different wavelengths or fiber modes for speeds up to 2.5 Gbps. Protocol independence allows for use in a broad range of applications including Fast and Gigabit Ethernet, FDDI, ESCON, SONET OC-3, OC-12, OC-48 and Fiber Channel.

Features

▸ CWDM and DWDM SFP-ready platform

▸ Link Pass Through [pg 16]

▸ Automatic Link Restoration [pg 17]

Enterprise Application

Router

SFMFF4040-100

Switch

Multimode 850nm

Single Mode 1310nm or any CWDM 1310 to 1550nm

Service Provider Application

CWDM Mux/Edge Switch

SFMFF4040-100

Router

CWDM 1310 to 1550nm

Multimode 850nm

CFMFF4040-100 Chassis Cards

SFMFF4040-100

Router

Up to 19 connections

Single Mode 1310nm

Multimode 850nm

Ordering Information

SFMFF4040-100
SFP Slot (empty) to SFP Slot (empty)

Optional Accessories (sold separately)

SFP Modules [pg 98-104]

Wide Input (24 - 60 VDC) Power Supplies
SPS-2460-PS or SPS-2460-SA [pg 67]

Mounting Options

RMS19-SA4-01 [pg 65]
4-Slot Media Converter Shelf

E-MCR-05 [pg 65]
12-Slot Media Converter Rack

WMBD [pg 66]
DIN Rail Mount Bracket 5.0" [127 mm]

WMBL [pg 66]
Wall Mount Bracket 4.0" [102 mm]

Specifications

Standards	Multi-Source Agreement (MSA), Small Form Factor Pluggable (SFP)
Status LEDs	**LK1:** Link on Port 1 **LK2:** Link on Port 2 **PWR:** Power
Dimensions	**Width:** 3.25" [83 mm] **Depth:** 4.8" [122 mm] **Height:** 1.0" [25 mm]
Power Consumption	2 Watts with TN-SFP-xx modules installed
Power	External AC/DC required: 12 VDC 0.5A
Environment	**SFMFF4040-100 Board:** -10 – 60°C operating temp; See SFP Module temperature ratings; 5% to 95% humidity (non-condensing); 0 – 10,000 ft.
Safety Compliance	Wall Mount Power Supply: UL listed and CSA certified
Regulatory Compliance	FCC Class A; EN55024 (CISPR 22) Class A; ICES-003; CISPRB; CE Mark
Warranty	Lifetime

LINK PASS THRU LINK RESTORE LOOP BACK **NEW PRODUCT**

stand-alone fiber transponder

STGFFxxxx-100

10 Gigabit Ethernet Fiber Transponder

The Transition Networks' 10 Gigabit Ethernet fiber to fiber device is a two-port 10G pluggable fiber transponder, supporting a variety of XFP and SFP+ modules allowing network designers to utilize the module to meet their network requirements.

The fiber transponder can use either Transition Networks' or third party MSA compatible 10G XFP or SFP+ modules including support for the following standards; 10GBase-SR, 10GBase-LR, 10GBase-ER, 10GBase-LRM, and 10GBase-ZR.

This device provides 3R (reamplify, reshape, and retime) optical signal regeneration.

Features

▶ Supports 10 Gigabit Ethernet Fiber to Fiber full duplex conversion

▶ LED Link Status Indicators

▶ Link Pass Through [pg 16]

▶ Full-Duplex

▶ Automatic Link Restoration [pg 17]

▶ Loopback [pg 17]

▶ Supports +5V, +3.3V, and +1.8V MSA compliant XFP modules

▶ Supports 3R (Reamplify, Reshape, and Retime) optical signal regeneration

▶ Supports 10GBase-CX4 modules in the CTGFF4848-100

10 Gigabit Ethernet Fiber Transponder

Specifications

Standards	IEEE Std. 802.3ae, IEEE 802.3ak, IEEE 802.3ag, IEEE 802.3, IEEE 802.3x, Multisource Agreement (MSA) XFP and SFP+
Data Rate	10 Gbps
Status LED	PWR (power): GREEN- power on 1LNK- fiber #1 link: GREEN- On link 1ACT- fiber #1 activity/fault: GREEN- BLINK activity, YELLOW- Fault 2LNK- fiber #2 link: GREEN- On link 2ACT- fiber #2 activity/fault: GREEN- BLINK activity, YELLOW- Fault
DIP Switches SW1- Port 1 mode SW2- Port 2 mode SW3- LPT SW4-	 **UP:** Limiting (xR); **DOWN:** Linear (LRM) **UP:** Limiting (xR); **DOWN:** Linear (LRM) **UP:** Enabled; **DOWN:** Disabled Interface loopback, forces each fiber to loop its RX to TX
Dimensions	**Width:** 1.72" [44 mm] **Depth:** 5.0" [127 mm] **Height:** 3.4" [86 mm]
Power Consumption	7 Watts
Power Supply	12 VDC barrel
Environment	0 to 50º C, dependant on ratings of the XFP and SFP+ modules used
Shipping Weight	1 lb. [0.45 kg]
Regulatory Compliance	FCC Class A, EN55024 (CISPR22) Class A; CE Mark; EN55022 Class A
Warranty	Lifetime

Ordering Information

STGFF4747-100
(2) Port 10GBase-xx open XFP to Open XFP

STGFF4848-100
(2) Port 10GBase-xx open SFP+ to Open SFP+

Optional Accessories (sold separately)

SFP+ Modules

TN-10GSFP-LR1
10GBase-LR/LW, SFP+ w/ Digital Diagnostics (DMI) 1310 DFB nm
[10 km/6.2 mi.] Link Budget: 6.4 dB

TN-10GSFP-LR2
10GBase-LR/LW, SFP+ w/ Digital Diagnostics (DMI) 1310 DFB nm
[20 km/12.4 mi.] Link Budget: 11.4 dB

TN-10GSFP-LR4
10GBase-LR/LW, SFP+ w/ Digital Diagnostics (DMI) 1310 DFB nm
[40 km/24.8 mi.] Link Budget: 16.5 dB

TN-10GSFP-LR7
10GBase-LR/LW, SFP+ w/ Digital Diagnostics (DMI) 1310 DFB nm
[70 km/43.4 mi.] Link Budget: 25 dB

TN-10GSFP-SR
10GBase-LR/LW, SFP+ w/ Digital Diagnostics (DMI) 850 DFB nm

**[300/82/33 m; 985/269/108 ft.]
Link Budget: 2.6 dB**

XFP Modules

TN-XFP-SR
10GBase-SR/SW/10G Fibre Channel, XFP w/ Digital Diagnostics (DMI) 850nm (LC)
**[62.5/125 uM: 33 m/108 ft.]
[50/125 uM with 500 MHZ-km: 269 ft.]
[50/125 uM: 300 m/985 ft.]
Modal dispersion 39.cB**

TN-XFP-LR1
10GBase-LR/LW/10G Fibre Channel, XFP w/ Digital Diagnostics (DMI) 1310nm (LC)
[10 km/6.2 mi.] Link Budget: 6.2 dB

TN-XFP-LR2
10GBase-LR/LW/10G Fibre Channel, XFP w/ Digital Diagnostics (DMI) 1310nm (LC)
[20 km/12.4 mi.] Link Budget: 12.0 dB

TN-XFP-ER
10GBase-LR/ER/10G Fibre Channel, XFP w/ Digital Diagnostics (DMI)1310nm (LC)
[40 km/24.9 mi.]Link Budget: 16.5 dB

TN-XFP-ZR
10GBase-LR/ER/10G Fibre Channel, XFP w/ Digital Diagnostics (DMI) 1550nm (LC)
[80 km/49.7 mi.] Link Budget: 23.0 dB

Mounting Options

WMBD [pg 66]
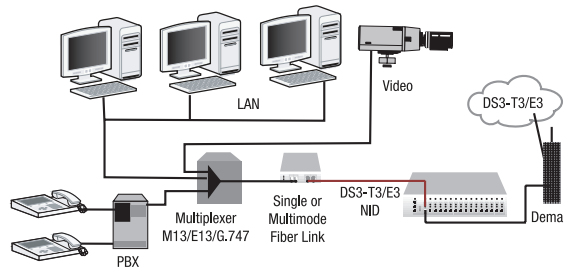DIN Rail Bracket 5.0" [127 mm]

WMBD-F [pg 66]
DIN Rail Bracket (flat) 3.3" [84 mm]

WMBL [pg 66]
Wall Mount Bracket 4.0" [102 mm]

WMBV [pg 66]
Vertical Wall Mount Bracket 5.0" [127 mm]

Wide Input (24 - 60 VDC) Power Supplies

SPS-2460-SA [pg 67]
Stand-Alone Power Supply

LOOP BACK

stand-alone device

SCSCF30xx-11x

DS3-T3/E3

DS3-T3/E3 and STS-1 Coax to Fiber Device

The DS3 – T3/E3 & STS-1 coax to fiber device provides a solution for those users that need to extend DS3 connections over fiber.

The DS3 – T3/Es & STS-1 supports Small Form Pluggable (SFP) transceivers to support a variety of fiber types, distances and wavelengths to provide maximum flexibility across a variety of network topologies. The use of Coarse Wave Division Multiplexing (CWDM) SFPs can be utilized to further increase the bandwidth capacity of the fiber infrastructure.

The DS3 – T3/E3 & STS-1 Device must be used in pairs*. A typical installation will include a chassis card [CCSCF, pg 61] installed in the Point System™ locally and a stand-alone device installed at the remote location.

Features

▸ AIS (Alarm Indication Signal)
▸ Coax Line Build Out
▸ Switch selectable for DS3/T3 or E3
▸ Loopback – Coax and Fiber [pg 17]
▸ LEDs for immediate visual status
▸ Supports dual or single fiber
▸ Supports multimode and single mode fiber at a variety of distances
▸ Supports CWDM SFPs

Optional Accessories (sold separately)

Wide Input (24 - 60 VDC) Power Supplies

SPS-2460-PS [pg 67]
  Piggy Back Power Supply

SPS-2460-SA [pg 67]
  Stand-Alone Power Supply

Mounting Options

E-MCR-05 [pg 65]
  12-Slot Device Rack

WMBD [pg 66]
  DIN Rail Bracket 5.0" [127 mm]

WMBD-F [pg 66]
  DIN Rail Bracket (flat) 3.3" [84 mm]

WMBL [pg 66]
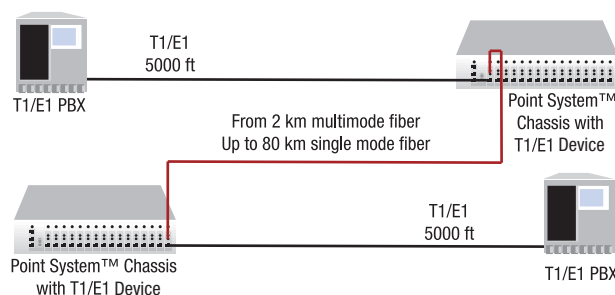 Wall Mount Bracket 4.0" [102 mm]

WMBV [pg 66]
  Vertical Wall Mount Bracket 5.0" [127 mm]

RMS19-SA4-01 [pg 65]
  4-Slot Device Shelf

Integrate Voice & Data on Fiber Network

Specifications

Complete list of fiber optic connector specifications [pg 117-123]

Standards	ANSI, ITU-TS, ETSI, AT&T, G.703, G.921 & G.955
Coax Connectors	75 ohm coax **TX output**　　　　　　**RX input** min: +2.5 dBm　　　min: -9.7dBm max: +9.1 dBm　　　max: +10.5 dBm
Fiber Connectors	SFP: LC connector Uses standard 100BASE-X/OC-3 SFP
Data Rates	DS3/T3 = 44.7 Mbps; E3 = 34.4 Mbps; STS-1 = 51.8 Mbps
Status LED	Power, Coax link status, coax loop-back status, AIS on coax link; Fiber link status, fiber loop-back status, AIS on fiber link
Dimensions	Width: 3.25" [83 mm]; Depth: 4.7" [119 mm]; Height: 1.0" [25 mm]
Power Consumption	3.0 Watts
Power Supply	12 VDC, 0.8 Amp (minimum)
Environment	Operating Temperature 0º to 50ºC (32º to 122ºF) Humidity 5-95% non-condensing Storage Temperature -20º to 85ºC (-4º to 185ºF)
Shipping Weight	2.0 lbs. [0.90 kg]
Regulatory Compliance	CISPR/EN55022 Class A; FCC Class A; CE Mark
MTBF w/ Power Supply	Greater than 41,660 hours (MIL-HDBD-217F) Greater than 114,580 hours (Bellcore)
MTBF w/o Power Supply	Greater than 250,000 hours (MIL-HDBD-217F) Greater than 687,000 hours (Bellcore)
Warranty	Lifetime

SCSCF3029-116
  (2) Coax (BNC)
to 1310nm TX/1550nm RX single fiber
  single mode (SC)
  [80 km/49.7 mi.] Link Budget: 33.0 dB

SCSCF3029-117
  (2) Coax (BNC)
to 1550nm TX/1310nm RX single fiber
  single mode (SC)
  [80 km/49.7 mi.] Link Budget: 32.0 dB

*The SCSCF30xx-110 will only work with another CCSCF30xx-110 or SCSCF30xx-110. The product does not work with a -10x model.

Ordering Information

Complete list of fiber optic connector specifications [pg 117-123]

SCSCF3011-110
  (2) Coax (BNC)
to 1300nm multimode (ST)
  [2 km/ 1.2 mi.] Link Budget: 14.0 dB

SCSCF3013-110
  (2) Coax (BNC)
to 1300nm multimode (SC)
  [2 km/ 1.2 mi.] Link Budget: 14.0 dB

SCSCF3014-110
  (2) Coax (BNC)
to 1310nm single mode (SC)
  [20 km/12.4 mi.] Link Budget: 19.0 dB

SCSCF3015-110
  (2) Coax (BNC)
to 1310nm single mode (SC)
  [40 km/24.9 mi.] Link Budget: 29.0 dB

SCSCF3016-110
  (2) Coax (BNC)
to 1310nm single mode (SC)
  [60 km/37.3 mi.] Link Budget: 32.0 dB

SCSCF3017-110
  (2) Coax (BNC)
to 1550nm single mode (SC)
  [80 km/49.7 mi.] Link Budget: 29.0 dB

SCSCF3040-110
  (2) Coax (BNC)
to SFP slot (empty)

Single Fiber Products
Recommended use in pairs [pg 18]

SCSCF3029-110
  (2) Coax (BNC)
to 1310nm TX/1550nm RX single fiber
  single mode (SC)
  [20 km/12.4 mi.] Link Budget: 19.0 dB

SCSCF3029-111
  (2) Coax (BNC)
to 1550nm TX/1310nm RX single fiber
  single mode (SC)
  [20 km/12.4 mi.] Link Budget: 19.0 dB

SCSCF3029-112
  (2) Coax (BNC)
to 1310nm TX/1550nm RX single fiber
  single mode (SC)
  [40 km/24.9 mi.] Link Budget: 25.0 dB

SCSCF3029-113
  (2) Coax (BNC)
to 1550nm TX/1310nm RX single fiber
  single mode (SC)
  [40 km/24.9 mi.] Link Budget: 25.0 dB

SCSCF3029-114
  (2) Coax (BNC)
to 1310nm TX/1550nm RX single fiber
  single mode (SC)
  [60 km/37.3 mi.] Link Budget: 29.0 dB

SCSCF3029-115
  (2) Coax (BNC)
to 1550nm TX/1310nm RX single fiber
  single mode (SC)
  [60 km/37.3 mi.] Link Budget: 29.0 dB

stand-alone device

SSDTFx0xx-12x

Remotely Managed T1/E1 Device

T1/E1

Features

▸ Remote unit in-band management [pg 16]
▸ Local or Remote Loopbacks on copper or fiber in software mode [pg 17]
▸ Loopbacks via test set [pg 17]
▸ Converts the copper ports on T1/E1 devices, such as a PBX or T1/E1 Router, to multimode or single mode fiber
▸ Switch selectable RJ-48 connectors for T1 or E1
▸ Jitter attenuators optimize Bit Error Rate (BER) performance
▸ Network debug procedures make BER testing more convenient
▸ Built-in troubleshooting with the addition of a selectable TAOS (Transmit All Ones) switch on the fiber and copper interfaces allows the network engineer to test all T1/E1 equipment on that network segment and ensure the network link
▸ Dry Relay Contacts enable the device to be tied into a separate alarm circuit commonly found in a T1/E1 twisted pair environment. Contacts will be activated on loss of power or loss of fiber link.
▸ LED provides Alarm Indication Signal (AIS)
▸ Can be used with fractional T1/E1 circuits
▸ Report device status

• Copper & Fiber Link status
• Hardware switch settings: LBO, AIS Copper, AIS Fiber, HW/SW
• AIS detected Copper & Fiber
• Model Number
• Copper & Fiber Connector

▸ Remote commands:
• Loopback Copper & Fiber
• AIS transmitted on Fiber on loss of Copper link
• AIS Transmitted on Copper on loss of Fiber link

Optional Accessories (sold separately)

Wide Input (18 – 72 VDC) Power Supplies
SPS-24602-PS [pg 67]
    Piggy Back Power Supply
SPS-2460-SA [pg 67]
    Stand-Alone Power Supply

Mounting Options
E-MCR-05 [pg 65]
    12-Slot Device Rack
RMS19-SA4-01 [pg 65]
    4-Slot Device Shelf
WMBD [pg 66]
    DIN Rail Bracket 5.0" [127 mm]
WMBD-F [pg 66]
    DIN Rail Bracket (flat) 3.3" [84 mm]
WMBL [pg 66]
    Wall Mount Bracket 4.0" [102 mm]
WMBV [pg 66]
    Vertical Wall Mount Bracket 5.0" [127 mm]

▸ Remote management in a stand-alone device When used in conjunction with a managed Point System™ chassis, this stand-alone unit can be managed remotely.

▸ The Remotely Managed T1/E1 copper to fiber device will provide a solution for users who desire to extend their T1 or E1 circuits over fiber and remotely manage them "in-band" from admin locations.

Provide Campus Interconnects

T1/E1
5000 ft

T1/E1 PBX

Point System™
Chassis with
T1/E1 Device

From 2 km multimode fiber
Up to 80 km single mode fiber

Point System™ Chassis
with T1/E1 Device

T1/E1
5000 ft

T1/E1 PBX

Specifications

Complete list of fiber optic connector specifications [pg 117-123]

Standards	ITU-T, ANSI, AT&T, ETSI
3-position Jumper	**Hardware**: mode is determined by 4-position switch settings **Software**: mode is determined by most recently saved on-board microprocessor settings.
Status LEDs	**PWR (Power)**: Steady green LED indicates connection to external AC power **SDC (Signal Detect/Copper)**: On indicates twisted pair link is up **SDF (Signal Detect/Fiber)**: On indicates fiber link is up
Dimensions	**Width**: 3.25" [82 mm] **Depth**: 4.8" [122 mm] **Height**: 1.0" [25 mm]
Power	External AC/DC provided; 12V DC; 0.5A; unregulated; standard; UL listed
Environment	0 – 50°C, 5% – 95% humidity (non-condensing), 0 – 10,000 ft.
Shipping Weight	2 lbs. [0.90 kg]
Safety Compliance	**Wall Mount Power Supply**: CSA certified
Regulatory Compliance	CISPR/EN55022 Class A; FCC Class A; CE Mark
Warranty	Lifetime

Devices must be used in pairs. Typically installation will include a chassis card [CSDTF, pg 62] installed in the Point System™ locally and a stand-alone device installed at the remote location.

Ordering Information

Complete list of fiber optic connector specifications [pg 117-123]

SSDTF1011-120
    Twisted Pair (RJ-48) **[1.5 km/0.9 mi.]**
to 850nm multimode (ST)
    [2 km/1.2 mi.] Link Budget: 13.5 dB

SSDTF1013-120
    Twisted Pair (RJ-48) **[1.5 km/0.9 mi.]**
to 850nm multimode (SC)
    [2 km/1.2 mi.] Link Budget: 13.5 dB

SSDTF1027-120
    Twisted Pair (RJ-48) **[1.5 km/0.9 mi.]**
to 1300nm multimode (ST)
    [5 km/3.1 mi.] Link Budget: 13.5 dB

SSDTF1012-120
    Twisted Pair (RJ-48) **[1.5 km/0.9 mi.]**
    1310nm single mode (ST)
    [8 km/5 mi.] Link Budget: 7.0 dB

SSDTF1022-120
    Twisted Pair (RJ-48) **[1.5 km/0.9 mi.]**
to 1310nm single mode (ST)
    [15 km/9.3 mi.] Link Budget: 10.0 dB

SSDTF1014-120
    Twisted Pair (RJ-48) **[1.5 km/0.9 mi.]**
to 1310nm single mode (SC)
    [20 km/12.4 mi.] Link Budget: 16.0 dB

SSDTF1015-120
    Twisted Pair (RJ-48) **[1.5 km/0.9 mi.]**
to 1310nm single mode (SC)
    [40 km/24.9 mi.] Link Budget: 30.0 dB

SSDTF1016-120
Twisted Pair (RJ-48) **[1.5 km/0.9 mi.]**
to 1310nm single mode (SC)
    [60 km/37.3 mi.] Link Budget: 33.0 dB

SSDTF1017-120
    Twisted Pair (RJ-48) **[1.5 km/0.9 mi.]**
to 1550nm single mode (SC)
    [80 km/49.7 mi.] Link Budget: 29.0 dB

Single Fiber Products [pg 18]

SSDTF1029-120
    Twisted Pair (RJ-48) **[1.5 km/0.9 mi.]**
to 1310nm TX /1550nm RX single fiber SM (SC)
    [20 km/12.4 mi.] Link Budget: 19.0 dB

SSDTF1029-121
    Twisted Pair (RJ-48) **[1.5 km/0.9 mi.]**
to 1550nm TX/1310nm RX single fiber SM (SC)
    [20 km/12.4 mi.] Link Budget: 19.0 dB

SSDTF1029-122
    Twisted Pair (RJ-48) **[1.5 km/0.9 mi.]**
to 1310nm TX/1550nm RX single fiber SM (SC)
    [40 km/24.9 mi.] Link Budget: 25.0 dB

SSDTF1029-123
    Twisted Pair (RJ-48) **[1.5 km/0.9 mi.]**
to 1550nm TX/1310nm RX single fiber SM (SC)
    [40 km/24.9 mi.] Link Budget: 25.0 dB

< 76 >   Call us at 800.526.9267 or 952.941.7600

AUTO LINK RESTORE • REMOTE MGMT • LOOP BACK • FIELD UPGRADEABLE FIRMWARE • SINGLE FIBER • NEW PRODUCT

stand-alone device

S4TEF10xx-120

4x T1/E1/J1 Copper to Fiber Transport Mux

▸ Low cost transport capability: (4) T1/E1/J1

▸ Target applications of the device include: FTTx, such as Fiber-to-the-Business, Fiber-to-the-Building, Fiber-to-the-MDU and Fiber-to-the-Home; Cell Tower Backhaul

▸ Automatic Link Restoration [pg 17]

▸ Remote Management [pg 16]

The product provides physical layer status monitoring and alarm classification functions for Telecom operators to manage their fiber optic network and reduce operation and maintenance costs.

Copper connections are compatible with G.703 and AMI/B8ZS/HDB3; while the optical connection will run at 155 Mbps. A hardware-based solution guarantees the constant bit rate of TDM transport without requiring traffic management.

Features

▸ Loopback via Test Set

▸ Local and Remote Loopback [pg 17]

▸ AIS/TAOS

▸ LEDs for each data port

▸ Settings for line code, line length, local loopback or remote loopback [pg 17]

▸ T1/E1/J1 mode settings

▸ Local (AUX) Management Interface

▸ Access to complete status information on local and remote device

▸ Field Upgradeable Firmware [pg 17]

▸ Extended Operating Temperature

Devices must be used in pairs. Typically installation will include a chassis card [C4TEF, pg 63] installed in the Point System™ locally and a stand-alone device installed at the remote location.

Optional Accessories (sold separately)

Wide Input (24 - 60 VDC) Power Supplies

SPS-2460-SA [pg 67]
  Stand-Alone Power Supply

Mounting Options

WMBD [pg 66]
  DIN Rail Bracket 5.0" [127 mm]

WMBD-F [pg 66]
  DIN Rail Bracket (flat) 3.3" [84 mm]

WMBL [pg 66]
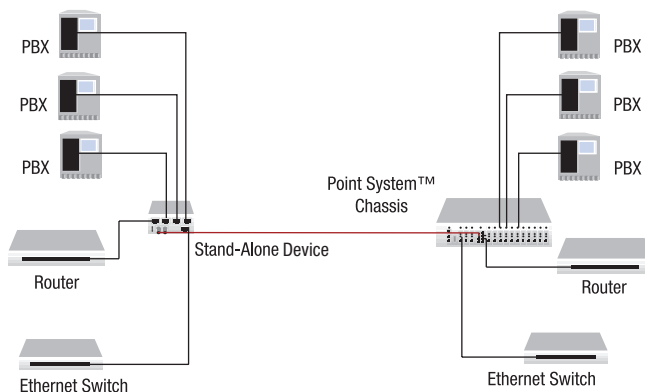 Wall Mount Bracket 4.0" [102 mm]

WMBV [pg 66]
  Vertical Wall Mount Bracket 5.0" [127 mm]

*Note: Operating Temperature -20°C – 70°C only on these models.

** SFP port uses standard 100BASE-x/oc-3 SFP

Application

PBX
PBX
PBX

Router

Stand-Alone NID

Point System™ Chassis

PBX
PBX
PBX

Router

Specifications

Complete list of fiber optic connector specifications [pg 117-123]

Standards	Ethernet interface: IEEE 802.3™-2008
	TDM interfaces: ANSI T1.102, T1.403 and T1.408 ITU I.431, G.703,G.736, G.775 and G.823 ETSI 300-166, 300-233 and TBR 12/13 AT&T Pub 62411
Switches	Numerous switch settings for line coding, line buildout, loopback (per port), AIS setting
Dimensions	**Width**: 3.7" [94 mm] **Depth**: 4.7" [119 mm] **Height**: 1.8" [46 mm]
Power	External AC/DC provided; 12 VDC, 1.25A; unregulated; standard; UL Listed
Power Consumption	4.4 Watts
Operating Temperature	-40°C – 70°C (not including power supply)
Storage Temperature	-40°C – 85°C
Altitude	0 – 10,000 ft.
Operating Humidity	5% – 95% (non-condensing)
Shipping Weight	2 lbs. [0.90 kg]
Regulatory Compliance	EN55022 Class A, EN55024, CE mark
Warranty	Lifetime

Ordering Information

Complete list of fiber optic connector specifications [pg 117-123]

S4TEF1011-120
    1300nm multimode (ST)
    [2 km/1.2 mi.] Link Budget: 11.0 dB
to   (4) RJ-48 **[1.5 km/0.9 mi.]**

S4TEF1013-120
    1300nm multimode (SC)
    [2 km/1.2 mi.] Link Budget: 11.0 dB
to   (4) RJ-48 **[1.5 km/0.9 mi.]**

S4TEF1014-120
    1310nm single mode (SC)
    [20 km/12.4 mi.]
    Link Budget: 16.0 dB
to   (4) RJ-48 **[1.5 km/0.9 mi.]**

S4TEF1015-120
    1310nm single mode (SC)
    [40 km/24.9 mi.]
    Link Budget: 26.0 dB
to   (4) RJ-48 **[1.5 km/0.9 mi.]**

*****S4TEF1016-120**
    1310nm single mode (SC)
    [60 km/37.3 mi.]
    Link Budget: 29.0 dB
to   (4) RJ-48 **[1.5 km/0.9 mi.]**

*****S4TEF1017-120**
    1550nm single mode (SC)
    [80 km/49.7 mi.]
    Link Budget: 29.0 dB
to   (4) RJ-48 **[1.5 km/0.9 mi.]**

*****S4TEF1035-120**
    1550nm single mode (SC)
    [120 km/74.6 mi.]
    Link Budget: 36.0 dB
to   (4) RJ-48 **[1.5 km/0.9 mi.]**

******S4TEF1040-120**
    1 SFP port (Empty)
to   (4) RJ-48 **[1.5 km/0.9 mi.]**

******S4TEF1040-140**
    2 SFP ports (Empty)
to   (4) RJ-48 **[1.5 km/0.9 mi.]**

Single Fiber Products
Recommended use in pairs [pg 18]

*****S4TEF1029-120**
    1310nm TX/1550nm RX single fiber single mode (SC)
    [20 km/12.4 mi.] Link Budget: 19.0 dB
to   (4) RJ-48 **[1.5 km/0.9 mi.]**

*****S4TEF1029-121**
    1550nm TX/1310nm RX single fiber single mode (SC)
    [20 km/12.4 mi.] Link Budget: 19.0 dB
to   (4) RJ-48 **[1.5 km/0.9 mi.]**

*****S4TEF1029-122**
    1310nm TX/1550nm RX single fiber single mode (SC)
    [40 km/24.9 mi.] Link Budget: 25.0 dB
to   (4) RJ-48 **[1.5 km/0.9 mi.]**

*****S4TEF1029-123**
    1550nm TX/1310nm RX single fiber single mode (SC)
    [40km/24.9 mi.] Link Budget: 25.0 dB
to   (4) RJ-48 **[1.5 km/0.9 mi.]**

stand-alone device

S4TEF10xx-125

4x T1/E1/J1 + 10/100 Ethernet Transport Mux

▸ Low cost transport capability:
(4) T1/E1/J1; (1) Ethernet
▸ Target applications include: FTTx,
such as Fiber-to-the-Business,
Fiber-to-the-Building, Fiber-to-the-
MDU and Fiber-to-the-Home.

These products offer a low cost transport capability for four T1/E1/J1 and one Ethernet port. The offering will provide copper connections compatible with G.703, AMI/B8ZS/HDB3 and 10/100BASE-TX; while the optical connection will run at 155 Mbps. TDM traffic is not mapped to Ethernet. A hardware-based solution guarantees the constant bit rate of TDM transport without requiring traffic management. The product provides physical layer status monitoring, alarm classification and data classification functions for Telecom providers to manage their fiber optic network and reduce operation and maintenance costs. Target applications of the device include: FTTx, such as Fiber-to-the-Business, Fiber-to-the-Building, Fiber to-the-MDU and Fiber-to-the-Home.

Features

▸ Loopback via Test Set
▸ Auto-Negotiation for 10/100BASE-TX [pg 15]
▸ AutoCross™ (auto MDI/MDI-X) [pg 15]
▸ Transparent Link Pass Through for Ethernet [pg 16]
▸ Automatic Link Restoration [pg 17]
▸ Pause (Flow Control) [pg 16]
▸ Remote Management [pg 16]
▸ Local and Remote Loopback [pg 17]
▸ Remote Fiber Loss Signaling
▸ AIS/TAOS
▸ LEDs for each data port
▸ Settings for line code, line length, local loopback or remote loopback [pg 17]
▸ T1/E1/J1 mode settings
▸ Local (AUX) Management Interface
▸ Access to complete status information on local and remote device
▸ Field Upgradeable Firmware [pg 17]
▸ Extended Operating Temperature

Optional Accessories (sold separately)

Wide Input (24 - 60 VDC) Power Supplies

SPS-2460-SA [pg 67]
Stand-Alone Power Supply

Mounting Options

WMBD [pg 66]
DIN Rail Bracket 5.0" [127 mm]

WMBD-F [pg 66]
DIN Rail Bracket (flat) 3.3" [84 mm]

WMBL [pg 66]
Wall Mount Bracket 4.0" [102 mm]

WMBV [pg 66]
Vertical Wall Mount Bracket 5.0" [127 mm]

* Note: operating temperature -20°C to 30°C only on these models.

** SFP port uses standard 100BASE-x/oc-3 SFP

Application

PBX · PBX · PBX · Router · Ethernet Switch · Stand-Alone Device · Point System™ Chassis · PBX · PBX · PBX · Router · Ethernet Switch

Specifications

Complete list of fiber optic connector specifications [pg 117-123]

Standards	Ethernet interface: IEEE 802.3™-2008 TDM interfaces: ANSI T1.102, T1.403 and T1.408 ITU I.431, G.703,G.736, G.775 and G.823 ETSI 300-166, 300-233 and TBR 12/13 AT&T Pub 62411
Switches	Numerous switch settings for line coding, line buildout, loopback (per port), AIS setting
Ethernet port settings	Auto-Negotiation, Force speed/duplex and enable Transparent Link Pass Through
Dimensions	**Width**: 3.7" [94 mm] **Depth**: 4.7" [119 mm] **Height**: 1.8" [46 mm]
Power	External AC/DC provided; 12 VDC, 1.25A; unregulated; standard; UL listed
Power Consumption	4.4 Watts
Operating Temperature	-40°C – 70°C (not including power supply)
Storage Temperature	-40°C – 85°C
Altitude	0 – 10,000 ft.
Operating Humidity	5% – 95% (non-condensing)
Shipping Weight	2 lbs. [0.90 kg]
Regulatory Compliance	EN55022 Class A, EN55024, CE mark
Warranty	Lifetime

Devices must be used in pairs. Typically installation will include a chassis card [C4TEF, pg 64] installed in the Point System™ locally and a stand-alone device installed at the remote location.

Ordering Information

S4TEF1011-125
1300nm multimode (ST)
[2 km/1.2 mi.] Link Budget: 11.0 dB
to   (4) RJ-48 **[1.5 km/0.9 mi.]**
plus10/100BASE-TX (RJ-45) **[100 m]**

S4TEF1013-125
1300nm multimode (SC)
[2 km/1.2 mi.] Link Budget: 11.0 dB
to   (4) RJ-48 **[1.5 km/0.9 mi.]**
plus10/100BASE-TX (RJ-45) **[100 m]**

S4TEF1014-125
1310nm single mode (SC)
[20 km/12.4 mi.] Link Budget: 16.0 dB
to   (4) RJ-48 **[1.5 km/0.9 mi.]**
plus 10/100BASE-TX (RJ-45) **[100 m]**

S4TEF1015-125
1310nm single mode (SC)
[40 km/24.9 mi.] Link Budget: 26.0 dB
to   (4) RJ-48 **[1.5 km/0.9 mi.]**
plus 10/100BASE-TX (RJ-45) **[100 m]**

*S4TEF1016-125
1310nm single mode (SC)
[60 km/37.3 mi.] Link Budget: 29.0 dB
to   (4) RJ-48 **[1.5 km/0.9 mi.]**
plus 10/100BASE-TX (RJ-45) **[100 m]**

*S4TEF1017-125
1550nm single mode (SC)
[80 km/49.7 mi.] Link Budget: 29.0 dB
to   (4) RJ-48 **[1.5 km/0.9 mi.]**
plus 10/100BASE-TX (RJ-45) **[100 m]**

*S4TEF1035-125
1550nm single mode (SC)
[120 km/74.6 mi.] Link Budget: 36.0 dB
to   (4) RJ-48 **[1.5 km/0.9 mi.]**
plus 10/100BASE-TX (RJ-45) **[100 m]**

**S4TEF1040-125
1 SFP port (Empty)
to   (4) RJ-48 **[1.5 km/0.9 mi.]**
plus 10/100BASE-TX (RJ-45) **[100m]**

**S4TEF1040-145
2 SFP ports (Empty)
to   (4) RJ-48 **[1.5 km/0.9 mi.]**
plus 10/100BASE-TX (RJ-45) **[100m]**

Single Fiber Products [pg 18]

*S4TEF1029-125
1310nm TX/1550nm RX single fiber SM (SC) **[20 km/12.4 mi.] LB: 19.0 dB**
to   (4) RJ-48 **[1.5 km/0.9 mi.]**
plus 10/100BASE-TX (RJ-45) **[100 m]**

*S4TEF1029-126
1550nm TX/1310nm RX single fiber SM (SC) **[20 km/12.4 mi.] LB: 19.0 dB**
to   (4) RJ-48 **[1.5 km/0.9 mi.]**
plus 10/100BASE-TX (RJ-45) **[100 m]**

*S4TEF1029-127
1310nm TX/1550nm RX single fiber SM (SC) **[40 km/24.9 mi.] LB: 25.0 dB**
to   (4) RJ-48 **[1.5 km/0.9 mi.]**
plus 10/100BASE-TX (RJ-45) **[100 m]**

*S4TEF1029-128
1550nm TX/1310nm RX single fiber SM (SC) **[40 km/24.9 mi.] LB: 25.0 dB**
to   (4) RJ-48 **[1.5 km/0.9 mi.]**
plus 10/100BASE-TX (RJ-45) **[100 m]**

DbManager

DbManager Options

Graphical User Interface (GUI)

DbManager is a Windows, Graphical User Interface (GUI) providing full management of all PacketBand, MediaBand and Liberator products in the network. DbManager offers a 4 layer directory type structure network map window, 2 event windows (one historic and one current), and a terminal window showing communications between Manager and devices.

DbManager can be provided to support up to 15 user seats, with each seat having full visibility of the network map and connection to devices. Options exist on DbManager for North-Bound SNMP support. The SNMP support adds a proxy agent to the DbManager whereby Alarms & Events received by DbManager from the devices are transmitted out of the NB SNMP interface as Trap/Alarm messages. All Even/Alarms are also stored locally on the DbManager PC hard drive.

DbLite is designed to provide configuration/management on a local basis. DbLite allows connection to only a single device (via serial or Ethernet) and is included with each PacketBand, MediaBand and Liberator product.

*Other versions of DbManager are also available to support 10 and 15 concurrent work stations. Please ask for details.

Ordering Information

DBM-NS-1-2
Single work-station DbManager with visibility/connectivity to 2 units. No SNMP Traps & Alarms

DBM-NS-1-4
Single work-station DbManager with visibility/connectivity to 4 units. No SNMP Traps & Alarms

DBM-NS-1-10
Single work-station DbManager with visibility/connectivity to 10 units. No SNMP Traps & Alarms

DBM-NS-1-25
Single work-station DbManager with visibility/connectivity to 25 units. No SNMP Traps & Alarms

DBM-NS-1-50
Single work-station DbManager with visibility/connectivity to 50 units. No SNMP Traps & Alarms

DBM-NS-1-100
Single work-station DbManager with visibility/connectivity to 100 units. No SNMP Traps & Alarms

DBM-NS-1-ULTD
Single work-station DbManager with visibility/connectivity unlimited number of units. No SNMP Traps & Alarms

DBM-1-2
Single work-station DbManager with visibility/connectivity to 2 units. With SNMP Traps & Alarms

DBM-1-4
Single work-station DbManager with visibility/connectivity to 4 units. With SNMP Traps & Alarms

DBM-1-10
Single work-station DbManager with visibility/connectivity to 10 units. With SNMP Traps & Alarms

DBM-1-25
Single work-station DbManager with visibility/connectivity to 25 units. With SNMP Traps & Alarms

DBM-1-50
Single work-station DbManager with visibility/connectivity to 50 units. With SNMP Traps & Alarms

DBM-1-100
Single work-station DbManager with visibility/connectivity to 100 units. With SNMP Traps & Alarms

DBM-1-ULTD
Single work-station DbManager with visibility/connectivity unlimited number of units. With SNMP Traps & Alarms

DBM-4-25
4 work-station DbManager with visibility/connectivity to 25 units. With SNMP Traps & Alarms

DBM-4-50
4 work-station DbManager with visibility/connectivity to 50 units. With SNMP Traps & Alarms

DBM-4-100
4 work-station DbManager with visibility/connectivity to 100 units. With SNMP Traps & Alarms

DBM-4-ULTD
4 work-station DbManager with visibility/connectivity to unlimited number of units. With SNMP Traps & Alarms

NEW PRODUCT

DbManager

DbManager Comparison Chart

Feature	DBmanager Lite	DB Manager Full
Network-wide visibility – all nodes/devices and status	✗	✓
Visibility of all links and their status	✗	✓
Optional support for multiple work-stations	✗	✓
Single node/device visibility/status	✓	✓
Connect via COM port (auto-speed)	✓	✓
Connect via IP	✓	✓
Connect via ISDN management (specific products)	✓	✓
Configure multiple device IP addresses	✓	✓
Starter/Expert configuration modes	✓	✓
Remote device software update	✓	✓
"Find Node" option	✓	✓
"Find Link" option	✓	✓
View captured trace files	✓	✓
Audible alarm settings	✓	✓
Configure passwords for devices	✓	✓
All Alarms/Events written to hard drive in real-time "CSV" format	✓	✓
Simultaneous software updates to multiple devices	✗	✓
Automatic polling to check unit status	✗	✓
IP and DTE interface loops (PacketBand product range)	✓	✓
Alarms on jitter buffer and packet loss	✗	✓
Secure Management options	✗	✓
4 Level operator password access	✗	✓
Device events displayed in node/link colors	✗	✓
Find Node option in Event List	✗	✓
Index column in Event List	✗	✓
DTE and LL software loops (DataBand product range)	✗	✓
ISDN Call Status display	✗	✓
Sort Events by field type	✗	✓
PC System Time displayed with Events	✗	✓
Add operator comments (with time stamp) to Events	✗	✓
Secure global deletion of system Events	✗	✓
SNMP Traps and Alarms option	✗	✓
Map window displaying customer name	✗	✓
DbManager Demo modes	✓	✓
Included Free with product	✓	✗

< 80 >

Call us at 800.526.9267 or 952.941.7600

NEW PRODUCT

packetband-tdm

PacketBand-TDM-1 & -1MC
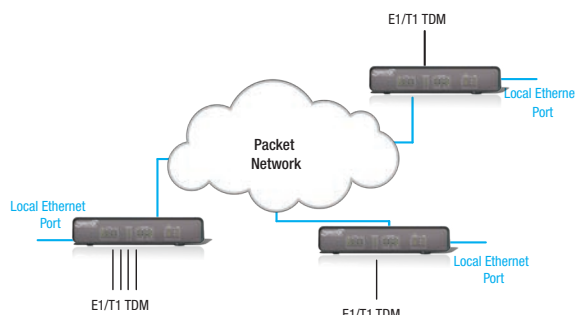
The PacketBand-TDM-1 (TDM-1) supplies a clock-locked clear channel or structured E1 or T1 circuit over Ethernet, IP, or MPLS networks. It supports a single E1/T1 and can be used in pairs or with other members of the PacketBand range.

E1/T1 TDM

Local Ethernet Port

Packet Network

Local Ethernet Port

Local Ethernet Port

E1/T1 TDM

E1/T1 TDM

Features

▸ Multi-standard TDM pseudowire support: CESoPSN, SATOP, TDM over IP

▸ Highly accurate and stable clock recovery

▸ G.823 Synchronization levels

▸ Various clocking options for different network types and clock recovery requirements

▸ Out-of-band clocking method via Multicast services (PacketBand-TDM-1MC)

▸ "Inter-works" with other PacketBand family members

▸ 1 E1/T1 interface

▸ (2) 10/100/1000Mbps RJ45 interfaces

▸ (1) 100/1000Mbps SFP interface

▸ Support for Jumbo Packets up to 10,240 bytes on Ethernet ports

▸ TDM packets can be assigned IP Diffserv (DSCP) or ToS and 802.1p CoS values

▸ Supports full 802.1q tagging and associated 802.1p CoS prioritization levels

▸ All egress packets, including TDM links, can be prioritized across four output queues

▸ 802.1Q VLAN including Q-in-Q

▸ Link Aggregation Control Protocol (LACP)

▸ Rapid Spanning Tree Protocol (RSTP)

▸ Rate limiting

▸ Remote management with DbManager
   + Configuration changes
   + Alarms & Events
   + Graphs
   + Loopbacks and pings
   + "Sniffer" / monitor port
   + Software / Firmware updates

Specifications

Clock Recovery	Capable of exceeding G.823 Synchronous Interface requirements (subject to network performance)
TDM port (E1)	RJ45 connector Presents as DCE (crossed cable for DTE) 120 Ohm 75 Ohm user-selectable via converter cable G.703 unstructured G.704 channelized ITU G.706 Selectable CRC4/non-CRC4 HDB3 Transparent to user signaling
TDM port (T1)	RJ45 connector Presents as DCE (crossed cable for DTE) 100 Ohm Unframed 1.544Mbps Framed 1.536Mbps (robbed-bit) ESF or D4 selectable B8ZS or AMI selectable Transparent to user signaling
Ethernet Interfaces	2 x RJ45 UTP 10/100/1GE Auto-sensing or manual SFP cage (module not supplied) for various fiber modes
Local Management Port	RJ12 Asynchronous Auto-sensing to 115kbps
Oscillator Performance	Hold-over 24hrs 4ppb Aging per day 0.5ppb Temperature Stability 14ppb
IP & MAC Address	Single MAC address, IP address, subnet mask and default gateway, Support for DHCP
Configuration	Held in non-volatile memory
Power (AC)	Internal via IEC connector Auto-sensing 96VAC-240VAC Max consumption 0.2Amps RMS @230VAC MTBF 400,000hrs
Power (DC)	1. Nominal -48VDC, 4mm terminal block, -33VDC to -75VDC, 0.35A max, MTBF 1,790,000hrs 2. Nominal -24VDC, 4mm terminal block, -18VDC to -75VDC, 0.55A max, MTBF 800,000hrs
Dimensions	**Width:** 8.86" [225 mm] **Depth:** 7.87" [200 mm] **Height:** 1.73" [44 mm]
Environment	Operating Temperature -20°C to +55°C Humidity 10-90% non-condensing
Safety	EC EN60950-1:2002 ACA TS001:1997 ACS/NZ60950:2000 AS/NZS3260:1993 IEC950
Warranty	1 year hardware & software

Ordering Information

PB-TDM-1-AC
Single T1/E1 CESoPSN unit. (2xUTP) 10/100/GE ports and (1xSFP) port for WAN with Asymmetrical and Plesiochronous clocking. Includes Enhanced Clock, 32 logical links, serial control cable and DbManager Lite. AC Power.

PB-TDM-1-24VDC
Single T1/E1 CESoPSN unit. (2xUTP) 10/100/GE ports and (1xSFP) port for WAN with Asymmetrical and Plesiochronous clocking. Includes Enhanced Clock, 32 logical links, serial control cable and DbManager Lite. 24 VDC Power.

PB-TDM-1-48VDC
Single T1/E1 CESoPSN unit. (2xUTP) 10/100/GE ports and (1xSFP) port for WAN with Asymmetrical and Plesiochronous clocking. Includes Enhanced Clock, 32 logical links, serial control cable and DbManager Lite. 48 VDC Power.

PB-TDM-1MC-AC
Single T1/E1 CESoPSN unit. (2xUTP) 10/100/GE ports and (1xSFP) port for WAN with Asymmetrical and Plesiochronous clocking. Includes multicast option. Also includes Enhanced Clock, 32 logical links, serial control cable and DbManager Lite. AC Power.

PB-TDM-1MC-24VDC
Single T1/E1 CESoPSN unit. (2xUTP) 10/100/GE ports and (1xSFP) port for WAN with Asymmetrical and Plesiochronous clocking. Includes multicast option. Also includes Enhanced Clock, 32 logical links, serial control cable and DbManager Lite. 24 VDC Power.

PB-TDM-1MC-48VDC
Single T1/E1 CESoPSN unit. (2xUTP) 10/100/GE ports and (1xSFP) port for WAN with Asymmetrical and Plesiochronous clocking. Includes multicast option. Also includes Enhanced Clock, 32 logical links, serial control cable and DbManager Lite. 48 VDC Power.

Optional Accessories (sold separately)

PB/cont
Replacement serial controller cable

PB/cpack/1P
Cable Pack for single E1/T1 PacketBand. 2m

PB/Xcpack/1P
Crossed-cable pack for single E1/T1 PacketBand if connecting to DCE. 2m

PB/cpack/75BNC/01
120 Ohm RJ45 to 75 Ohm dual BNC conversion cable 20cm

PB/RMK/3/D
19" rack kit for 2 units side by side

PB/RMK/3/S
19" rack kit for single unit (Excludes chassis based systems and extended temperature model)
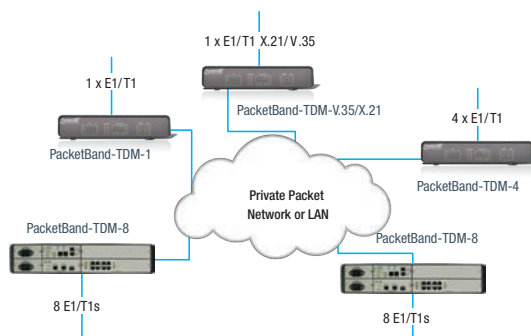
PB/RMK/W/1
Wall mount kit

NEW PRODUCT

packetband-tdm

PacketBand-TDM-4 & -3MC

The PacketBand-TDM-4 (TDM-4) supplies clock-locked clear channel or structured E1/T1 circuits over Ethernet, IP, or MPLS networks. It supports up to four E1/T1s and can be used in pairs or with other members of the PacketBand range.

Features

▶ Multi-standard TDM pseudowire support: CESoPSN, SATOP, TDM over IP

▶ Highly accurate and stable clock recovery

▶ G.823 Synchronization levels

▶ Various clocking options for different network types and clock recovery requirements

▶ "Inter-works" with other PacketBand family members

▶ Up to 4 E1/T1 interfaces

▶ (2) 10/100/1000Mbps RJ45 interfaces

▶ (1) 100/1000Mbps SFP interface

▶ Support for Jumbo Packets up to 10,240 bytes on Ethernet ports

▶ TDM packets can be assigned IP Diffserv (DSCP) or ToS and 802.1p CoS values

▶ Supports full 802.1q tagging and associated 802.1p CoS prioritization levels

▶ All egress packets, including TDM links, can be prioritized across four output queues

▶ 802.1Q VLAN including Q-in-Q

▶ Link Aggregation Control Protocol (LACP)

▶ Rapid Spanning Tree Protocol (RSTP)

▶ Rate limiting

▶ Remote management with DbManager

+ Configuration changes

+ Alarms & Events

+ Graphs

+ Loopbacks and pings

+ "Sniffer" / monitor port

+ Software / Firmware updates

Specifications

Clock Recovery	Capable of exceeding G.823 Synchronous Interface requirements (subject to network performance)
TDM port (E1)	4 ports User switchable E1/T1 RJ45 connector Presents as DCE (crossed cable for DTE) 120 Ohm 75 Ohm user-selectable via converter cable G.703 unstructured G.704 channelized ITU G.706 Selectable CRC4/non-CRC4 HDB3 Transparent to user signaling
TDM port (T1)	4 ports User switchable T1/E1 RJ45 connector Presents as DCE (crossed cable for DTE) 100 Ohm Unframed 1.544Mbps Framed 1.536Mbps (robbed-bit) ESF or D4 selectable B8ZS or AMI selectable Transparent to user signaling
Ethernet Interfaces	2 x RJ45 UTP 10/100/1GE Auto-sensing or manual SFP cage (module not supplied) for various fibre modes
Local Management Port	RJ12 Asynchronous Auto-sensing to 115kbps Also remote access via packet network Dry contact alarm relay pins 4, 5, 6
Oscillator Performance	Hold-over 24hrs 4ppb Aging per day 0.5ppb Temperature Stability 14ppb
IP & MAC Address	Single MAC address, IP address, subnet mask and default gateway, Support for DHCP
Configuration	Held in non-volatile memory
Power (AC)	Internal via IEC connector Auto-sensing 96VAC-240VAC Max consumption 0.2Amps RMS @230VAC MTBF 400,000hrs
Power (DC)	1. Nominal -48VDC, 4mm terminal block, -33VDC to -75VDC, 0.35A max, MTBF 1,790,000hrs 2. Nominal -24VDC, 4mm terminal block, -18VDC to -75VDC, 0.55A max, MTBF 800,000hrs
Dimensions	**Width:** 8.86" [225 mm] **Depth:** 7.87" [200 mm] **Height:** 1.73" [44 mm]
Environment	Operating Temperature -20°C to +55°C Humidity 10-90% non-condensing
Safety	EC EN60950-1:2002 ACA TS001:1997 ACS/NZ60950:2000 AS/NZS3260:1993 IEC950
Warranty	1 year hardware & software

Ordering Information

PB-TDM-4-AC
Quad T1/E1 CESoPSN unit. (2xUTP) 10/100/ GE ports and (1xSFP) port for WAN with Asymmetrical and Plesiochronous clocking. Includes LACP, RSTP, Enhanced Clock, 64 logical links, serial control cable and DbManager Lite. AC Power.

PB-TDM-4-24VDC
Quad T1/E1 CESoPSN unit. (2xUTP) 10/100/ GE ports and (1xSFP) port for WAN with Asymmetrical and Plesiochronous clocking. Includes LACP, RSTP, Enhanced Clock, 64 logical links, serial control cable and DbManager Lite. 24 VDC Power.

PB-TDM-4-48VDC
Quad T1/E1 CESoPSN unit. (2xUTP) 10/100/ GE ports and (1xSFP) port for WAN with Asymmetrical and Plesiochronous clocking. Includes LACP, RSTP, Enhanced Clock, 64 logical links, serial control cable and DbManager Lite. 48 VDC Power.

PB-TDM-3MC-AC
Quad T1/E1 CESoPSN unit. (2xUTP) 10/100/ GE ports and (1xSFP) port for WAN with Asymmetrical and Plesiochronous clocking. Includes multicast option. Also includes LACP, RSTP, Enhanced Clock, 64 logical links, serial control cable and DbManager Lite. AC Power.

PB-TDM-3MC-24VDC
Quad T1/E1 CESoPSN unit. (2xUTP) 10/100/ GE ports and (1xSFP) port for WAN with Asymmetrical and Plesiochronous clocking. Includes multicast option. Also includes LACP, RSTP, Enhanced Clock, 64 logical links, serial control cable and DbManager Lite. 24 VDC Power.

PB-TDM-3MC-48VDC
Quad T1/E1 CESoPSN unit. (2xUTP) 10/100/ GE ports and (1xSFP) port for WAN with Asymmetrical and Plesiochronous clocking. Includes multicast option. Also includes LACP, RSTP, Enhanced Clock, 64 logical links, serial control cable and DbManager Lite. 48 VDC Power.

Optional Accessories (sold separately)

PB/cont
Replacement serial controller cable

PB/cpack/2P
Cable Pack for 2-port E1/T1 PacketBand. 2m

PB/cpack/4P
Cable Pack for 4-port E1/T1 PacketBand. 2m

PB/Xcpack/2P
Crossed-cable pack for 2-port E1/T1 PacketBand if connecting to DCE. 2m

PB/Xcpack/4P
Crossed-cable pack for 4-port e1/T1 PacketBand if connecting to DCE. 2m

PB/cpack/75BNC/01
120 Ohm RJ45 to 75 Ohm dual BNC conversion cable 20cm

PB/RMK/W/1
Wall mount kit

PB-ET/RMK/01
19" rack kit

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Call us at 800.526.9267 or 952.941.7600

packetband-tdm

PacketBand-TDM-4 & -3MC

Extended Temperature

The PacketBand-TDM-4 (TDM-4) supplies clock-locked clear channel or structured E1/T1 circuits over Ethernet, IP, or MPLS networks. It supports up to four E1/T1s and can be used in pairs or with other members of the PacketBand range.

Features

▶ Extended Operating Temperature

▶ Multi-standard TDM pseudowire support: CESoPSN, SATOP, TDM over IP

▶ Highly accurate and stable clock recovery

▶ G.823 Synchronization levels

▶ Various clocking options for different network types and clock recovery requirements

▶ "Inter-works" with other PacketBand family members

▶ Up to 4 E1/T1 interfaces

▶ (2) 10/100/1000Mbps RJ45 interfaces

▶ (1) 100/1000Mbps SFP interface

▶ Support for Jumbo Packets up to 10,240 bytes on Ethernet ports

▶ TDM packets can be assigned IP Diffserv (DSCP) or ToS and 802.1p CoS values

▶ Supports full 802.1q tagging and associated 802.1p CoS prioritization levels

▶ All egress packets, including TDM links, can be prioritized across four output queues

▶ 802.1Q VLAN including Q-in-Q

▶ Link Aggregation Control Protocol (LACP)

▶ Rapid Spanning Tree Protocol (RSTP)

▶ Rate limiting

▶ Remote management with DbManager

+ Configuration changes

+ Alarms & Events

+ Graphs

+ Loopbacks and pings

+ "Sniffer" / monitor port

+ Software / Firmware updates

Specifications

Clock Recovery	Capable of exceeding G.823 Synchronous Interface requirements (subject to network performance)
TDM port (E1)	4 ports User switchable E1/T1 RJ45 connector Presents as DCE (crossed cable for DTE) 120 Ohm 75 Ohm user-selectable via converter cable G.703 unstructured G.704 channelized ITU G.706 Selectable CRC4/non-CRC4 HDB3 Transparent to user signaling
TDM port (T1)	4 ports User switchable T1/E1 RJ45 connector Presents as DCE (crossed cable for DTE) 100 Ohm Unframed 1.544Mbps Framed 1.536Mbps (robbed-bit) ESF or D4 selectable B8ZS or AMI selectable Transparent to user signaling
Ethernet Interfaces	2 x RJ45 UTP 10/100/1GE Auto-sensing or manual SFP cage (module not supplied) for various fibre modes 1 network and 1 or 2 user ports (2nd port using SFP)
Local Management Port	RJ12 Asynchronous Auto-sensing to 115kbps Also remote access via packet network Dry contact alarm relay pins 4, 5, 6
Oscillator Performance	Hold-over 24hrs 4ppb Aging per day 0.5ppb Temperature Stability 14ppb
IP & MAC Address	Single MAC address, IP address, subnet mask and default gateway, Support for DHCP
Configuration	Held in non-volatile memory
Power (AC)	Internal via IEC connector Auto-sensing 96VAC-240VAC Max consumption 0.2Amps RMS @230VAC MTBF 400,000hrs
Power (DC)	1. Nominal -48VDC, 4mm terminal block, -33VDC to -75VDC, 0.35A max, MTBF 1,790,000hrs 2. Nominal -24VDC, 4mm terminal block, -18VDC to -75VDC, 0.55A max, MTBF 800,000hrs
Dimensions	**Width:** 11.5" [292 mm] **Depth:** 7.87" [200 mm] **Height:** 1.73" [44 mm]
Environment	Operating Temperature -20°C to +65°C Humidity 10-90% non-condensing
Safety	EC EN60950-1:2002 ACA TS001:1997 ACS/NZ60950:2000 AS/NZS3260:1993 IEC950
Warranty	1 year hardware & software

NEW PRODUCT

packetband-tdm

PacketBand-TDM-8

1 x E1/T1 X.21/ V.35

1 x E1/T1

PacketBand-TDM-V.35/X.21

4 x E1/T1

PacketBand-TDM-1

PacketBand-TDM-4

Private Packet Network or LAN

PacketBand-TDM-8

PacketBand-TDM-8

8 E1/T1s

8 E1/T1s

A single PacketBand-TDM-8 chassis can support up to 8 E1/T1 circuits in G.704 or G.703 mode. These circuits can be connected to other chassis and/or to stand-alone smaller PacketBands such as the various single and 4 port units.

Features

▸ Multi-standard TDM pseudowire support: CESoPSN, SATOP, TDM over IP

▸ 2U chassis supporting up to 8 E1/T1 circuits

▸ G.704 grooming

▸ External clock sources

▸ Highly accurate and stable clock recovery

▸ G.823 Synchronization levels

▸ Various clocking options for different network types and clock recovery requirements

▸ "Inter-works" with other PacketBand family members

▸ Options for dual load-sharing, hot swappable AC/DC power supplies

▸ All interfaces on front of chassis for easy access

▸ Support for Jumbo Packets up to 10,240 bytes on Ethernet ports

▸ TDM packets can be assigned IP Diffserv (DSCP) or ToS and 802.1p CoS values

▸ Supports full 802.1q tagging and associated 802.1p CoS prioritization levels

▸ All egress packets, including TDM links, can be prioritized across four output queues

▸ 802.1Q VLAN including Q-in-Q

▸ Link Aggregation Control Protocol (LACP)

▸ Rapid Spanning Tree Protocol (RSTP)

▸ Rate limiting

▸ Remote management with DbManager
   + Configuration changes
   + Alarms & Events
   + Graphs
   + Loopbacks and pings
   + "Sniffer" / monitor port
   + Software / Firmware updates

Specifications

Clock Recovery	Capable of exceeding G.823 Synchronous Interface requirements (subject to network performance)
TDM Card	8 x RJ45 connectors Presents as DCE (crossed cable for DTE) 1 x LED with various states per interface Support for E1 and T1 on a per-port basis.
E1	120 Ohm 75 Ohm unbalanced via converter cable G.703 unstructured G.704 channelized ITU G.706 Selectable CRC/CRC4 HDB3 encoded Transparent to user signaling
T1	100 Ohm Unframed 1.544Mbps Framed 1.536Mbps (robbed-bit) ESF or D4 selectable B8ZS or AMI selectable Transparent to user signaling
Ethernet Card	Standard card 2 x standard SFP cage SFP "enabled" warning LED Default to 1GE 2 x RJ45 UTP ports 10/100/1GE Auto-sensing
Oscillator Performance	Hold-over 24hrs 4ppb Aging per day 0.5ppb Temperature Stability 14ppb
IP & MAC Address	Single MAC address, IP address, subnet mask and default gateway, Support for DHCP
Power Supplies	TDM-8 supports 1 or 2 supplies these are hot swapable to ATCA. 1 Supply can power a fully populated chasis.
AC	Auto-sensing 96VAC – 240VAC Max consumption 0.5A RMS @230VAC
DC	4mm terminal Block 36VDC tp 57VDC 1.2A max
Configuration	Held in non-volitile memory
Realtime Clock	For time-stamping Events and Alarms
Dimensions	**Width:** 17.25" [438 mm] **Depth:** 12.6" [320 mm] **Height:** 3.46" [88 mm]
Environment	Operating Temperature -20°C to +55°C Humidity 10-90% non-condensing
Safety	EC EN60950-1:2002 ACA TS001:1997 ACS/NZ60950:2000 AS/NZ3260:1993 IEC950
Warranty	1 year hardware & software

Ordering Information

PB-TDM-8-AC
8 port T1/E1 CESoPSN 2RU chassis. (2xUTP) 10/100/GE ports and (2 xSFP) ports for WAN. Includes LACP, RSTP, Enhanced Clock, 128 logical links, serial control cable, Terminal Card with external clock receive ports, DbManager Lite and 19" rack mount ears. Single AC Power Supply. Optional redundant power supply available seperately.

PB-TDM-8-DC
8 port T1/E1 CESoPSN 2RU chassis. (2xUTP) 10/100/GE ports and (2 xSFP) ports for WAN. Includes LACP, RSTP, Enhanced Clock, 128 logical links, serial control cable, Terminal Card with external clock receive ports, DbManager Lite and 19" rack mount ears. Single DC Power Supply. Optional redundant power supply available seperately.

Optional Accessories (sold separately)

PB/cont
Replacement serial controller cable

PB/cpack/8P
Cable Pack for 8 E1/T1 RJ45 2m.

PB/Xcpack/8P
Cable Pack for 8 E1/T1 RJ45 cross for DCE presentaiton 2m.

PB/cpack/75BNC/01
120 Ohm RJ45 to 75 Ohm dual BNC conversion cable 20cm

PB-MB-PSU-AC
Additional AC Power Supply for 2 RU PacketBand or MediaBand Chassis

PB-MB-PSU-DC
Additional DC Power Supply for 2 RU PacketBand or MediaBand Chassis

*Please Note:
The Packetband-TDM-8 is not expandable beyond 8 T4/E1 circuits.

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Call us at 800.526.9267 or 952.941.7600

packetband-tdm

PacketBand-TDM-16/32

A single PacketBand-TDM-16/32 chassis can support up to 32 E1/T1 circuits in G.704 or G.703 mode, up to 32 V.35/X.21 ports or 16 E1/T1 and 16 V.35/X.21. These circuits can be connected to other chassis and/or to stand-alone smaller.

Features

▸ Multi-standard TDM pseudowire support: CESoPSN, SATOP, TDM over IP

▸ 2U chassis supporting 16 or 32 E1/T1 circuits

▸ Clear- channel and channelized

▸ G.704 grooming

▸ External clock sources

▸ Highly accurate and stable clock recovery

▸ G.823 Synchronization levels

▸ Various clocking options for different network types and clock recovery requirements

▸ "Inter-works" with other PacketBand family members

▸ Options for dual load-sharing, hot swappable AC/DC power supplies

▸ All interfaces on front of chassis for easy access

▸ Support for Jumbo Packets up to 10,240 bytes on Ethernet ports

▸ TDM packets can be assigned IP Diffserv (DSCP) or ToS and 802.1p CoS values

▸ Supports full 802.1q tagging and associated 802.1p CoS prioritization levels

▸ All egress packets, including TDM links, can be prioritized across four output queues

▸ 802.1Q VLAN including Q-in-Q

▸ Link Aggregation Control Protocol (LACP)

▸ Rapid Spanning Tree Protocol (RSTP)

▸ Rate limiting

▸ Remote management with DbManager

   + Configuration changes

   + Alarms & Events

   + Graphs

   + Loopbacks and pings

   + "Sniffer" / monitor port

   + Software / Firmware updates

Specifications

Clock Recovery	Capable of exceeding G.823 Synchronous Interface requirements (subject to network performance)
E1/T1 Card	16 x RJ45 connectors Presents as DCE (crossed cable for DTE) 1 x LED with various states per interface Support for E1 and T1 on a per-port basis.
E1	120 Ohm 75 Ohm unbalanced via converter cable G.703 unstructured G.704 channelized ITU G.706 Selectable CRC/CRC4 HDB3 encoded Transparent to user signalling
T1	100 Ohm Unframed 1.544Mbps Framed 1.536Mbps (robbed-bit) ESF or D4 selectable B8ZS or AMI selectable Transparent to user signalling
V.35/X.21 Card	16 x HDMI sockets Various cable adaptors available Specify V.35 or X.21 in blocks of 4 ports Specify above blocks as DCE (gives clock) or DTE (receives clock)
V.35	Tx, Rx, TxClock, RxClock, ExternalClock, RTS, CTS, DSR, DCD, DTR Cable available as "flying lead", MRAC or RS530 25-way "D".
X.21	Tx, Rx, S (clock), C, I Cable available as "flying lead" or 15-way "D".
Ethernet Card	Standard card 2 x standard SFP cage SFP "enabled" warning LED Default to 1GE 2 x RJ45 UTP ports 10/100/1GE Auto-sensing
Terminal Card	1 x RJ12 asynchronous control port. 1 x RJ12 alarm port. 2 x RJ45 external clock inputs – 2Mbit square wave or HDB3 2 x BNC external clock inputs – 10MH
Oscillator Performance	Hold-over 24hrs 4ppb Aging per day 0.5ppb Temperature Stability 14ppb
Power Supplies	TDM-16/32 supports 1 or 2 supplies these are hot swappable to ATCA. 1 Supply can power a fully populated chassis.
AC	Auto-sensing 96VAC – 240VAC Max consumption 0.2A RMS @230VAC
DC	4mm terminal Block 36VDC tp 57VDC 1.2A max
Configuration	Held in non-volitile memory
Realtime Clock	For time-stamping Events and Alarms
Dimensions	**Width:** 17.25" [438 mm] **Depth:** 12.6" [320 mm] **Height:** 3.46" [88 mm]
Environment	Operating Temperature -20°C to +50°C Humidity 10-90% non-condensing
Safety	EC EN60950-1:2002 ACA TS001:1997 ACS/NZ60950:2000 AS/NZ3260:1993 IEC950
Warranty	1 year hardware & software

Ordering Information

PB-TDM-16-AC
16 port T1/E1 CESoPSN 2RU chassis. (2xUTP) 10/100/GE ports and (2 xSFP) ports for WAN. Includes LACP, RSTP, Enhanced Clock, 128 logical links, serial control cable, Terminal Card with external clock receive ports, DbManager Lite and 19" rack mount ears. Single AC Power Supply. Optional redundant power supply available separately.

PB-TDM-16-DC
16 port T1/E1 CESoPSN 2RU chassis. (2xUTP) 10/100/GE ports and (2 xSFP) ports for WAN. Includes LACP, RSTP, Enhanced Clock, 128 logical links, serial control cable, Terminal Card with external clock receive ports, DbManager Lite and 19" rack mount ears. Single DC Power Supply. Optional redundant power supply available separately.

PB-TDM-32-AC
32 port T1/E1 CESoPSN 2RU chassis. (2xUTP) 10/100/GE ports and (2 xSFP) ports for WAN. Includes LACP, RSTP, Enhanced Clock, 128 logical links, serial control cable, Terminal Card with external clock receive ports, DbManager Lite and 19" rack mount ears. Single AC Power Supply. Optional redundant power supply available separately.

PB-TDM-32-DC
32 port T1/E1 CESoPSN 2RU chassis. (2xUTP) 10/100/GE ports and (2 xSFP) ports for WAN. Includes LACP, RSTP, Enhanced Clock, 128 logical links, serial control cable, Terminal Card with external clock receive ports, DbManager Lite and 19" rack mount ears. Single AC Power Supply. Optional redundant power supply available separately.

Optional Accessories (sold separately)

PB/cont
Replacement serial controller cable

PB/cpack/4P
Cable Pack for 4-port E1/T1 PacketBand. 2m

PB/cpack/8P
Cable Pack for 8 E1/T1 RJ45 2m.

PB/Xcpack/8P
Cable Pack for 8 E1/T1 RJ45 cross for DCE presentation 2m.

PB/cpack/75BNC/01
120 Ohm RJ45 to 75 Ohm dual BNC conversion cable 20cm

PB-MB-PSU-AC
Additional AC Power Supply for 2 RU PacketBand or MediaBand Chassis

PB-MB-PSU-DC
Additional DC Power Supply for 2 RU PacketBand or MediaBand Chassis

NEW PRODUCT

packetband-tdm

PacketBand-V.35/X.21

The PacketBand-VX provides reliable, transparent and manageable end-to-end X.21 and V.35 connectivity across packet networks. It can connect to local devices and/or leased lines and is able to provide, take and recover clocks.

Circuits can be established 24/7 or in response to requests from the attached equipment via control signals so the circuit is established periodically and on demand.

PacketBand also supports Multicast for simplex broadcast applications.

Features

▸ Deliver clock-locked X.21 and V.35 circuits over Ethernet, IP or MPLS networks

▸ Highly accurate and stable clock recovery

▸ G.823 Synchronization levels

▸ Various clocking options for different network types and clock recovery requirements

▸ (2) 10/100/1000Mbps RJ45 interfaces

▸ (1) 100/1000Mbps SFP interface

▸ X.21 or V.35 interface

▸ Support for Jumbo Packets up to 10,240 bytes on Ethernet ports

▸ TDM packets can be assigned IP Diffserv (DSCP) or ToS and 802.1p CoS values

▸ Supports full 802.1q tagging and associated 802.1p CoS prioritization levels

▸ All egress packets, including TDM links, can be prioritized across four output queues

▸ 802.1Q VLAN including Q-in-Q

▸ Link Aggregation Control Protocol (LACP)

▸ Rapid Spanning Tree Protocol (RSTP)

▸ Rate limiting

▸ Remote management with DbManager

　+ Configuration changes

　+ Alarms & Events

　+ Graphs

　+ Loopbacks and pings

　+ "Sniffer" / monitor port

　+ Software / Firmware updates

Specifications

Clock Recovery	Capable of exceeding G.823 Synchronous Interface requirements (subject to network performance)
TDM port V.35	"M-Rack" 37 pin female DCE "M-Rack" 37-pin male DTE Speeds from 64kbps to 2.048Mbps
TDM port X.21	RS530 25-way "D" connector Speeds from 64kbps to 2.048Mbps g
Ethernet Interfaces	2 x RJ45 UTP 10/100/1GE Auto-sensing or manual SFP cage (module not supplied) for various fiber modes 1 network and 1 or 2 user ports
Local Management Port	RJ12 Asynchronous Auto-sensing to 115kbps Also remote access via packet network
Oscillator Performance	Hold-over 24hrs 4ppb Aging per day 0.5ppb Temperature Stability 14ppb
IP & MAC Address	Single MAC address, IP address, subnet mask and default gateway, Support for DHCP
Configuration	Held in non-volatile memory
Power (AC)	Internal via IEC connector Auto-sensing 96VAC-240VAC Max consumption 0.2Amps RMS @230VAC MTBF 400,000hrs
Power (DC)	1. Nominal -48VDC 4mm terminal block -33VDC to -75VDC 0.35A max MTBF 1,790,000hrs 2. Nominal -24VDC 4mm terminal block -18VDC to -75VDC 0.55A max MTBF 800,000hrs
Dimensions	**Width:** 8.86" [225 mm] **Depth:** 7.86" [200 mm] **Height:** 1.73" [44 mm]
Environment	Operating Temperature -20°C to +55°C Humidity 10-90% non-condensing
Safety	EC EN60950-1:2002 ACA TS001:1997 ACS/NZ60950:2000 AS/NZS3260:1993 IEC950
Warranty	1 year hardware & software

Ordering Information

PB-TDM-V35-DCE-AC
　Single V.35 port MRAC type 34-way female DCE, (2 UTP) 10/100/GE ports and (1xSFP) port for WAN. Includes LACP, RSTP, Enhanced Clock, serial control cable and DbManager Lite. AC power.

PB-TDM-V35-DTE-AC
　Single V.35 port MRAC type 34-way female DTE, (2 UTP) 10/100/GE ports and (1xSFP) port for WAN. Includes LACP, RSTP, Enhanced Clock, serial control cable and DbManager Lite. AC power.

PB-TDM-X21-DCE-AC
　Single X.21 port RS530 25 way female DCE, (2 UTP) 10/100/GE ports and (1xSFP) port for WAN. Includes LACP, RSTP, Enhanced Clock, serial control cable and DbManaber Lite.
　AC Power.

PB-TDM-X21-DTE-AC
　Single X.21 port RS530 25 way female DTE, (2 UTP) 10/100/GE ports and (1xSFP) port for WAN. Includes LACP, RSTP, Enhanced Clock, serial control cable and DbManaber Lite.
　AC Power.

PB-TDM-X21(15)-DCE-AC
　Single X.21 port with 15-way female DCE, (2UTP) 10/100/GE ports and (1xSFP) port for WAN. Includes LACP, RSTP, Enhanced Clock, serial control cable and DbManager Lite.
　AC Power

PB-TDM-X21(15)-DTE-AC
　Single X.21 port with 15-way male DTE, (2UTP) 10/100/GE ports and (1xSFP) port for WAN. Includes LACP, RSTP, Enhanced Clock, serial control cable and DbManager Lite.
　AC Power

Optional Accessories (sold separately)

PB/cpack/MRAC
　V.35/V.35 MRAC male and female 2m

PB/cpack/RS
　RS530 cable male & female. 2m

PB/cpack/RSF-V35M
　RS530 (female) to V.35 MRAC (male) 2m cable

PB/cpack/RSM-V35F
　RS530 (male) to V.35 MRAC (female) 2m cable.

PB/cpack/X21
　X.21/V.11 cable male & female. 2m

PB/RMK/3/D
　19" rack kit for 2 units side by side

PB/RMK/3/S
　19" rack kit for single unit

PB/RMK/W/1
　Wall mount kit

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packetband-isdn

PacketBand-ISDN-P

Features

▸ Product versions supports up to 4 ISDN PRIs

▸ T1 and E1 ISDN available

▸ Transmits all data and voice protocols over packet networks

▸ Totally transparent to all data formats

▸ All PacketBands and interfaces synchronized to the same clocks

▸ SIP Server option for centralized call routing

▸ Various clocking options with high quality clock recovery

▸ Any "B" channel can dial any other on the packet network, or "break-out/in" via a gate way PacketBand to national/international ISDN

▸ Provides low-cost migration to IP networks for legacy equipment

▸ Low data overheads

▸ Configurable packet size

▸ Compensates for "jitter" or packet delay variation

▸ Re-orders packets

▸ Very low latency or processing delay

▸ Four 10/100 Base Ethernet ports; one to WAN and three local Ethernets

▸ Local Ethernets support Rate Limiting

▸ Quality of Service (QoS) options

▸ VLAN Tagging

▸ Full timeslot cross-connectivity

▸ Versions support TE and/or NT (connects to a network and local equipment)

▸ Support for Fractional PRIs

▸ Euro-ISDN and various ANSI protocols

▸ E1 to T1 conversion

▸ a-Law to μ-Law conversion

▸ Support for contention or over-booking

▸ Call Progress Tone generation

▸ Number manipulation/conversion/LCR

▸ Automatic Primary/Secondary/Tertiary routes

▸ Routing profiles can be scheduled at different times of the day/week

▸ ISDN Layer 2 and Layer 3 message capture and log for analysis

▸ Easy and intuitive to configure via GUI management package

▸ Compact table-top with optional rack-mount extenders

▸ Approved (Emissions & Safety)

▸ RoHS compliant

The PacketBand-ISDN-P delivers transparent switched PRI ISDN synchronous data services across asynchronous packet networks for PRI interfaces.

Specifications

PRI Interface	Up to 4 PRIs. Different options available with 1 or 4 ports A pair of ports are Power-Failure Relay Protected Typical driving distance – 500m Switchable NT/TE with straight cables E1 RJ45 120Ohm balanced G.703 HDB3 encoded ETSI-DSS1 (Euro-ISDN) ETSI Q.931/921 ETSI 300-011 (Layer 1) ETSI 300-125 (layer 2) ETSI 300-102 (layer 3)*Call for details Approved to TBR4 Selectable CRC4 or non-CRC4 Framing
Packet Ports (x4)	RJ45 standard twisted-pair CAT5E cable Typical driving distance 500m–1,500m per Link depending on data rate and cable Supports data rates to 50Mbps full-duplex between the two units Provides management access to all units with Ethernet card in PC
Safety	IEC60950-1:2002 including National differences: ACS/NZS60950:2000 AS/NZS3260:1993 ACA TS001:1997
T1	RJ45 100Ohm balanced ESF or D4 framing B8Zs or AMI line coding NI-2 North American National DMS-100 and 5ESS switch variants AT&T TR-62411 and ANSI T1.403 Robbed-Bit Signalling Hong Kong variant available
Serial Control Port	RJ12 with Dry-contact Alarm Relay Access password protected. Asynchronous, 8 data, 1 stop bit, no parity speed 19.2 to 115kbps
Power	Internal AC PSU Standard IEC connector 95-250 VAC; 15W; 47-63Hz Max consumption 0.2Amps RMS @230VAC
Dimensions	**1P & 4P Models** **Width:** 11.5" [292 mm] **Depth:** 7.86" [200 mm] **Height:** 1.73" [44 mm] **16 & 32 P Models** **Width:** 17.25" [438 mm] **Depth:** 12.6" [320 mm] **Height:** 3.46" [88 mm]
Environment	Operating Temperature -20°C to +55°C Humidity 10-90% non-condensing
Warranty	1 year hardware & software

Ordering Information

PB-ISDN-1P-SW-AC
Single PRI port, user selectable NT/TE port. 30 logical links. AC power. Includes serial control cable and DbManager Lite.

PB-ISDN-4P-SW-AC
Quad PRI ports, user selectable NT/TE port. 120 logical links. AC power. Includes serial control cable and DbManager Lite.

PB-ISDN-16-AC
16 port PRI 2RU chassis. (2xUTP) 10/100/GE ports and (2 xSFP) ports for WAN. Includes LACP, RSTP, Enhanced Clock, 128 logical links, serial control cable, Terminal Card with external clock receive ports, DbManager Lite and 19" rack mount ears. Single AC Power Supply. Optional redundant power supply available separately.

PB-ISDN-32-AC
32 port PRI 2RU chassis. (2xUTP) 10/100/GE ports and (2 xSFP) ports for WAN. Includes LACP, RSTP, Enhanced Clock, 128 logical links, serial control cable, Terminal Card with external clock receive ports, DbManager Lite and 19" rack mount ears. Single AC Power Supply. Optional redundant power supply available separately.

Optional Accessories (sold separately)

PB/cont
Replacement serial controller cable

PB/cpack/1P
Cable Pack for single E1/T1 PacketBand. 2m

PB/cpack/4P
Cable Pack for 4-port E1/T1 PacketBand. 2m

PB/RMK/W/1
Wall mount kit

PB/RMK/2
19" rack mount for 1P & 4P models
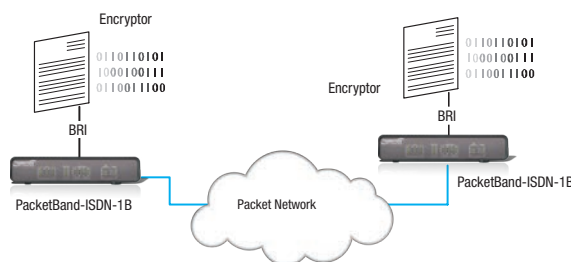
NEW PRODUCT
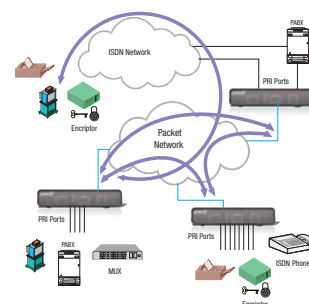
packetband-isdn

PacketBand-ISDN-1B

PACKETBAND-ISDN-1B

Features

▸ Product version supports a single ISDN BRI
▸ Provides low-cost migration to IP networks for legacy equipment
▸ Low-cost solution for carriers wanting to deliver ISDN services
▸ US-ANSI and Euro-ETSI ISDN available
▸ Transmits all data and voice protocols over packet networks
▸ Totally transparent to all data formats
▸ Any "B" channel can dial any other on the packet network, or "break-out/in" via a "gateway" PacketBand to national/international ISDN
▸ All PacketBands and interfaces synchronized to the same clocks
▸ Internal AC, DC and POE power options
▸ SIP Server option for centralized call routing
▸ Various clocking options with high quality clock recovery
▸ Configurable packet size
▸ Compensates for "jitter" or packet delay variation
▸ Re-orders packets
▸ Very low latency or processing delay
▸ Two 10/100 Base Ethernet ports; one to WAN (Packet Network)and one to a local Ethernet port
▸ Ethernet ports support Rate Limiting
▸ Quality of Service (QoS) options
▸ VLAN and Double VLAN tagging
▸ Full cross-connectivity
▸ Supports NT presentation (connects to local equipment and acts like a network)
▸ Support for contention or over-booking
▸ Call Progress Tone generation
▸ Sophisticated number manipulation/conversion/LCR
▸ Automatic Primary/Secondary/Tertiary routing options
▸ Routing profiles can be scheduled at different times of the day/week
▸ ISDN Layer 2 and Layer 3 message capture and log for analysis
▸ Easy and intuitive to configure via GUI management package
▸ Compact table-top with optional rack-mount extenders
▸ Approved (Emissions & Safety)
▸ RoHS compliant

Encryptor

0110110101
1000100111
0110011100

Encryptor

0110110101
1000100111
0110011100

BRI

BRI

PacketBand-ISDN-1B

Packet Network

PacketBand-ISDN-1B

Deliver switched, transparent, synchronous, ISDN data services across asynchronous packet networks.

Specifications

BRI Interface	Support for one BRI Typical driving distance – typically 500m Overlap to En-Bloc conversion
ETSI (Euro-ISDN)	RJ45 120Ohm balanced Point-to-Point and Point-to-Multipoint ETSI-DSS1 (Euro-ISDN) ETSI Q.931/921 ETSI 300-011 (Layer 1) ETSI 300-125 (layer 2) ETSI 300-102 (layer 3)*
Packet Ports (x2)	RJ45 standard twisted-pair CAT5E cable Typical driving distance 500m–1,500m per Link depending on data rate and cable Supports data rates up to 50Mbps full-duplex between two units Provides management access to all units with Ethernet card in PC
Serial Control Port	Access password protected Asynchronous, 8 data, 1 stop bit, no parity speed 9.6 to 115kbps
Safety	IEC60950-1:2002 including National differences AS/NZS3260:1993 ACS/NZS60950:2000 ACA TS001:1997
ANSI (US-ISDN)	RJ45 100Ohm balanced Support for SPIDs and Auto-SPID NI-1 North American National DMS-100 and 5ESS switch variants AT&T TR-62411 and ANSI T1.403
Power	Internal AC PSU Standard IEC connector 95-240 VAC; 15W; 47-63Hz Auto-sensing Standard IEC connector Max consumption 0.2Amps RMS @230VAC
Dimensions	**Width:** 8.6" [225 mm] **Depth:** 7.86" [200 mm] **Height:** 1.73" [44 mm]
Environment	Operating Temperature -20°C to +55°C Humidity 10-90% non-condensing
Warranty	1 year hardware & software

PB-ISDN-1BNT-AC
Single BRI NT port, 2 logical links. AC power. Includes serial control cable and DbManager Lite.

PB-ISDN-1BTE-AC
Single BRI TE port, 2 logical links. AC power. Includes serial control cable and DbManager Lite.

Optional Accessories (sold separately)

PB/cont
Replacement serial controller cable

PB/RMK/3/D
19" rack kit for 2 units side by side

PB/RMK/3/S
19" rack kit for single unit

PB/RMK/W/1
Wall mount kit

NEW PRODUCT

packetband-isdn

PacketBand-ISDN-B-4

Features

▸ Product versions supports up to 4 ISDN BRIs

▸ US-ANSI and Euro-ETSI ISDN available

▸ Transmits all data and voice protocols over packet networks

▸ Totally transparent to all data formats

▸ All PacketBands and interfaces synchronized to the same clocks

▸ Internal AC and DC power options

▸ SIP Server option for centralized call routing

▸ Various clocking options with high quality clock recovery

▸ Any "B" channel can dial any other on the packet network, or "break-out/in" via a "gateway" PacketBand to national/ international ISDN

▸ Provides low-cost migration to IP networks for legacy equipment

▸ Low data overheads

▸ Configurable packet size

▸ Compensates for "jitter" or packet delay variation

▸ Re-orders packets

▸ Very low latency or processing delay

▸ Four 10/100 Base Ethernet ports; one to WAN (Packet Network) and three local Ethernets

▸ Local Ethernets support Rate Limiting

▸ Quality of Service (QoS) options

▸ VLAN and Double VLAN tagging

▸ Full cross-connectivity

▸ Versions support TE and/or NT (connects to a network and local equipment)

▸ ETSI to ANSI conversion

▸ a-Law to μ-Law conversion

▸ Support for contention or over-booking

▸ Call Progress Tone generation

▸ Number manipulation/conversion/LCR

▸ Automatic Primary/Secondary/Tertiary routes

▸ Routing profiles can be scheduled at different times of the day/week

▸ ISDN Layer 2 and Layer 3 message capture and log for analysis

▸ Easy and intuitive to configure via GUI management package

▸ Compact table-top with optional rack-mount extenders

▸ Approved (Emissions & Safety)

▸ RoHS compliant

The PacketBand-ISDN-B-4 delivers transparent switched ISDN data services across packet networks.

All ports are locked with central, or network clocks, providing a fully synchronous environment across asynchronous networks.

Specifications

BRI Interfaces	Support for 4 or 8 BRIs Typical driving distance – 500m Support for a-Law to μ-Law conversion and a-Law and μ-Law tones (ring/busy etc) Overlap to En-Bloc conversion Support for Dual TEIs
ETSI (Euro-ISDN)	RJ45 120Ohm balanced Point-to-Point and Point-to-Multipoint ETSI-DSS1 (Euro-ISDN) ETSI Q.931/921 ETSI 300-011 (Layer 1) ETSI 300-125 (layer 2) ETSI 300-102 (layer 3)* Approved to TBR3
Packet Ports (x4)	RJ45 standard twisted-pair CAT5E cable Typical driving distance 500m–1,500m per Link depending on data rate and cable Supports data rates up to 50Mbps full-duplex between two units Provides management access to all units with Ethernet card in PC
ANSI (US-ISDN)	RJ45 100Ohm balanced Support for SPIDs and Auto-SPID NI-1 North American National DMS-100 and 5ESS switch variants AT&T TR-62411 and ANSI T1.403
Serial Control Port	Access password protected Asynchronous, 8 data, 1 stop bit, no parity speed 19.2 to 115kbps
Power	Internal AC PSU Standard IEC connector 95-240 VAC; 15W; 47-63Hz Auto-sensing Standard IEC connector Max consumption 0.2Amps RMS @230VAC
Dimensions	**Width:** 8.6" [225 mm] **Depth:** 7.86" [200 mm] **Height:** 1.73" [44 mm]
Environment	Operating Temperature -20°C to +55°C Humidity 10-90% non-condensing
Warranty	1 year hardware & software

Ordering Information

PB-ISDN-4BNT-AC
Quad BRI NT ports, 16 logical links. AC power. Includes serial control cable and DbManager Lite.

PB-ISDN-4BTE-AC
Quad BRI TE ports, 16 logical links. AC power. Includes serial control cable and DbManager Lite.

Optional Accessories (sold separately)

PB/cont
Replacement serial controller cable

PB/RMK/W/1
Wall mount kit

PB/RMK/2
19" rack mount kit for PB-ISDN-4B models

NEW PRODUCT

mediaband

MediaBand-1
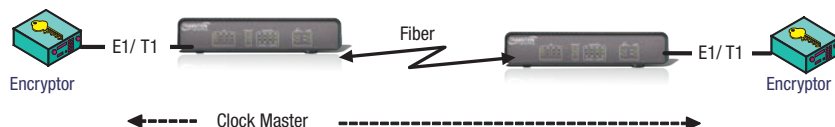
MediaBand-1 transports a single E1/T1 G.703 circuit across a wide variety of fiber links. The same fiber can be used to simultaneously transport Ethernet services.

Features

▸ Highly-accurate clocking and clocking options
▸ Remotely manageable via Ethernet ports
▸ Intuitive graphical manager – no DIP switches
▸ Real-time Events & Alarms
▸ Excellent diagnostics and link performance statistics
▸ Robust, reliable and professional quality
▸ Inter-works with other members of the MediaBand family

Specifications

TDM port (E1)	(1) RJ45 connector Presents as DCE (crossed cable for DTE) 120 Ohm 75 Ohm user-selectable via converter cable G.703 unstructured HDB3 Transparent to user signaling
TDM port (T1)	(1) RJ45 connector Presents as DCE (crossed cable for DTE) 100 Ohm Unframed G.703 1.544Mbps B8ZS or AMI selectable Transparent to user signalling
Ethernet Interfaces	1 x SFP cage (module not supplied) for various fibre modes 1 x RJ45 UTP 10/100/1GE Auto-sensing or manual
Local Management Port	RJ12 Asynchronous Auto-sensing to 115kbps Also remote access via packet network
Oscillator Performance	Hold-over 24hrs 15ppb Aging per day 10ppb Temperature Stability 12ppb
IP & MAC Address	Single MAC address, IP address, subnet mask and default gateway
Configuration	Held in non-volatile memory
Power (AC)	Internal via IEC connector Auto-sensing 96VAC-240VAC Max consumption 0.2Amps RMS @230VAC MTBF 400,000hrs
Power (DC)	1. Nominal -48VDC 4mm terminal block -33VDC to -75VDC 0.35A max MTBF 1,790,000hrs 2. Nominal -24VDC 4mm terminal block -18VDC to -75VDC 0.55A max MTBF 800,000hrs
Safety	EC EN60950-1:2002 ACA TS001:1997 ACS/NZ60950:2000 AS/NZS3260:1993 IEC950
Dimensions	**Width:** 8.86" [225 mm] **Depth:** 7.86" [200 mm] **Height:** 1.73" [44 mm]
Environment	Operating Temperature -20°C to +55°C Humidity 10-90% non-condensing
Warranty	1 year hardware & software

Ordering Information

MB-1-AC
Single port T1/E1 converter with SFP cage plus 2 10/100/1000Mbps RJ45 ports for Ethernet transport and management. Includes serial control cable and DbManager Lite. AC Power

MB-1-24VDC
Single port T1/E1 converter with SFP cage plus 2 10/100/1000Mbps RJ45 ports for Ethernet transport and management. Includes serial control cable and DbManager Lite. 24VDC Power

MB-1-48VDC
Single port T1/E1 converter with SFP cage plus 2 10/100/1000Mbps RJ45 ports for Ethernet transport and management. Includes serial control cable and DbManager Lite. 48VDC Power

Optional Accessories (sold separately)

PB/cont
Replacement serial controller cable

PB/cpack/1P
Cable Pack for single E1/T1 PacketBand. 2m

PB/cpack/75BNC/01
120 Ohm RJ45 to 75 Ohm dual BNC conversion cable 20cm

PB/RMK/3/D
19" rack kit for 2 units side by side

PB/RMK/3/S
19" rack kit for single unit

NEW PRODUCT

mediaband

MediaBand-4

Mux   E1/T1   Fiber   E1/T1   Mux

LAN   LAN

Manager
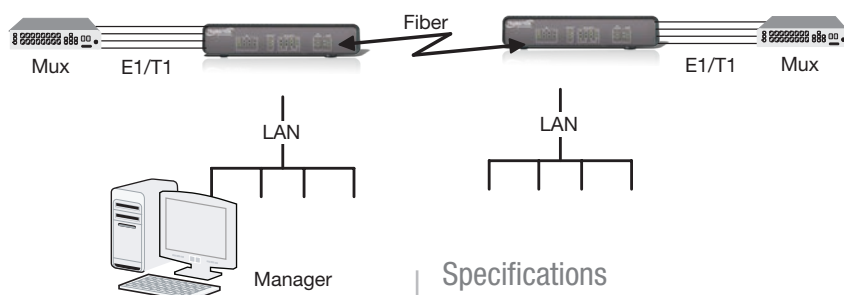
MediaBand-4 transports up to four E1/T1 circuits across a wide variety of fiber links. The same fiber can be used to simultaneously transport Ethernet services.

Features

- Highly-accurate clocking and clocking options
- Support for multiple different clocks across the fiber
- Remotely manageable via Ethernet ports
- Distribution options across UTP
- Intuitive graphical manager – no DIP switches
- Real-time Events & Alarms
- Excellent diagnostics and link performance statistics
- Robust, reliable and professional quality
- Inter-works with other members of the MediaBand family

Specifications

TDM port (E1)	(4) RJ45 connectors Presents as DCE (crossed cable for DTE) 120 Ohm 75 Ohm user-selectable via converter cable G.703 unstructured HDB3 Transparent to user signaling
TDM port (T1)	(4) RJ45 connectors Presents as DCE (crossed cable for DTE) 100 Ohm Unframed G.703 1.544Mbps B8ZS or AMI selectable Transparent to user signaling
Ethernet Interfaces	1 x SFP cage (module not supplied) for various fiber modes 1 x RJ45 UTP 10/100/1GE Auto-sensing or manual
Local Management Port	RJ12 Asynchronous Auto-sensing to 115kbps Also remote access via packet network
Oscillator Performance	Hold-over 24hrs 15ppb Aging per day 10ppb Temperature Stability 12ppb
IP & MAC Address	Single MAC address, IP address, subnet mask and default gateway
Configuration	Held in non-volatile memory
Realtime Clock	For time-stamping Events and Alarms
Power (AC)	Internal via IEC connector Auto-sensing 96VAC-240VAC Max consumption 0.2Amps RMS @230VAC MTBF 400,000hrs
Power (DC)	1. Nominal -48VDC 4mm terminal block -33VDC to -75VDC 0.35A max MTBF 1,790,000hrs 2. Nominal -24VDC 4mm terminal block -18VDC to -75VDC 0.55A max MTBF 800,000hrs
Safety	EC EN60950-1:2002 ACA TS001:1997 ACS/NZ60950:2000 AS/NZS3260:1993 IEC950
Dimensions	**Width:** 8.86" [225 mm] **Depth:** 7.86" [200 mm] **Height:** 1.73" [44 mm]
Environment	Operating Temperature -20°C to +55°C Humidity 10-90% non-condensing
Warranty	1 year hardware & software

Ordering Information

MB-4-AC
4 port T1/E1 converter with SFP cage plus 2 10/100/1000Mbps RJ45 ports for Ethernet transport and management. Includes serial control cable and DbManager Lite. AC Power

MB-4-24VDC
4 port T1/E1 converter with SFP cage plus 2 10/100/1000Mbps RJ45 ports for Ethernet transport and management. Includes serial control cable and DbManager Lite. 24 VDC Power

MB-4-48VDC
4 port T1/E1 converter with SFP cage plus 2 10/100/1000Mbps RJ45 ports for Ethernet transport and management. Includes serial control cable and DbManager Lite. 48 VDC Power

Optional Accessories (sold separately)

PB/cont
Replacement serial controller cable

PB/cpack/2P
Cable Pack for 2-port E1/T1 PacketBand. 2m

PB/cpack/4P
Cable Pack for 4-port E1/T1 PacketBand. 2m

PB/cpack/75BNC/01
120 Ohm RJ45 to 75 Ohm dual BNC conversion cable 20cm

PB/RMK/3/D
19" rack kit for 2 units side by side

PB/RMK/3/S
19" rack kit for single unit

PB/RMK/W/1
Wall mount kit

NEW PRODUCT

mediaband

MediaBand-8/16/32

The MediaBand-8/16/32 interfaces to 8, 16 or 32 E1 or T1 circuits and delivers these clear trunks transparently across a fiber link. V.35 and X.21 interfaces are also available.

Features

▶ The same fiber can be used to simultaneously transport Ethernet services.

▶ Optional second fiber link for automatic resilience

▶ Removable internal AC/DC power supply

▶ Optional hot-swappable second load sharing AC/DC supply for resilience

▶ Remotely manageable via Ethernet ports

▶ Cascade chassis and other MediaBand products down the same fiber

▶ Intuitive graphical manager – no DIP switches

▶ Real-time Events & Alarms

▶ Robust, reliable and professional quality

Specifications

TDM port (E1)	(8-32) RJ45 connectors Presents as DCE (crossed cable for DTE) 120 Ohm 75 Ohm user-selectable via converter cable G.703 unstructured HDB3 Transparent to user signalling
TDM port (T1)	(8-32) RJ45 connectors Presents as DCE (crossed cable for DTE) 100 Ohm Unframed G.703 1.544Mbps B8ZS or AMI selectable Transparent to user signalling
X.21 and V.35 Interfaces	8 port and 16 port card. Specify interface type at time of ordering Speeds 64kbps to 2.048Mbps HDMI connectors Converter cables to V.35 MRAC/DB25 Converter cables to X.21 DB15 V.35 signals; Tx, Rx, S (Tx), S (Rx), Ext Clock, DCD, CTS, RTS, DTR, DSR X.21 signals; Tx, Rx, S, C, I
Ethernet Interfaces	(2) SFP cage (module not supplied) for various fiber modes 2 x RJ45 UTP 10/100/1GE Auto-sensing or manual
Local Management Port	RJ12 Asynchronous Auto-sensing to 115kbps Also remote access via Ethernet port
Oscillator Performance	Hold-over 24hrs 15ppb Aging per day 10ppb Temperature Stability 12ppb
IP & MAC Address	Single MAC address, IP address, subnet mask.
Configuration	Held in non-volatile memory
Realtime Clock	For time-stamping Events and Alarms
Events & Alarms	Held in non-volatile memory FIFO Automatically sent to DbManager
Power (AC)	MediaBand-32 supports 1 or 2 supplies these are hot swappable to ATCA spec. 1 Supply can power a fully populated MediaBand. AC Auto-sensing 96VAC – 240VAC Max consumption 0.5A RMS @230VAC DC 4mm terminal Block 36VDC tp 57VDC 1.2A max-33VDC to -75VDC 0.35A max MTBF 1,790,000hrs
Safety	EC EN60950-1:2002 ACA TS001:1997 ACS/NZ60950:2000 AS/NZS3260:1993 IEC950
Dimensions	**Width:** 17.25" [438 mm] **Depth:** 12.6" [320 mm] **Height:** 3.46" [88 mm]
Environment	Operating Temperature -20°C to +55°C Humidity 10-90% non-condensing
Warranty	1 year hardware & software

Ordering Information

*MB-8-AC
8 Port T1/E1 converter with 2 SFP cages plus 2 10/100/1000Mbps RJ45 ports for Ethernet transport and management. Includes 19" rack mount ears, serial control cable and DbManager Lite. AC Power.

*MB-8-DC
8 Port T1/E1 converter with 2 SFP cages plus 2 10/100/1000Mbps RJ45 ports for Ethernet transport and management. Includes 19" rack mount ears, serial control cable and DbManager Lite. DC Power.

MB-16-AC
16 Port T1/E1 converter with 2 SFP cages plus 2 10/100/1000Mbps RJ45 ports for Ethernet transport and management. Includes 19" rack mount ears, serial control cable and DbManager Lite. AC Power.

MB-16-DC
16 Port T1/E1 converter with 2 SFP cages plus 2 10/100/1000Mbps RJ45 ports for Ethernet transport and management. Includes 19" rack mount ears, serial control cable and DbManager Lite. DC Power.

MB-32-AC
32 Port T1/E1 converter with 2 SFP cages plus 2 10/100/1000Mbps RJ45 ports for Ethernet transport and management. Includes 19" rack mount ears, serial control cable and DbManager Lite. AC Power.

MB-32-DC
32 Port T1/E1 converter with 2 SFP cages plus 2 10/100/1000Mbps RJ45 ports for Ethernet transport and management. Includes 19" rack mount ears, serial control cable and DbManager Lite. DC Power.

Optional Accessories (sold separately)

PB/cont
Replacement serial controller cable

PB/cpack/8P
Cable Pack for 8 E1/T1 RJ45 2m.

PB/cpack/75BNC/01
120 Ohm RJ45 to 75 Ohm dual BNC conversion cable 20cm

PB-MB-PSU-AC
Additional AC Power Supply for 2 RU PacketBand or MediaBand Chassis

PB-MB-PSU-DC
Additional DC Power Supply for 2 RU PacketBand or MediaBand Chassis

*Please Note:
MB-8 models are not expandable beyond 8 T1/E1 circuits

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Call us at 800.526.9267 or 952.941.7600

NEW PRODUCT

liberator

Liberator S

ISDN Converter, ISDN Splitter, Switch, and Concentrator

Liberator models dsupport up to 4 PRI interfaces and 0, 4, 8 or 16 BRI 'S' interfaces.

A standard Liberator 'S' can be user configured with all PRI interfaces the same.

Features

▶ Very flexible PRI/BRI ISDN switch

▶ ISDN splitter, sharer or concentrator

▶ Converts between PRI and BRI

▶ Connects to ISDN networks and/or local ISDN devices

▶ Shares ISDN access between multiple local devices

▶ Full cross-connection between any/ all 'B' channels

▶ BRI Power Feed options

▶ Least Cost Routing

▶ Dynamic re-directing of calls if destinations unavailable

▶ Local connectivity between any ports

▶ Build multiple BRI networks ports into a local PRI

▶ NT BRIs and NT/TE user switchable

▶ BRI Power Failure Relay Protection option

▶ PRI ports NT/TE user switchable

▶ PRI ports Power Failure Relay protected

▶ Standard ETSI to ANSI PRI to BRI conversion

▶ BRI ANSI to ETSI conversion

▶ Supports A-Law to µ-Law for voice conversion

▶ Support for "Call Deflection"

▶ Tones generated from network and/or by Liberator

▶ Different models available to support different I/O combinations

▶ Field-upgradeable versions to remotely enable additional ports

▶ Remotely manageable and software upgradeable

▶ Off-line Call Routing configurator

▶ Many applications and uses

Specifications

Interfaces	PRI - 1, 2, 3 or 4 PRI ports. Marked as 'PRI21' 'PRI22' 'PRI23' and 'PRI24' By default PRI21 and PRI23 are configured for TE ISDN stack (user-side); PRI22 and PRI24 for NT (network-side) The default configurations can be changed by the user but crossed cables are necessary Interfaces PRI21 - PRI22 and PRI22 – PRI24 are protected against power failure by relays which provide a metallic path in the event of failure.
E1	RJ45 120Ohm balanced (E1) G.704 HDB3 encoded Auto-detect CRC4 or non- CRC4 framing (Multiframe or Doubleframe) Support of non-switched E1 and Fractional E1 services ISDN PRI ETSI Q.931/921, ETSI-DSS1, ETSI 300-011, ETSI300-125, ETSI 300-102, approved to TBR4 A-Law and µ-Law tones
T1	RJ45 100Ohm balanced T1 ESF or D4 Framing selectable B8ZS or AMI Line code selectable NI-2, DMS-100, AT&T 5ESS Switch selectable AT&T TR-62411 and ANSI T1.403 Compliant Hong Kong variant available A-Law and µ-Law tones
BRI 0, 4, 8 or 16 Ports	(depending upon Model) 1 x SFP cage (module not supplied) for various fiber modes 1 x Optional SFP cage for second fi bre for resiliency 2 x RJ45 UTP 10/100/1GE Auto-sensing or manual
Control Ports RJ11 Marked 'Cmd'	Asynchronous 8 data, 1 stop bit no parity 19.2kbps to 115kbps Password protected Dry contact alarm relay
LEDs	PRI x 4 BRI PWR Run LAN ACT LAN 100
Relays	Interfaces pairs PRI21 and PRI22 and PRI23 and PRI 24 are Power-Failure Relay protected as standard. Interfaces will be connected together using relays in the event of power failure. This forms a metallic path between the two ports.
Power	1. Mains - AC Internal switch-mode supply IEC connector Voltage range 95-240VAC autosensing Input frequency 47-63Hz Max current consumption 200mA @ 230VAC
Environment	Operating 0 – 55 °C Humidity 10-90% non-condensing Natural convection cooling
Safety	IEC60950-1:2007 ACS/NZS60950:2000 AS/NZS3260:1993 ACA TS001:1997
Dimensions	**Width:** 11.5" [292 mm] **Depth:** 7.86" [200 mm] **Height:** 1.73" [44 mm]
Weight	1.1Kgs 2.4lb
Warranty	1 year hardware & software

Ordering Information

LIB-2P4B-AC
Liberator "S" Chassis with internal AC power supply. 2 PRIs, user selectable NT/TE. 4 BRI ports, user selectable NT/TE. Includes serial control cable and DbManager Lite.

LIB-2P8B-AC
Liberator "S" Chassis with internal AC power supply. 2 PRIs, user selectable NT/TE. 8 BRI ports, user selectable NT/TE. Includes serial control cable and DbManager Lite.

LIB-2P16B-AC
Liberator "S" Chassis with internal AC power supply. 2 PRIs, user selectable NT/TE. 16 BRI ports, user selectable NT/TE. Includes serial control cable and DbManager Lite.

LIB-4P16B-AC
Liberator "S" Chassis with internal AC power supply. 4 PRIs, user selectable NT/TE. 16 BRI ports, user selectable NT/TE. Includes serial control cable and DbManager Lite.

LIB-4P8B-AC
Liberator "S" Chassis with internal AC power supply. 4 PRIs, user selectable NT/TE. 8 BRI ports, user selectable NT/TE. Includes serial control cable and DbManager Lite.

LIB-4P0B-AC
Liberator "S" Chassis with internal AC power supply. 4 PRIs, user selectable NT/TE. 0 (zero) BRI ports. Includes serial control cable and DbManager Lite.

Optional Accessories (sold separately)

PB-ET/RMK/01
19" rack kit for Liberator product

LIB/CPACK/1P
Cable pack for 1 PRI ports (1 crossed 1 straight)

LIB/CPACK/2P
Cable pack for 2 PRI ports (2 crossed 2 straight)

LIB/CPACK/4P
Cable pack for 4 PRI ports (4 crossed 4 straight)

LIB/CPACK/4
Cable pack for Liberators with 4 NT BRIs

LIB/CPACK/4X
Cable pack for Liberators with 4 TE BRIs (crossed)

LIB/CPACK/8
Cable pack for Liberators with 8 NT BRIs

LIB/CPACK/8X
Cable pack for Liberators with 8 TE BRIs (crossed)

LIB/CPACK/12
Cable pack for Liberators with 12 NT BRIs

LIB/CPACK/12X
Cable pack for Liberators with 12 TE BRIs (crossed)

LIB/CPACK/16
Cable pack for Liberators with 16 NT BRIs

LIB/CPACK/16X
Cable pack for Liberators with 16 TE BRIs (crossed)

PB/cont
Replacement serial controller cable

transition networks managed switch

SM24-100SFP-AH

(24) 100BASE-X SFP Ports, (2) 10/100/1000 RJ-45 Ports, (2) Gigabit Combo Ports Managed Switch

▶ 802.3ah Link OAM
▶ Supports SNMP v1, v2 & v3
▶ STP, RSTP and MSTP
▶ Advanced Quality of Service (QoS)
▶ Enhanced Security Features
▶ IGMP v1, v2 and v3

Management Features

▶ **In-Band Management:** Telnet, Web-based HTTP or HTTPS, SNMP manager, or Secure Shell

▶ **Out-of-Band Management:** RS-232 dB-9 console port

▶ **Software Loading:** TFTP in-band or XModem out-of-band

▶ **SNMP:** Management access via MIB database, Trap management to specified hosts

▶ **RMON:** Groups 1, 2, 3, 9 (Statistics, History, Alarm, Event)

Next Generation Switch

The SM24-100SFP-AH features a 1U form factor consisting of (24) 100Base-X SFP ports, (2) 10/100/1000 RJ-45 ports and (2) Gigabit combo ports. The 24 SFP ports accept industry standard 100BASE-X optical transceivers.

The SM24-100SFP-AH switch also includes Carrier Ethernet specific software, QoS and Management features which enable service providers to deliver secure services while checking end to end connectivity for customers. The SM24-100SFP–AH switch is a next generation switch designed to fulfill the needs of service providers.

Flexible Uplink Options

In addition to the (24) 100BASE-X ports the SM24-100SFP-AH has combo Gigabit uplink ports that allow copper or fiber connections to be used, depending on the network environment. The fiber ports are SFP and can accommodate a wide range of transceivers for your uplink requirements.

Carrier Ethernet Specific Software

The SM24-100SFP-AH switch was designed for use with Carrier Ethernet. Feature enhancements such as 802.3ah, Q-in-Q, Carrier Class Rate-Limit, QoS and subscriber isolation were added to help service providers deploy, manage and secure the network services they are delivering.

Single IP Management up to 36 Switches

The SM24-100SFP-AH is managed as a single switch and has a single IP address.   Up to 36 of the SM24-100SFP-AH switches can be virtually stacked and managed as a single switch while using only one IP address.

Specifications

Standards Compliance	IEEE 802.1D Spanning Tree Protocol & traffic priorities IEEE 802.1p Priority tags IEEE 802.1Q VLAN IEEE 802.1s Multiple Spanning Tree Protocol IEEE 802.1v Protocol-based VLANs IEEE 802.1w Rapid Spanning Tree Protocol IEEE 802.1X Port Authentication IEEE 802.3ah Link OAM Ethernet, Fast Ethernet, Gigabit Ethernet Full-duplex flow control Link Aggregation Control Protocol IEEE 802.3ac VLAN tagging DHCP Client (RFC 1541) HTTPS IGMP (RFC 1112) IGMPv2 (RFC 2236) Management Information Bases RADIUS+ (RFC 2618) RMON (RFC 1757 groups 1,2,3,9) SNMP (RFC 1157) SNMPv2 (RFC 2571) SNMPv3 (RFC DRAFT 3414, 3410, 2273, 3411, 3415) SNTP (RFC 2030) SSH (Version 2.0) TFTP (RFC 1350)
Physical Ports	(24) 100BASE-X SFP ports (2) 10/100/1000 BASE-TX ports (2) Combo Gigabit Ethernet (RJ-45/SFP) ports (1) RJ-45 Console port
MAC Address	17K MAC address table
Max Pocket Size	10 Kbytes jumbo packet size (on Gigabit ports) 1628 on Fast Ethernet ports
Backplane Bandwidth	12.8 Gbps
LEDs	System: Power Port: Status
Power Consumption	54 Watts maximum
AC Input	100 to 240V, 50-60 Hz, 2 A
Temperature	Operating: 0° to 50°C (32° to 122°F) Storage: -40° to 70°C (-40° to 158°F)
Operating Humidity	10% to 90% (non-condensing)
Dimensions	**Width:** 1.73" [44 mm] **Depth:** 17.3" [440 mm] **Height:** 9.0" [230 mm]
Weight	7.7 lbs [3.5 kg]
Certifications	FCC Class A, CE Mark, UL, cUL

Ordering Information

SM24-100SFP-AH
(24) 100BASE-X SFP Ports, (2) 10/100/1000 RJ-45 Ports, 2 Gigabit Combo Ports Managed Switch - Includes 19" Rackmount Kit

Optional Accessories (sold separately)

SFP Modules [pg 98-104]

SM24-100SFP-ACRPS [pg 95]
Redundant Power Supply

Features

▶ **Authentication:**
Local, RADIUS, TACACS, Port (802.1X, MAC Authentication, Web Authentication), HTTPS, SSH, Port Security

▶ **Access Control Lists:**
IP, MAC; 1000 rules per system

▶ **DHCP Client**

▶ **Port Configuration:**
100BASE-FX: 100 Mbps full duplex
1000BASE-T: 10/100 Mbps at half/full duplex, 1000 Mbps at full duplex
1000BASE-SX/LX/LH - 1000 Mbps at full duplex (SFP)

▶ **Flow Control:**
Full Duplex: IEEE 802.3-2005
Half Duplex: Back pressure

▶ **Broadcast Storm Control:**
Traffic throttled above a critical threshold

▶ **Port Mirroring:**
Multiple source ports, one destination port

▶ **Rate Limits:**
Input limit, Output limit

▶ **Port Trunking:**
Static trunks (Cisco Ether Channel compliant) Dynamic trunks (Link Aggregation Control Protocol)

▶ **Spanning Tree Algorithm:**
Spanning Tree Protocol (STP, IEEE 802.1D); Rapid Spanning Tree Protocol (RSTP, IEEE 802.1w); Multiple Spanning Tree Protocol (MSTP, IEEE 802.1s)

▶ **VLAN Support:**
Up to 255 groups; port-based or tagged (802.1Q), Private VLANs, Protocol-based VLANs

▶ **Class of Service:**
Supports 4 levels of priority and Weighted Round Robin Queueing (which can be con figured by VLAN tag or port), Layer 3/4 priority mapping: IP DSCP

▶ **Multicast Filtering:**
IGMP Snooping (Layer 2) Multicast VLAN Registration

▶ **Quality of Service:**
DiffServ supports class maps, policy maps, and service policies

▶ **BOOTP client**

▶ **SNTP** (Simple Network Time Protocol)

▶ **SNMP** (Simple Network Management Protocol)

▶ **RMON** (Remote Monitoring, groups 1,2,3,9)

▶ **SMTP Email Alerts**

▶ **DHCP Snooping**

▶ **IP Source Guard**

▶ **IP Clustering**

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Call us at 800.526.9267 or 952.941.7600

transition networks managed switch power supply

SM24-100SFP-ACRPS

Redundant Power Supply

The SM24-100SFP-ACRPS is a redundant power supply designed to increase availability in converged data, voice and video networks. The SM24-100SFP-ACRPS delivers redundancy and resiliency at an affordable price.

The SM24-100SFP-ACRPS provides redundant power to the SM24-100SFP-AH switch with an immediate failover capability. The SM24-100SFP-ACPRS will become the main power supply in the event of a failure of the internal power supply on the SM24-100SFP-AH [pg 94].

Ordering Information

SM24-100SFP-ACRPS
(1) Redundant Power Supply Port with 19" Rackmount Ears
Used with: SM24-100SFP-AH

Features

▸ High Availability

▸ Increased Network Uptime

▸ Ease of Use

▸ Ease of Deploying

▸ Cost Effective

▸ Thermal Protection

▸ Overload Protection

Specifications

Dimensions	**Width:** 12.6" [320 mm] **Depth:** 6.4" [163 mm] **Height:** 1.73" [44 mm]
Power	Output: 126 Watts; 12 VDC Input: 100-240 VAC, 50 – 60 Hz
Environment	0 – 45°C operating temperature -40 – 70°C storage temperature
Shipping Weight	7.7 lbs. [3.5 kg]
Compliance	CE Mark, UL, FCC Class A
Warranty	Lifetime

transition networks managed switch

SM24-1000SFP-AH

Layer 2 Gigabit Metro Ethernet Switch

Features:

▶ **OAM:**
802.1ag Service OAM
802.3ah Link OAM

▶ **Auto-negotiation:**
for port speed and duplex mode

▶ **Flow Control:**
IEEE 802.3x & Back Pressure

▶ **Spanning Tree Protocol:**
IEEE 802.1D Spanning Tree Protocol (STP), IEEE 802.1w Rapid Spanning Tree Protocol (RSTP), IEEE 802.1s Multiple Spanning Tree Protocol (MSTP)

▶ **VLANs:**
255 IEEE 802.1Q VLANs, Port-based VLAN, Protocol VLAN, Private VLAN, GVRP, IEEE 802.1ad Q-in-Q

▶ **Link Aggregation:**
Static Trunk, IEEE 802.3ad LACP, Load Balancing Trunk groups: 32 Trunk links: 2~8 for Gigabit Ethernet port Trunk links: 2~4 for 10G Ethernet port

▶ **IGMP:**
IGMP v1, v2, v3, 255 IGMP Groups, MVR

▶ **QoS:**
8 Priority Queues, Priority Queues Scheduling, Scheme, WRR, Strict Priority, IEEE 802.1p, IP Precedence/DSCP,, TCP/UDP port number

▶ **DiffServ:**
Rate Limiting, Ingress/Egress, Per Port COS

▶ **Switch Management:**
CLI via console port or Telnet, Web management SNMP v1, v2c, v3

▶ **Firmware & Configuration:**
Dual firmware configuration files, Firmware Configuration upgrade via TFTP/FTP/X modem server

▶ **RMON:**
(groups 1,2,3 and 9)

▶ **SNTP**

▶ **Port Mirroring**

▶ **Event/Error/System Log**

▶ **Security:**
Port Security, IP Source Guard, DHCP Snooping, IEEE 802.1X, Port-based

▶ **RADIUS authentication**

▶ **Encryption: MD5, TLS, TTLS**

▶ **TACACS+ authentication**

▶ **HTTPS/SSH**

▶ **Access Control List (ACL):**
IP-based, MAC-based, IP/MAC-based, VLAN, TCP/UDP port

▶ **Storm Control:**
Broadcast, Multicast, Unknown Unicast

Specifications

Standards Compliance	IEEE 802.1D Spanning Tree Protocol and traffic priorities
	IEEE 802.1p Priority tags
	IEEE 802.1Q VLAN
	IEEE 802.1s Multiple Spanning Tree Protocol
	IEEE 802.1v Protocol-based VLANs
	IEEE 802.1w Rapid Spanning Tree Protocol
	IEEE 802.1X Port Authentication
	IEEE 802.1ag Service OAM
	IEEE 802.3ah Link OAM
	Ethernet, Fast Ethernet, Gigabit Ethernet, 10 Gigabit Ethernet
	Full-duplex flow control
	Link Aggregation Control Protocol
	IEEE 802.3ac VLAN tagging
	DHCP Client (RFC 1541)
	HTTPS
	IGMP (RFC 1112)
	IGMPv2 (RFC 2236)
Physical Ports	(24) Gigabit SFP ports
	(2) 10 G XFP ports
	(2) expansion slots for modules
	(1) RJ-45 craft port
	(1) RS-232 console port
	(1) dB-15 port for alarm I/P and O/P
MAC Address	32K MAC address table
Jumbo Packet Support	9K
Switching Capacity	128 Gbps
LEDs	Power & Port Status
Power Consumption	100 Watts maximum
Power Requirement	AC Input: 100~240V, 50~60 Hz, , Output: +12 VDC DC Input: +18 VDC~+36 VDC, -36 VDC~-72 VDC, Output: +12 VDC
Temperature	-20°C to 60°C (Standard Operating) -40°C to 70°C (Non-Operating)
Operating Humidity	10% to 90% (non-condensing)
Dimensions	**Height:** 2.6" [67 mm] **Width:** 17.0" [436 mm] **Depth:** 10.0" [253 mm] (1.5RU)
Shipping Weight	11lb. (5kg)
Certifications	FCC Class A, CE Mark, UL
MTBF	80,000 hrs (min), at 40°C degree 150,000 hrs (min) at 25°C degree

Ordering Information

SM24-1000SFP-AH
(24) 1000BASE-X SFP Ports, (2) 10G XFP ports and 2 expansion slots for modules - Includes 19" Rackmount kit and Fan module. Does not include power supply. Must order Power supply(s) separately.

Optional Accessories (sold separately)

SFP & XFP Modules [pg 98-104]

SM24-1000SFP-ACPWR AC Power module
SM24-1000SFP-DCPWR: DC Power module
SM24-1000SFP-FAN: Fan module
SM24-1000SFP-10GM: 10G XFP expansion module (Does not include XFP)

The SM24-1000SFP-AH Gigabit Metro Ethernet Switch provides a flexible platform to enable carrier-class access technology through easy-to-maintain hardware architecture and advanced management software features. With all front panel access, field-replaceable fan tray, and redundant power supply design, SM24-1000SFP-AH eases the necessary field installation. Advanced management software enables remote trouble-shooting and management. With advanced security features and flexible, fine-grained QoS capability, SM24-1000SFP-AH allows service providers to deliver secure triple-play services. The dual 10G XFP Ethernet ports provide redundant fiber uplink connections to the edge of the optical core networks. The SM24-1000SFP-AH also includes 2 expansion slots to accommodate extra dual 10G XFP ports.

The SM24-1000SFP-AH Gigabit Metro Ethernet Switch is part of a series of purpose-built next-generation switches, designed by Transition Networks, in order to fulfill the demands of converged metro access networks.

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gbic modules

TN-GB-xM5x

GBIC Modules **1000BASE-LX or SX**

Transition Networks' GBIC transceiver is a plug-in module and it is hot-swappable. It allows for seamless integration of fiber with copper LAN connections wherever GBIC interface slots are available. This device is economical, saves time, offers flexibility and eliminates the necessity for replacing entire devices when the customers need to change or upgrade fiber connections.

Features

▸ Laser Class 1 Product

▸ Compliant with 802.3z 1000BASE-SX; 1000BASE-LX

▸ Plug-and-Play module

▸ Hot-swappable

▸ TTL Logic Interface

*Note: Using Transition Networks' GBIC modules will not void or interfere with the original equipment manufacturer's warranty or maintenance contracts.

Transition Networks' GBICs are built to comply with IEEE 802.3z which is intended to provide Gigabit interconnectivity between different vendors.

Transition's GBIC modules are compatible with all major switch and router vendors.

Fiber Connections with GBICs
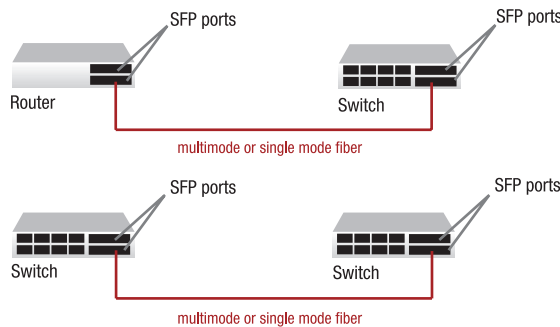
SFP ports
SFP ports
Router
Switch

multimode or single mode fiber

SFP ports
SFP ports
Switch
Switch

multimode or single mode fiber

Specifications

Complete list of fiber optic connector specifications [pg 117-123]

Standards	IEEE 802.3z 1000BASE-SX; 1000BASE-LX
Dimensions	**Width**: 1.2" [30 mm] **Depth**: 2.6" [65 mm] **Height**: 0.40" [10 mm]
Power	5V
Power Consumption	0.8 Watts
Environment	0°C – 70°C
Compliance	UL Registered, CSA, IEC 60825-1 and IEC 60825-2, CE Marked
Warranty	Lifetime

Ordering Information

Complete list of fiber optic connector specifications [pg 117-123]

TN-GB-MM5
1000BASE-SX 850nm multimode (SC)
[62.5/125µm: 220 m/722 ft.]
Link Budget: 8.5 dB
[50/125 µm: 550 m/1804 ft.]
Link Budget: 8.5 dB

TN-GB-SM5
1000BASE-LX 1310nm single mode (SC)
[10 km/6.2 mi.] Link Budget: 11.0 dB

TN-GB-SM53
1000BASE-LX 1310nm single mode (SC)
[30 km/18.6 mi.] Link Budget: 19.0 dB

small form factor pluggables

TN-SFP-xxx

SFP Modules: Small Form Factor Pluggables MSA Compatible Simplex LC

Applications

▸ Gigabit Ethernet Switches and Routers
▸ Fibre Channel Switch Infrastructure
▸ xDSL Applications
▸ Metro Edge Switching

Features

▸ Hot-Pluggable SFP Footprint Simplex LC Optical Transceiver
▸ Digital Diagnostic Function
▸ Class 1 Laser International Safety Standard IEC-60825 Compliant
▸ Compatible with SFP Multi-Sourcing Agreement (MSA)

Additional Features

TN-SFP-BXx or LXBxx SXBx modules

▸ Compliant with IEEE 802.3z Gigabit Ethernet
▸ Compliant with Fiber Channel 1X SM-LC-L FC-PI

Can be used on Fiber Transponder xFMFF4040-100

TN-SFP-OC3x SFP modules

▸ Compliant with 100BASE-FX
▸ Compliant with Intermediate-Reach SONET OC-3/SDH STM-1 (S-1.1)

TN-SFP-OC12x SFP modules

▸ Compliant with Intermediate-Reach SONET OC-12/SDH STM-4 (S-4.1)

Specifications

Complete list of fiber optic connector specifications [pg 117-123]

Standards	IEEE 802.3 2003; ANSI X3.297-1997
Dimensions	**Width:** 0.52" [13 mm] **Depth:** 2.18" [55 mm] **Height:** 0.33" [8 mm]
Power	3.3V
Power Consumption	0.66 Watts
Environment	0°C – 70°C
Compliance	IEC-60825; FDA 21; CFR 1040.10 and 1040.11
Warranty	Lifetime

*Note: Per Cisco Systems' literature, the Cisco switches with SFP slots do not accept modules other than Cisco's own SFPs. The Cisco switch identifies the manufacturer ID along with the part number and blocks operations to this port for non-Cisco interfaces.

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

Ordering Information

Complete list of fiber optic connector specifications [pg 117-123]

TN-SFP-SXB1
1000BASE-SX 1310nm TX/1550nm RX MM (LC)
[500 m/1640 ft.] Link Budget: 7.0 dB

TN-SFP-SXB2
1000BASE-SX 1550nm TX/1310nm RX MM (LC)
[500 m/1640 ft.] Link Budget: 7.0 dB

TN-SFP-BXU (model with DMI)
TN-SFP-EBXU (model without DMI)
1000BASE-BX 1310nm TX/1490nm RX SM (LC)
[10 km/6.2 mi.] Link Budget: 11.0 dB

TN-SFP-BXD (model with DMI)
TN-SFP-EBXD (model without DMI)
1000BASE-BX 1490nm TX/1310nm RX SM (LC)
[10 km/6.2 mi.] Link Budget: 11.0 dB

TN-SFP-BXU2
1000BASE-BX 1310nm TX/1490nm RX SM (LC)
[20 km/12.4 mi.] Link Budget: 14.0 dB

TN-SFP-BXD2
1000BASE-BX 1490nm TX/1310nm RX SM (LC)
[20 km/12.4 mi.] Link Budget: 14.0 dB

TN-SFP-LXB11
1000BASE-LX 1310nm TX/1550nm RX SM (LC)
[10 km/6.2 mi.] Link Budget: 11.0 dB

TN-SFP-LXB12
1000BASE-LX 1550nm TX/1310nm RX SM (LC)
[10 km/6.2 mi.] Link Budget: 11.0 dB

TN-SFP-LXB21
1000BASE-LX 1310nm TX/1550nm RX SM (LC)
[20 km/12.4 mi.] Link Budget: 14.0 dB

TN-SFP-LXB22
1000BASE-LX 1550nm TX/1310nm RX SM (LC)
[20 km/12.4 mi.] Link Budget: 14.0 dB

TN-SFP-LXB41
1000BASE-LX 1310nm TX/1550nm RX SM (LC)
[40 km/24.9 mi.] Link Budget: 20.0 dB

TN-SFP-LXB42
1000BASE-LX 1550nm TX/1310nm RX SM (LC)
[40 km/24.9 mi.] Link Budget: 20.0 dB

TN-SFP-LXB61
1000BASE-LX 1310nm TX/1550nm RX SM (LC)
[60 km/37.3 mi.] Link Budget: 23.0 dB

TN-SFP-LXB62
1000BASE-LX 1550nm TX/1310nm RX SM (LC)
[60 km/37.3 mi.] Link Budget: 23.0 dB

TN-SFP-LXB81
1000BASE-LX 1510nm TX/1590nm RX SM (LC)
[80 km/49.7 mi.] Link Budget: 24.0 dB

TN-SFP-LXB82
1000BASE-LX 1590nm TX/1510nm RX SM (LC)
[80 km/49.7 mi.] Link Budget: 24.0 dB

TN-SFP-LXB121
1000BASE-LX 1510nm TX/1590nm RX SM (LC)
[120 km/74.6 mi.] Link Budget: 31.0 dB

TN-SFP-LXB122
1000BASE-LX 1590nm TX/1510nm RX SM (LC)
[120 km/74.6 mi.] Link Budget: 31.0 dB

TN-SFP-LXB161
1000BASE-LX 1510nm TX/1590nm RX SM (LC)
[160 km/99.4 mi.] Link Budget: 37.0 dB

TN-SFP-LXB162
1000BASE-LX 1590nm TX/1510nm RX SM (LC)
[160 km/99.4 mi.] Link Budget: 37.0 dB

TN-SFP-LXMB11
100Base-BX/1000Base-BX 1310nm TX/1550nm RX SM (LC)
[10 km/6.2 mi.] Link Budget: 11.0 dB

TN-SFP-LXMB12
100Base-BX/1000Base-BX 1550nm TX/1310nm RX SM (LC)
[10 km/6.2 mi.] Link Budget: 11.0 dB

TN-SFP-OC3MB1
100BASE-FX 1310nm TX/1550nm RX MM (SC)
[2 km/1.2 mi.] Link Budget: 15.0 dB

TN-SFP-OC3MB2
100BASE-FX 1550nm TX/1310nm RX MM (SC)
[2 km/1.2 mi.] Link Budget: 15.0 dB

TN-SFP-OC3SB21
100BASE-FX 1310nm TX/1550nm RX SM (LC)
[20 km/12.4 mi.] Link Budget: 19.0 dB

TN-SFP-OC3SB22
100BASE-FX 1550nm TX/1310nm RX SM (LC)
[20 km/12.4 mi.] Link Budget: 19.0 dB

TN-SFP-OC3SB41
100BASE-FX 1310nm TX/1550nm RX SM (LC)
[40 km/24.9 mi.] Link Budget: 25.0 dB

TN-SFP-OC3SB42
100BASE-FX 1550nm TX/1310nm RX SM (LC)
[40 km/24.9 mi.] Link Budget: 25.0 dB

TN-SFP-OC3SB61
100BASE-FX 1310nm TX/1550nm RX SM (LC)
[60 km/37.3 mi.] Link Budget: 29.0 dB

TN-SFP-OC3SB62
100BASE-FX 1550nm TX/1310nm RX SM (LC)
[60 km/37.3 mi.] Link Budget: 29.0 dB

TN-SFP-OC3SB81
100BASE-FX 1310nm TX/1550nm RX SM (LC)
[80 km/49.7 mi.] Link Budget: 31.0 dB

TN-SFP-OC3SB82
100BASE-FX 1550nm TX/1310nm RX SM (LC)
[80 km/49.7 mi.] Link Budget: 31.0 dB

TN-SFP-OC12SB41
100BASE-FX 1310nm TX/1550nm RX SM (LC)
[40 km/24.9 mi.] Link Budget: 25.0 dB

TN-SFP-OC12SB42
100BASE-FX 1550nm TX/1310nm RX SM (LC)
[40 km/24.9 mi.] Link Budget: 25.0 dB

Extended Operating Temperature -40°C to +85°C

TN-SFP-LXB11T
1000BASE-LX 1310nm TX/1550nm RX SM (LC)
[10 km/6.2 mi.] Link Budget: 11.0 dB

TN-SFP-LXB12T
1000BASE-LX 1550nm TX/1310nm RX SM (LC)
[10 km/6.2 mi.] Link Budget: 11.0 dB

TN-SFP-LXB21T
1000BASE-LX 1310nm TX/1550nm RX SM (LC)
[20 km/12.4 mi.] Link Budget: 14.0 dB

TN-SFP-LXB22T
1000BASE-LX 1550nm TX/1310nm RX SM (LC)
[20 km/12.4 mi.] Link Budget: 14.0 dB

small form factor pluggables

TN-SFP-xxx

SFP Modules: Small Form Factor Pluggables
MSA Compatible Duplex LC & RJ-45

Applications

▸ Gigabit Ethernet Switches and Routers

▸ Fibre Channel Switch Infrastructure

▸ xDSL Applications

▸ Metro Edge Switching

Features

▸ Hot-Pluggable SFP Footprint Duplex LC Optical Transceiver

▸ Digital Diagnostic Function

▸ Class 1 Laser International Safety Standard IEC-60825 Compliant

▸ Compatible with SFP Multi-Sourcing Agreement (MSA)

Additional Features

TN-SFP-SX or -LXx SFP modules

▸ Compliant with IEEE 802.3z

 Gigabit Ethernet

▸ Compliant with Fiber Channel 1X SM-LC-L FC-PI

Can be used on Fiber Transponder xFMFF4040-100

TN-SFP-OC3x SFP modules

▸ Compliant with 100BASE-FX

▸ Compliant with Intermediate-Reach SONET OC-3/SDH STM-1 (S-1.1)

TN-SFP-OC12x SFP modules

▸ Compliant with Intermediate-Reach SONET OC-12/SDH STM-4 (S-4.1)

TN-SFP-TX

▸ Compliant with IEEE 802.3u Fast Ethernet

TN-SFP-T-MG

▸ Compliant with IEEE 802.3:2002

▸ 10/100/1000BASE-T operation in host system with SGMII interface

▸ Compatible with 1000BASE-T Auto-Negotiation [pg 15]

▸ AutoCross™ [pg 15]

Specifications

Standards	IEEE 802.3 2003; ANSI X3.297-1997
Dimensions	**Width:** 0.52" [13 mm] **Depth:** 2.18" [55 mm] **Height:** 0.33" [8 mm]
Power	3.3V
Power Consumption	0.66 Watts
Environment	TN-SFP-SX TN-SFP-SXD TN-SFP-LX1 TN-SFP-ESX5 TN-SFP-ESX6 TN-SFP-OC3S3 TN-SFP-ELX1 TN-SFP-FC2XM TN-SFP-FC2XS2 -10°C – 85°C
	TN-SFP-LX3 TN-SFP-LX5 TN-SFP-LX8 TN-SFP-LX12 TN-SFP-LX16 TN-SFP-OCx TN-SFP-FC2XS40 TN-SFP-FC2XS15 TN-SFP-TX TN-SFP-T-MG 0°C – 70°C
Compliance	IEC-60825; FDA 21; CFR 1040.10 and 1040.11
Warranty	Lifetime

*Note: Per Cisco Systems' literature, the Cisco switches with SFP slots do not accept modules other than Cisco's own SFPs. The Cisco switch identifies the manufacturer ID along with the part number and blocks operations to this port for non-Cisco interfaces.

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

Ordering Information

Complete list of fiber optic connector specifications [pg 117-123]

TN-SFP-OC3M
 100BASE-FX/OC-3 1300nm multimode (LC)
 [2 km/1.2 mi.] Link Budget: 11.0 dB

TN-SFP-OC3S
 100BASE-FX/OC-3 1310nm single mode (LC)
 [20 km/12.4 mi.] Link Budget: 17.0 dB

TN-SFP-OC3S3
 100BASE-FX/OC-3 1310nm SM (LC)
 [30 km/18.6 mi.] Link Budget: 20.0 dB

TN-SFP-OC3S8
 100BASE-FX/OC-3 1550nm SM (LC)
 [80 km/49.7 mi.] Link Budget: 29.0 dB

TN-SFP-OC3S10
 100BASE-FX/OC-3 1550nm SM (LC)
 [100 km/62.1 mi.] Link Budget: 31.0 dB

TN-SFP-OC3S12
 100BASE-FX/OC-3 1550nm SM (LC)
 [120 km/74.6 mi.] Link Budget: 34.0 dB

TN-SFP-OC3S20
 100BASE-FX/OC-3 1550nm SM (LC)
 [200km/124.3 mi.] Link Budget: 46.0 dB

TN-SFP-OC12M
 OC-12/STM-4 SFP 1300nm MM (LC)
 [1 km/0.6 mi.] Link Budget: 7.0 dB

TN-SFP-OC12S
 OC-12/STM-4 SFP 1310nm SM (LC)
 [20 km/12.4 mi.] Link Budget: 14.0 dB

TN-SFP-OC12S4
 OC-12/STM-4 SFP 1310nm SM (LC)
 [40 km/24.9 mi.] Link Budget: 28.0 dB

TN-SFP-OC12S8
 OC-12/STM-4 SFP 1310nm SM (LC)
 [80 km/49.7 mi.] Link Budget: 29.0 dB

TN-SFP-OC3MT
 100BASE-FX/OC-3 1300nm MM (LC)
 [2 km/1.2 mi.] Link Budget: 11.0 dB

TN-SFP-OC3ST
 100BASE-FX/OC-3 1310nm SM (LC)
 [20 km/12.4 mi.] Link Budget: 17.0 dB

TN-SFP-SX (model without DMI)
TN-SFP-SXD (model with DMI)
 1000BASE-SX 850nm multimode (LC)
 [62.5/125 µm: 220 m/722 ft.] Link Budget: 8.0 dB
 [50/125 µm: 550 m/1804 ft.] Link Budget: 8.0 dB

TN-SFP-ESX5
 1000BASE-SX 1300nm Ext. MM (LC)
 [50/125 µm fiber only: up to 2 km/1.2 mi.] Link Budget: 8.0 dB

TN-SFP-ESX6
 1000BASE-SX 1300nm Ext. MM (LC)
 [62.5/125 µm fiber only: up to 2 km/1.2 mi.] Link Budget: 8.0 dB

TN-SFP-FC4XM
 Fiber Channel 1x/2x/4x/1000BASE-SX 850nm (LC) multimode
 [62.5/125 µm:70m/246 ft.]
 [50/125 µm: 150m/492 ft.]
 Link Budget: 6.0 dB

TN-SFP-FC4XS5
 Fiber Channel 1x/2x/4x/1000BASE-LX 1310 nm (LC) SM
 [5 km/3.1 mi.] Link Budget: 10.0 dB

TN-SFP-FC4XS10
 Fiber Channel 1x/2x/4x/1000BASE-LX 1310 nm (LC) SM
 [10 km/6.2 mi.] Link Budget: 10.0 dB

TN-SFP-FC4XS20
 Fiber Channel 1x/2x/4x/1000BASE-LX 1310 nm (LC) SM
 [20 km/12.4 mi.]Link Budget: 13.0 dB

TN-SFP-FC4XS40
 Fiber Channel 1x/2x/4x/1000BASE-LX 1550 nm (LC) SM
 [40 km/24.9 mi.]Link Budget: 18.0 dB

TN-SFP-FC4XS80
 Fiber Channel 1x/2x/4x/1000BASE-LX 1550 nm (LC) SM
 [80 km/49.7 mi.] Link Budget: 26.0dB

TN-SFP-LX1 (model with DMI)
TN-SFP-ELX1 (model without DMI)
 1000BASE-LX 1310nm single mode (LC)
 [10 km/6.2 mi.] Link Budget: 11.5 dB

TN-SFP-LX3
 1000BASE-LX 1310nm single mode (LC)
 [30 km/18.6 mi.] Link Budget: 19.0 dB

TN-SFP-LX5
 1000BASE-LX 1550nm single mode (LC)
 [50 km/31.1 mi.] Link Budget: 19.0 dB

TN-SFP-LX8
 1000BASE-LX 1550nm single mode (LC)
 [80 km/49.7 mi.] Link Budget: 24.0 dB

TN-SFP-LX12
 1000BASE-LX 1550nm single mode (LC)
 [120 km/74.6 mi.] Link Budget: 32.0 dB

TN-SFP-LX16
 1000BASE-LX 1550nm single mode (LC)
 [160 km/99.4 mi.] Link Budget: 37.0 dB

TN-SFP-LX20
 1000BASE-LX 1550 nm (LC) SM
 [200 km/124.3 mi.] Link Budget: 41.0 d

TN-SFP-FC2XM
 OC-48/STM-16/Fibre Channel 1x/2x/1000BASE-SX 850nm (LC) MM
 [62.5/125 µm: 150 m/492 ft.]*
 Link Budget: 6.0 dB
 [50/125 µm: 300 m/984 ft.]*
 Link Budget: 6.0 dB

TN-SFP-FC2XS2
 Fibre Channel 2x/1x/OC-48/STM-16/ 1000BASE-LX 1310nm single mode (LC)
 [2 km/1.2 mi.] Link Budget: 8.5 dB

TN-SFP-FC2XS15
 Fibre Channel 2x/1x/OC-48/STM-16/1000BASE-LX 1310nm single mode (LC)
 [15 km/9.3 mi.] Link Budget: 13.0 dB

TN-SFP-FC2XS40
 Fibre Channel 2x/1x/OC-48/STM-16/ 1000BASE-LX 1310nm single mode (LC)
 [40 km/24.9 mi.] Link Budget: 26.0 dB

TN-SFP-TX
 100BASE-TX (RJ-45)
 [100 m/328 ft.]

TN-SFP-T-MG
 10/100/1000BASE-T (RJ-45)
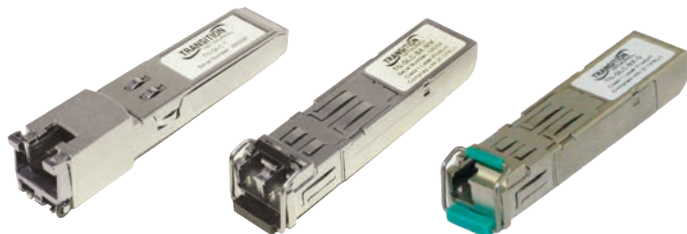 **[100 m/328 ft.]**

Extended Operating Temperature: -40°C to +85°C

TN-SFP-LX1T
 1000BASE-LX 1310nm single mode (LC)
 [10 km/6.2 mi.] Link Budget: 11.5 dB

cisco compatible small form factor pluggables

TN-GLC-xxx & TN-SFP-GE-x

SFP Modules: Small Form Factor Pluggables
Cisco Compatible

Features

▶ Hot-Pluggable SFP Footprint Duplex LC Optical Transceiver - both simplex and duplex

▶ Class 1 Laser International Safety

Standard IEC-60825 Compliant

▶ Compatible with SFP Multi-Sourcing Agreement (MSA)

Additional Features

TN-GLX-xxx (except those below)

▶ Compliant with IEEE 802.3z Gigabit Ethernet

▶ Compliant with Fiber Channel 1X SM-LC-L FC-PI

TN-GLC-FE-xxx & TN-GLC-GE-xxx modules

▶ Compliant with IEEE 802.3100BASE-FX

▶ Compliant with IEEE 802.3ah100BASE-FX

▶ Compliant with Intermediate-Reach SONET OC-3/SDH STM-1 (S-1.1)

Can be used on Fiber Transponder xFMFF4040-100

TN-SFP-GE-x modules

▶ Compliant with IEEE 802.3z Gigabit Ethernet

▶ Digital Diagnostic Function

▶ Extended operating temperature

Applications

▶ Gigabit Ethernet Switches & Routers

▶ Fibre Channel Switch Infrastructure

▶ xDSL Applications

▶ Metro Edge Switching

Specifications

Complete list of fiber optic connector specifications [pg 117-123]

Standards	IEEE 802.3 2003; ANSI X3.297-1997
Dimensions (fiber)	**Width:** 0.52" [13 mm] **Depth:** 2.18" [55 mm] **Height:** 0.33" [8 mm]
Dimensions (copper)	**Width:** 0.95" [24 mm] **Depth:** 2.8" [71 mm] **Height:** 0.54" [14 mm]
Power	3.3V
Power Consumption	0.66 Watts (fiber) 1.0 Watts (copper)
Environment TN-GLC-xxx	0°C – 70°C operating 40°C – 85°C storage
TN-SFP-GE-x TN-GLC-xxx-RGD TN-SFP-GE-T	-40°C – 85°C operating -40°C – 100°C storage -10°C – 80°C operating
Compliance	IEC-60825; FDA 21; CFR 1040.10 and 1040.11
Warranty	Lifetime

* Note: The Transition Networks TN-GLC-xxx series small form factor pluggable (SFP) tranceiver modules are designed to install in any SFP port allowing for 1000Base-T, 1000Base-SX or 1000Base-LX interfaces to the network through the SFP connector. The TN-GLC-xxx tranceivers are Cisco compatible* and are designed for bi-directional serial-optical data communication such as Gigabit Ethernet or fiber channel at speeds up to 1.25 Gbps.

*Transition Networks' SFP modules fully comply with the Multi-Sourcing Agreement (MSA). This compliance allows our SFP modules to be used in all other MSA compliant SFP platforms. In addition, TN SFP modules are also compatible with all Cisco SFP-based routers and switches, as well as Cisco's IOS software. TN SFP modules ARE NOT Cisco OEM brand modules.

Ordering Information

Complete list of fiber optic connector specifications [pg 117-123]

Standard Operating Temperature -0°C to +70°C

TN-GLC-T
1000BASE-T (RJ-45) **[100 m/328 ft.]**

TN-GLC-SX-MM
1000BASE-SX 850nm multimode (LC)
[62.5/125 µm: 220 m/722 ft.]
Link Budget: 8.5 dB
[50/125 µm: 550 m/1804 ft.]
Link Budget: 8.5 dB

TN-GLC-SX-MM-2K
1000BASE-SX 1300nm Ext. MM (LC)
[2 km/1.2 mi.] Link Budget: 10.0 dB

TN-GLC-LH-SM
1000BASE-LX 1310nm single mode (LC)
[10 km/6.2 mi.] Link Budget: 10.5 dB

TN-GLC-LHX-SM
1000BASE-LX 1310nm single mode (LC)
[40 km/24.9 mi.]Link Budget: 22.0 dB

TN-GLC-ZX-SM
1000BASE-LX 1550nm single mode (LC)
[80 km/49.7 mi.]Link Budget: 24.0 dB

TN-GLC-ZX-SM-15
1000BASE-LX 1550nm single mode (LC)
[150 km/93.2 mi.]Link Budget: 37.0 dB

TN-GLC-BX-U
1000BASE-BX 1310nm TX/1490nm RX single fiber single mode (LC)
[10 km/6.2 mi.] Link Budget: 12.0 dB

TN-GLC-BX-D
1000BASE-BX 1490nm TX/1310nm RX single fiber single mode (LC)
[10 km/6.2 mi.] Link Budget: 12.0 dB

TN-GLC-BX-U-40
1000BASE-BX 1310nm TX/1490nm RX single fiber single mode (LC)
[40 km/24.9 mi.]Link Budget: 20.0 dB

TN-GLC-BX-D-40
1000BASE-BX 1490nm TX/1310nm RX single fiber single mode (LC)
[40 km/24.9 mi.]Link Budget: 20.0 dB

TN-GLC-BX-U-60
1000BASE-BX 1310nm TX/1490nm RX single fiber single mode (LC)
[60 km/37.3 mi.]Link Budget: 23.0 dB

TN-GLC-BX-U-80
1000BASE-BX 1490nm TX/1550nm RX single fiber single mode (LC)
[80 km/49.7 mi.]Link Budget: 26.0 dB

TN-GLC-BX-U-120
1000BASE-BX 1490nm TX/1550nm RX single fiber single mode (LC)
[120 km/74.6 mi.]Link Budget: 31.0 dB

TN-GLC-BX-D-60
1000BASE-BX 1490nm TX/1310nm RX single fiber single mode (LC)
[60 km/37.3 mi.]Link Budget: 23.0 dB

TN-GLC-BX-D-80
1000BASE-BX 1550nm TX/1490nm RX single fiber single mode (LC)
[80 km/49.7 mi.]Link Budget: 26.0 dB

TN-GLC-BX-D-120
1000BASE-BX 1550nm TX/1490nm RX single fiber single mode (LC)
[120 km/74.6 mi.]Link Budget: 31.0 dB

TN-GLC-FE-100BX-U
100BASE-BX 1310nm TX/1550nm RX single fiber single mode (LC)
[10 km/6.2 mi.] Link Budget: 18.0 dB

TN-GLC-FE-100BX-U-20
100BASE-BX 1310nm TX/1550nm RX single fiber single mode (LC)
[20 km/12.4 mi.]Link Budget: 20.0 dB

TN-GLC-FE-100BX-U-40
100BASE-BX 1310nm TX/1550nm RX single fiber single mode (LC)
[40 km/24.9 mi.]Link Budget: 26.0 dB

TN-GLC-FE-100BX-U-80
100BASE-BX 1310nm TX/1550nm RX single fiber single mode (LC)
[80 km/49.7 mi.] Link Budget: 32.0 dB

TN-GLC-FE-100BX-D
100BASE-BX 1550nm TX/1310nm RX single fiber single mode (LC)
[10 km/6.2 mi.] Link Budget: 18.0 dB

TN-GLC-FE-100BX-D-20
100BASE-BX 1550nm TX/1310nm RX single fiber single mode (LC)
[20 km/12.4 mi.] Link Budget: 20.0 dB

TN-GLC-FE-100BX-D-40
100BASE-BX 1550nm TX/1310nm RX single fiber single mode (LC)
[40 km/24.9 mi.] Link Budget: 26.0 dB

TN-GLC-FE-100BX-D-80
100BASE-BX 1310nm TX/1550nm RX single fiber single mode (LC)
[80 km/49.7 mi.] Link Budget: 32.0 dB

*TN-GLC-FE-100FX
100BASE-FX 1300nm multimode (LC)
[2 km/1.2 mi.] Link Budget: 8.5 dB

TN-GLC-FE-100LX
100BASE-FX 1310nm single mode (LC)
[10 km/6.2 mi.] Link Budget: 19.0 dB

*TN-GLC-GE-100FX
100BASE-FX 1300nm multimode (LC)
[2 km/1.2 mi.] Link Budget: 8.5 dB

Extended Operating Temperature -40°C to +85°C

*TN-GLC-FE-100FX-RGD
100BASE-FX 1300nm multimode (LC)
[2 km/1.2 mi.] Link Budget: 8.5 dB

TN-GLC-FE-100LX-RGD
100BASE-FX 1310nm single mode (LC)
[10 km/6.2 mi.] Link Budget: 19.0 dB

TN-GLC-SX-MM-RGD
1000BASE-SX 850nm multimode (LC)
[62.5/125 µm: 220 m/722 ft.]
Link Budget: 8.5 dB
[50/125 µm: 550 m/1804 ft.]
Link Budget: 8.5 dB

TN-SFP-GE-S
1000BASE-SX 850nm multimode (LC)
[62.5/125 µm: 220 m/722 ft.]
Link Budget: 8.5 dB
[50/125 µm: 550 m/1804 ft.]
Link Budget: 8.5 dB

TN-GLC-LX-SM-RGD
1000BASE-LX 1310nm single mode (LC)
[10 km/6.2 mi.] Link Budget: 10.5 dB

TN-GLC-ZX-SM-RGD
1000BASE-LX 1550nm single mode (LC)
[80 km/49.7 mi.]Link Budget: 24.0 dB

TN-SFP-GE-L
1000BASE-LX 1310nm single mode (LC)
[10 km/6.2 mi.] Link Budget: 10.5 dB

TN-SFP-GE-Z
1000BASE-LX 1550nm single mode (LC)
[80 km/49.7 mi.] Link Budget: 24.0 dB

TN-SFP-GE-T
1000BASE-T (RJ-45) **[100 m/328 ft.]**

*Provides 100BASE-FX interface when plugged into a Gigabit SFP slot on Cisco Catalyst 2970, 3560 & 3750 series switches.

small form factor pluggables

TN-SFP-xxx-Cxx

SFP Modules: **Small Form Factor Pluggables CWDM Wavelengths**

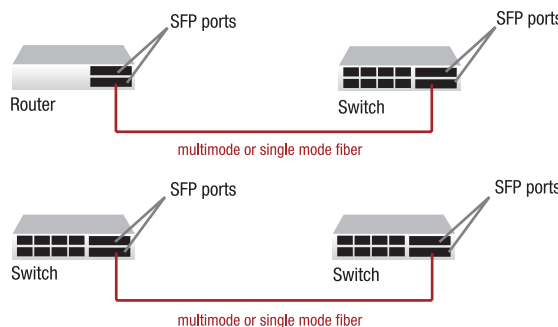### Features

▸ Coarse Wavelength Division Multiplexing (CWDM) ITU Grid Compliant Wavelengths
▸ Hot-Pluggable SFP Footprint Duplex LC Optical Transceiver
▸ Digital Diagnostic Function
▸ Class 1 Laser International Safety Standard IEC-60825 Compliant
▸ Compatible with SFP Multi-Sourcing Agreement (MSA)

Additional Features

TN-SFP-LX8-Cxx/TN-SFP-LX16-Cxx SFP modules

▸ Compliant with IEEE 802.3z Gigabit Ethernet
▸ Compliant with Fiber Channel 1X SM-LC-L FC-PI (Can be used on Optical Line Converter xFMFF4040-100)

TN-SFP-OC3S8-Cxx/TN-SFP-OC3S16-Cxx SFP modules

▸ Compliant with 100BASE-FX
▸ Compliant with Intermediate-Reach SONET OC-3/SDH STM-1 (S-1.1)

TN-SFP-OC12S-Cxx SFP modules

▸ Compliant with Intermediate-Reach SONET OC-12/SDH STM-4 (S-4.1)

TN-SFP-OC48S-Cxx SFP modules

▸ Compliant with IEEE 802.3z Gigabit Ethernet
▸ Compliant with Fiber Channel 1X SM-LC-L FC-PI
▸ Compliant with Short-Reach SONET OC-48/SDH STM-16 (S-16.1)

*Note: Per Cisco Systems' literature, the Cisco switches with SFP slots do not accept modules other than Cisco's own SFPs. The Cisco switch identifies the manufacturer ID along with the part number and blocks operations to this port for non-Cisco interfaces.

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

Fiber Connections with SFPs

SFP ports   SFP ports

Router   Switch

multimode or single mode fiber

SFP ports   SFP ports

Switch   Switch

multimode or single mode fiber

Applications

▸ Gigabit Ethernet Switches and Routers
▸ Fibre Channel Switch Infrastructure
▸ xDSL Applications
▸ Metro Edge Switching

Specifications

Complete list of fiber optic connector specifications [pg 117-123]

Standards	IEEE 802.3 2003; ANSI X3.297-1997 (see additional standards by part number to the left)
Output Wavelength	$-5.5nm < \lambda_c < +7.5nm$
Dimensions	**Width**: 0.52" [13 mm] **Depth**: 2.18" [55 mm] **Height**: 0.33" [8 mm]
Power	3.3V
Power Consumption	0.66 Watts

SKU	Min	Typical	Max
TN-SFP-OC3S8-Cxx	--	155	200
TN-SFP-OC12S-Cxx	--	622	--
TN-SFP-LX8-Cxx	100	1250	--
TN-SFP-OC48S-Cxx	622	2488	2670

Environment	0°C – 70°C
Compliance	IEC-60825; FDA 21; CFR 1040.10 and 1040.11
Warranty	Lifetime

Ordering Information

Complete list of fiber optic connector specifications [pg 117-123]

TN-SFP-OC3S8-Cxx
SFP 100BASE-FX/OC-3 single mode (LC)
[80 km/49.7 mi.] Link Budget: 29.0 dB

TN-SFP-OC3S16-Cxx
SFP 100BASE-FX/OC-3 single mode (LC)
[160 km/99.4 mi.] Link Budget: 37.0 dB

TN-SFP-OC12S-Cxx
OC-12/STM-4 single mode (LC)
[80 km/49.7 mi.] Link Budget: 29.0 dB

TN-SFP-LX8-Cxx
1000BASE-LX/Fibre Channel 1x single mode (LC)
[80 km/49.7 mi.] Link Budget: 24.0 dB

TN-SFP-LX16-Cxx
1000BASE-LX/Fibre Channel 1x single mode (LC)
[160 km/99.4 mi.] Link Budget: 37.0 dB

TN-SFP-OC48S-Cxx
OC-48/STM-16/Fibre Channel 2x/1x/1000BASE-LX single mode (LC)
[40 km/24.9 mi.] Link Budget: 18.0 dB

TN-SFP-FC4XS-Cxx
Fibre Channel 4X/2x/1x/1000BASE-LX (LC) SM
[40 km/24.9 mi.] Link Budget: 18.0 dB

xx = center wavelength (l_c)

27 = 1270nm	45 = 1450nm
29 = 1290nm	47 = 1470nm
31 = 1310nm	49 = 1490nm
33 = 1330nm	51 = 1510nm
35 = 1350nm	53 = 1530nm
37 = 1370nm	55 = 1550nm
39 = 1390nm	57 = 1570nm
41 = 1410nm	59 = 1590nm
43 = 1430nm	61 = 1610nm

NEW PRODUCT

small form factor pluggables

TN-CWDM-xxx-1xx0

SFP Modules: Small Form Factor Pluggables CWDM Wavelengths Cisco Compatible

Features

▶ Coarse Wavelength Division Multiplexing (CWDM) ITU Grid Compliant Wavelengths

▶ Hot-Pluggable SFP Optical Transceiver With Duplex LC Connector

▶ Digital Diagnostic Function (DMI)

▶ Class 1 Laser International Safety Standard IEC-60825 Compliant

▶ Compatible with SFP Multi-Sourcing Agreement (MSA)

▶ Single +3.3 V Power Supply

▶ RoHS Compliant

Additional Features

▶ Compliant with IEEE 802.3z 1000BASE-LX/ZX

▶ Compliant with Fiber Channel 1x SM-LC-L FC-PI

▶ **TN-CWDM-SFP-1xx0 SFP Modules**

  Compliant eith IEEE 802.3z 1000Base-LX/ZX
  Compliant with Fiber Channel
  1x SM-LC-L FC-PI

▶ **TN-CWDM-100LX-1xx0 SFP Modules**

  Compliant with IEEE 802.3 100Base-FX

Fiber Connections with SFPs

SFP ports

SFP ports

Router

Switch

multimode or single mode fiber

SFP ports

SFP ports

Switch

Switch

multimode or single mode fiber

Applications

▶ Gigabit Ethernet Switches and Routers

▶ Fibre Channel Switch Infrastructure

▶ xDSL Applications

▶ Metro Edge Switching

Specifications

Complete list of fiber optic connector specifications [pg 117-123]

Standards	IEEE 802.3z, IEEE 802.3
Output Wavelength	$-5.5nm < \lambda_c < +7.5nm$
Dimensions	**Width:** 0.52" [13 mm] **Depth:** 2.18" [55 mm] **Height:** 0.33" [8 mm]
Power	3.3V
Environment	0°C to 70°C operating -40°C to 85°C storage
Compliance	IEC-60825; FDA 21; CFR 1040.10 and 1040.11
Warranty	Lifetime

Ordering Information

Complete list of fiber optic connector specifications [pg 117-123]

TN-CWDM-SFP-1xx0
  1000Base-LX/ZX Fibre Channel
  single mode (LC)
  [80 km/49.7 mi.] Link Budget: 24.0 dB

TN-CWDM-100LX-1xx0
  100Base-LX/SONET OC-3/SDH STM-1
  single mode (LC)
  [80 km/49.7 mi.] Link Budget: 29.0 dB

xx = center wavelength (l_c)

27 = 1270nm	45 = 1450nm
29 = 1290nm	47 = 1470nm
31 = 1310nm	49 = 1490nm
33 = 1330nm	51 = 1510nm
35 = 1350nm	53 = 1530nm
37 = 1370nm	55 = 1550nm
39 = 1390nm	57 = 1570nm
41 = 1410nm	59 = 1590nm
43 = 1430nm	61 = 1610nm

Note: The Transition Networks TN-CWDM-SFP-1xx0 and TN-CWDM-100LX-1xx0 small form factor pluggables (SFPs) are Cisco Compatible and are designed for bi-directional serial optical data communications such as Gigabit Ethernet, or Fibre Channel 1x. Each SFP operates at a nominal CWDM wavelength. There are 18 wavelengths available in 20nm steps from 1270nm to 1610nm.

*Transition Networks' SFP modules fully comply with the Multi-Sourcing Agreement (MSA). This compliance allows our SFP modules to be used in all other MSA compliant SFP platforms. In addition, TN-CWDM-SFP-1xx0 modules are also compatible with all Cisco SFP-based equipment, as well as Cisco's IOS software. TN SFP modules ARE NOT Cisco OEM brand modules.

small form factor pluggables

TN-J48xxx

SFP Modules: Small Form Factor Pluggables HP Compatible

Features

‣ Hot-Pluggable SFP Optical Transceiver with Duplex LC Connector

‣ Class 1 Laser International Safety Standard IEC-60825 Compliant

‣ Compatible with SFP Multi-Sourcing Agreement (MSA)

Additional Features

TN-J4858C module

‣ Compliant with IEEE 802.3z 1000BASE-SX

TN-J4859C module

‣ Compliant with IEEE 802.3z 1000BASE-LX

TN-J4860C module

‣ Compliant with IEEE 802.3z 1000BASE-ZX

*Note: Per HP literature, the HP switches with SFP slots do not accept modules other than HP's own SFPs. The HP switch identifies the manufacturer ID along with the part number and blocks operations to this port for non-HP interfaces.

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

Fiber Connections with SFPs
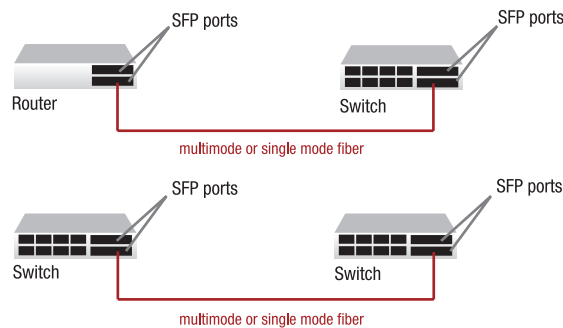
Applications

‣ Gigabit Ethernet Switches and Routers

‣ Fibre Channel Switch Infrastructure

‣ xDSL Applications

‣ Metro Edge Switching

Specifications

Complete list of fiber optic connector specifications [pg 117-123]

Standards	IEEE 802.3z
Dimensions	**Width:** 0.52" [13 mm] **Depth:** 2.2" [56 mm] **Height:** 0.33" [8 mm]
Power	3.3V
Environment	0°C to 70°C operating -40°C to 85°C storage
Compliance	IEC-60825; FDA 21; CFR 1040.10 and 1040.11
Warranty	Lifetime

Ordering Information

Complete list of fiber optic connector specifications [pg 117-123]

TN-J4858C
1000Base-SX 850nm (LC) multimode
[62.5/125 µm fiber: 220 m/722 ft.]
[50/125 µm fiber: 550 m/1804 ft.]
Link Budget: 9.0 dB

TN-J4859C
1000Base-LX 1310nm (LC) single mode
[20 km/12.4 mi.] Link Budget: 16.0 dB

TN-J4860C
1000Base-LX/ZX 1550nm (LC) single mode
[80 km/49.7 mi.] Link Budget: 24.0 dB

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10GBase SFP+

TN-10GSFP-xR(x)

10GBase SFP+ Modules: **10GBase SFP+ MSA Compatible Duplex LC**

TN-10GSFP-SR:

▸ Compliant with IEEE 802.3ae 10GBASE-SR/SW
▸ Link Length up to 300 m with OM3 multi-mode fiber; 82 m with OM2 multi-mode fiber; 33 m with OM1 multimode fiber

TN-10GSFP-LRx:

▸ Compliant with IEEE 802.3ae 10GBASE-LR/LW
▸ Maximum Link Length of 70 KM

Features

▸ SFP+ Optical Transceiver with duplex LC connector
▸ 10G small Form-Factor Pluggable (SFP+) MSA compatible
▸ SFF-8472 Digital Diagnostic Function (DMI)
▸ Single +3.3 V Power Supply,
▸ Up to 10.5 Gbps bidirectional data links
▸ RoHS Compliant (all models)
▸ 0 to 70°C Operating Temperature range
▸ -40 to 85°C Storage Temperature range
▸ Class 1 Laser International Safety Standard IEC 60825 Compliant

Specifications

Complete list of fiber optic connector specifications [pg 117-123]

Standards	IEEE 802.3ae
Data Rates	10.3 Gbps
Dimensions	Width: 0.52" [13 mm] Depth: 2.2" [56 mm] Height: 0.33" [8 mm]
Power Supply	+3.3V
Operating Temp	0°C - 70°C (32°F to 158°F)
Storage Temp	-40°C - 85°C (-40°F to 185°F)
Compliance	IEC-60825; FAD 21; CFR 1040.10 and 1040.11
Warranty	Lifetime

Ordering Information

Complete list of fiber optic connector specifications [pg 117-123]

*TN-10GSFP-SR
10GBase-SR/SW, SFP+ w/ Digital Diagnostics (DMI) 850nm (LC) **[300/82/33 m; 985/269/108 ft.] Link Budget: 2.6 dB**

TN-10GSFP-LR1
10GBase-LR/LW, SFP+ w/ Digital Diagnostics (DMI) 1310nm (LC) **[10 km/6.2 mi.] Link Budget: 6.4 dB**

TN-10GSFP-LR2
10GBase-LR/LW, SFP+ w/ Digital Diagnostics (DMI) 1310nm (LC) **[20 km/12.4 mi.] Link Budget: 11.4 dB**

TN-10GSFP-LR4
10GBase-LR/LW, SFP+ w/ Digital Diagnostics (DMI) 1310nm (LC) **[40 km/24.9 mi.] Link Budget: 16.5 dB**

TN-10GSFP-LR7
10GBase-LR/LW, SFP+ w/ Digital Diagnostics (DMI) 1310nm (LC) **[70 km/43.4 mi.] Link Budget: 25 dB**

TN-10GSFP-LRB11
10GBase-BX, SFP+ w/ Digital Diagnostics (DMI) 1270nm TX/1330nm RX SM (LC) **[10 km/6.2 mi.] Link Budget: 9.0 dB**

TN-10GSFP-LRB12
10GBase-BX, SFP+ w/ Digital Diagnostics (DMI) 1330nm TX/1270nm RX SM (LC) **[10 km/6.2 mi.] Link Budget: 9.0 dB**

TN-10GSFP-LRB21
10GBase-BX, SFP+ w/ Digital Diagnostics (DMI) 1270nm TX/1330nm RX SM (LC) **[20 km/12.4 mi.] Link Budget: 12.0 dB**

TN-10GSFP-LRB22
10GBase-BX, SFP+ w/ Digital Diagnostics (DMI) 1330nm TX/1270nm RX SM (LC) **[20 km/12.4 mi.] Link Budget: 12.0 dB**

TN-10GSFP-LRB41
10GBase-BX, SFP+ w/ Digital Diagnostics (DMI) 1270nm TX/1330nm RX SM (LC) **[40 km/24.9 mi.] Link Budget: 16.0 dB**

TN-10GSFP-LRB42
10GBase-BX, SFP+ w/ Digital Diagnostics (DMI) 1330nm TX/1270nm RX SM (LC) **[40 km/24.9 mi.] Link Budget: 16.0 dB**

TN-10GSFP-LRB61
10GBase-BX, SFP+ w/ Digital Diagnostics (DMI) 1270nm TX/1330nm RX SM (LC **[60 km/37.3 mi.] Link Budget: 23.0 dB**

TN-10GSFP-LRB62
10GBase-BX, SFP+ w/ Digital Diagnostics (DMI) 1330nm TX/1270nm RX SM (LC)) **[60 km/37.3 mi.] Link Budget: 23.0 dB**

*Distance up to 300m on 50/125 OM3 multi-mode fiber, up to 82 m for 50/125 um multi-mode fiber with model.

Bandwidth 500 MHz-km at 850nm, and up to 33 m for 62.5/125 um multi-mode fiber with model bandwidth 200 MHzkm at 850nm.

CWDM modules

TN-CWDM-xxx-1xx0-x0

CWDM Modules: 10G CWDM Cisco Compatible

Applications

▸ 10G Ethernet Switches and Routers
▸ xDSL Applications
▸ Metro Edge Switching

Features

▸ Compliant with IEEE 802.3ae 10GBASE-ER/EW
▸ SFF-8472 Digital Diagnostic Function (DMI)
▸ Maximum Link Length of 80KM
▸ RoHS Compliant (all models)
▸ 0 to 70°C Operating Temperature range
▸ -40 to 85°C Storage Temperature range
▸ Class 1 Laser International Safety Standard IEC 60825 Compliant

TN-CWDM-X2-1xx0-x0 X2 features:

• X2 Optical Transceiver with duplex SC connector
• Support +3.3V Power Supply

TN-CWDM-XFP-1xx0-x0 XFP features:

• XFP Optical Transceiver with duplex LC connector
• Low Power Dissipation < 2W
• Support both +5 V and +3.3 V Power Supply

TN-CWDM-10G-1xx0-x0 SFP+ features:

• SFP+ Optical Transceiver with duplex LC connector
• Single +3.3 V Power Supply

Specifications

Complete list of fiber optic connector specifications [pg 117-123]

Standards	IEEE 802.3ae
Output Wavelength	$-5.5nm < \lambda_c < +7.5nm$

Dimensions

TN-CWDM-X2-1xx0-x0 X2:

Width: 1.42" [36mm]
Depth: 3.58" [91mm]
Height: 0.53" [13.46 mm]

TN-CWDM-XFP-1xx0-x0 XFP:

Width: 0.71" [18mm]
Depth: 3.07" [78mm]
Height: 0.33" [8 mm]

TN-CWDM-10G-1xx0-x0 SFP+:

Width: 0.52" [13mm]
Depth: 2.18" [55mm]
Height: 0.33" [8 mm]

Power	+5v, 3.3v
Environment	0°C to 70°C operating -40°C to 85°C storage
Compliance	IEC-60825; FDA 21; CFR 1040.10 and 1040.11
Warranty	Lifetime

Ordering Information

Complete list of fiber optic connector specifications [pg 117-123]

TN-CWDM-X2-1xx0-40
10GBase-ER/EW,X2 w/Digital Diagnostics (DMI) single mode (SC)
[40 km/49.7 mi.] Link Budget: 15.5 dB

TN-CWDM-X2-1xx0-80
10GBase-ZR/ZW, X2 w/Digital Diagnostics (DMI) single mode (SC)
[80 km/49.7 mi.] Link Budget: 24.0 dB

TN-CWDM-XFP-1xx0-40
10GBase-LR/LW/10G Fibre Channel, XFP w/Digital Diagnostics (DMI) single mode (LC)
[40 km/49.7 mi.] Link Budget: 14.6 dB

TN-CWDM-XFP-1xx0-80
10GBase-LR/LW/10G Fibre Channel, XFP w/Digital Diagnostics (DMI) single mode (LC)
[80 km/49.7 mi.] Link Budget: 24.0 dB

TN-CWDM-10G-1xx0-40
10GBase-LR/LW/10G Fibre Channel, SFP+ w/Digital Diagnostics (DMI) single mode (LC)
[40 km/49.7 mi.] Link Budget: 14.1 dB

TN-CWDM-10G-1xx0-80
10GBase-LR/LW/10G Fibre Channel, SFP+ w/Digital Diagnostics (DMI) single mode (LC)
[80 km/49.7 mi.] Link Budget: 24.0 dB

xx = center wavelength (l_c)

47 = 1470nm
49 = 1490nm
51 = 1510nm
53 = 1530nm
55 = 1550nm
57 = 1570nm
59 = 1590nm
61 = 1610nm

Note: The Transition Networks TN-CWDM-xxx-1xx0-x0 10G modules are Cisco Compatible and are designed for bi-directional serial optical data communications such as 10G Ethernet. Each X2/XFP/SFP+ operates at a nominal CWDM wavelength. There are 8 wavelengths available in 20nm steps from 1470nm to 1610nm.

*Transition Networks' X2/XFP/SFP+ modules fully comply with the Multi-Sourcing Agreement (MSA). This compliance allows our X2/XFP/SFP+ modules to be used in all other MSA compliant XFP platforms. In addition, TN-CWDM-xxx-1xx0-x0 modules are also compatible with all Cisco X2/XFP/SFP+-based equipment, as well as Cisco's IOS software. TN SFP modules ARE NOT Cisco OEM brand modules.

NEW PRODUCT

small form factor pluggables

TN-EX-SFP-xx-xx & TN-JX-xx-xx

SFP Modules: SFP – Juniper Compatible

Features

▶ Small Form-Factor Pluggable (SFP) MSA compatible
▶ Compliant with IEEE 802.3z 1000BASE-SX/LX
▶ Compliant witt IEEE 802.3 100Base-FX
▶ Single +3.3 V Power Supply
▶ RoHS Compliant (all models)
▶ 0 to 70°C Operating Temperature range
▶ Class 1 Laser International Safety Standard
  EC 60825 Compliant

Fiber Connections with SFPs
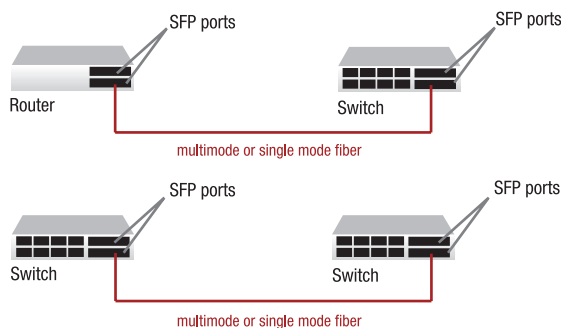
SFP ports   SFP ports

Router   Switch

multimode or single mode fiber

SFP ports   SFP ports

Switch   Switch

multimode or single mode fiber

Applications

▶ Gigabit Ethernet Switches and Routers
▶ Fibre Channel Switch Infrastructure
▶ xDSL Applications
▶ Metro Edge Switching

Specifications

Complete list of fiber optic connector specifications [pg 117-123]

Standards	IEEE 802.3
Dimensions	**Width:** 0.52" [13 mm] **Depth:** 2.2" [56 mm] **Height:** 0.33" [8 mm]
Power	3.3V
Environment	0°C to 70°C operating -40°C to 85°C storage
Compliance	IEC-60825; FDA 21; CFR 1040.10 and 1040.11
Warranty	Lifetime

Ordering Information

Complete list of fiber optic connector specifications [pg 117-123]

TN-EX-SFP-1FE-FX
100Base-FX 1310nm Multimode (LC)
[2 km/1.24 mi.] Link Budget: 8.0 dB

TN-EX-SFP-1FE-LX
100Base-FX 1310nm (LC) single mode
[10 km/6.2 mi.] Link Budget: 14.0 dB

TN-EX-SFP-1GE-SX
1000Base-SX 850nm (LC) Multimode
[62.5/125 um: 220 m/722 ft.]
[50/125 um: 550 m/1804 ft.]
Link Budget: 9.0 dB

TN-EX-SFP-1GE-LX
1000Base-LX 1310nm (LC) single mode
[10 km/6.2 mi.] Link Budget: 9.0 dB

*TN-JX-GE-100FX
100Base-FX 1310nm(LC) Multimode
[2 km/1.24 mi.] Link Budget: 8.0 dB

* Provides 100Base-FX interface when plugged
   into a Gigabit SFP slot in Juniper switches

NEW PRODUCT

HP Compatible 10G SFP+

TN-J91xx

10GBase SFP+ Modules: **10GBase SFP+ HP Compatible**

Applications

▸ 10G Ethernet Switches and Routers
▸ Metro Edge Switching

Specifications

Standards	IEEE 802.3z, IEEE 802.3, IEEE 802.3ae
Output Wavelength	$-5.5nm < \lambda_c < +7.5nm$
Dimensions	**Width:** 0.52" [13 mm] **Depth**: 2.18" [55 mm] **Height**: 0.33" [8 mm]
Power	3.3V
Environment	0°C to 70°C operating -40°C to 85°C storage
Compliance	IEC-60825; FDA 21; CFR 1040.10 and 1040.11
Warranty	Lifetime

Features

▸ SFP+ Optical Transceiver with LC connector
▸ 10G small Form-Factor Pluggable (SFP+) MSA compatible
▸ Compliant with IEEE 802.3ae 10GBASE-SR/LR/LW
▸ SFF-8472 Digital Diagnostic Function (DMI)
▸ Maximum Link Length of 80KM
▸ Single +3.3 V Power Supply
▸ RoHS Compliant (all models)
▸ Class 1 Laser International Safety Standard IEC 60825 Compliant

Ordering Information

Complete list of fiber optic connector specifications [pg 117-123]

*TN-J9150A
10GBase-SR, SFP+
w/ Digital Diagnostics (DMI) 850nm (LC)
[300/82/33 m; 985/269/108 ft.]
Link Budget: 4.0 dB

*Distance up to 300m on 50/125 OM3 multi-mode fiber, up to 82 m for 50/125 um multi-mode fiber with model.

Bandwidth 500 MHz-km at 850nm, and up to 33 m for 62.5/125 um multi-mode fiber with model bandwidth 200 MHzkm at 850nm.

* Note: The Transition Networks TN-SFP-10G-xx series 10G SFP+ transceiver modules are designed to install in any SFP+ port allowing for 10GBase-X interfaces to the network through the SFP+ connector. The TN-SFP-10G-xx transceivers are Cisco compatible* and are designed for bi-directional serial-optical data communication such as 10G Ethernet at speeds up to 10.3 Gbps.

*Transition Networks' SFP+ modules fully comply with the Multi-Sourcing Agreement (MSA). This compliance allows our SFP+ modules to be used in all other MSA compliant SFP+ platforms. In addition, TN SFP modules are also compatible with all Cisco SFP+ based routers and switches, as well as Cisco's IOS software. TN SFP+ modules ARE NOT Cisco OEM brand module

TN-XFP-xxx

XFP Modules: 10G XFP MSA Compatible Duplex LC
CWDM XFP Modules: 10G CWDM MSA Compatible

Features

▸ Hot-Pluggable XFP Footprint LC Optical Transceiver

▸ Digital Diagnostic Function

▸ Class 1 Laser International Safety Standard IEC-60825 Compliant

▸ Compatible with XFP Multi-Sourcing Agreement (MSA)

▸ XFP Optical Transceiver with duplex LC connector

▸ 10G small Form-Factor Pluggable (XFP) MSA compatible

▸ INF-8077i Digital Diagnostic Function (DMI)

▸ Maximum Link Length of 80 km

▸ Single +3.3V Power Supply

▸ Low Power Dissipation < 2W

▸ RoHS Compliant (all models)

Additional Features

TN-XFP-SR Module

▸ Compliant with IEEE 802.3ae 10GBASE-SR/SW

▸ Compliant with 10G Fibre Channel 1200-MX-SN-I

▸ Low power Dissipation < 1.2W

TN-XFP-LRx & TN-XFP-ER & TN-XFP-ZR

▸ Compliant with IEEE 802.3ae 10GBASE-LR/LW//ER/ZR

▸ Compliant with 10G Fibre Channel 1200-SM-LL-L

▸ Compliant with XFI 10G Serial Electrical Interface

▸ Low power Dissipation < 2W

Fiber Connections with XFPs
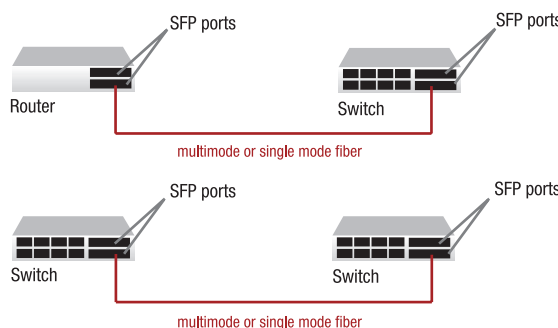
SFP ports   SFP ports

Router   Switch

multimode or single mode fiber

SFP ports   SFP ports

Switch   Switch

multimode or single mode fiber

Applications

▸ 10G Ethernet Switches and Routers

▸ 10G Fibre Channel Switch Infrastructure

▸ Metro Edge Switching

Specifications

Complete list of fiber optic connector specifications [pg 117-123]

Standards	IEEE 802.3ae
Output Wavelength	$-5.5nm < \lambda_c < +7.5nm$
Dimensions	**Width:** 0.71" [18 mm] **Depth:** 3.07" [78 mm] **Height:** 0.33" [8 mm]
Power	3.3V
Power Consumption	0.66 Watts
Environment TN-XFP-SR, TN-XFP-ZR, TN-XFP-LRx-Cxx:	0°C – 70°C Operating
TN-XFP-LR1, TN-XFP-LR2, TN-XFP-ER:	-5°C - 70°C Operating
TN-XFP-LR1-T, TN-XFP-LR2-T:	-45°C - 80°C Operating
Operation Humidity	10% to 90% (non-condensing)
Compliance	IEC-60825; FDA 21; CFR 1040.10 and 1040.11
Warranty	Lifetime

*Note: Per Cisco Systems' literature, the Cisco switches with XFP slots do not accept modules other than Cisco's own XFPs. The Cisco switch identifies the manufacturer ID along with the part number and blocks operations to this port for non-Cisco interfaces. Other major XFP switch manufacturers do not indicate in their literature that such restrictions are imposed.

*Transition Networks' XFP units fully comply with Multi-Sourcing Agreement (MSA). This compliance allows Transition Networks' XFP modules to be used on other MSA-compliant XFP platforms without any problems.

* The TN-XFP-LR4-Cxx will only have 12 wavelengths, from 1270nm to 1330nm and from 1470nm to 1610nm, each step 20nm

** The TN-XFP-LR7-Cxx will only have 7 wavelengths, from 1470nm to 1610nm, each step 20nm

Ordering Information

Complete list of fiber optic connector specifications [pg 117-123]

TN-XFP-SR
10GBase-SR/SW/10G Fibre Channel, XFP w/Digital Diagnostics (DMI) 850nm (LC)
[62.5/125 uM (OM1): 33 m/108 ft.]
[50/125 uM (OM2): 82 m/269 ft.]
[50/125 uM (OM3): 300 m/985 ft.]
Modal dispersion: 3.9 dB

TN-XFP-LR1
10GBase-LR/LW/10G Fibre Channel, XFP w/Digital Diagnostics (DMI)1310nm (LC)
[10 km/6.2 mi.] Link Budget: 6.2 dB

TN-XFP-LR2
10GBase-LR/LW/10G Fibre Channel, XFP w/Digital Diagnostics (DMI)1310nm (LC)
[20 km/12.4 mi.] Link Budget: 12.0 dB

TN-XFP-ER
10GBase-LR/ER/10G Fibre Channel, XFP w/Digital Diagnostics (DMI)1310nm (LC)
[40 km/24.9 mi.] Link Budget: 16.5 dB

TN-XFP-ZR
10GBase-ZR/10G Fibre Channel, XFP w/ Digital Diagnostics (DMI)1550nm (LC)
[80 km/49.7 mi.] Link Budget: 23.0 dB

TN-XFP-LR10
10GBase-LR/10G Fibre Channel, XFP w/Digital Diagnostics (DMI)1550nm (LC)
[100 km/62.1 mi.] Link Budget: 25.0 dB

TN-XFP-LRM
10GBase-LRM, XFP w/Digital Diagnostics (DMI) 1310nm (LC)
[300m/985 ft.] Link Budget: 4.5 dB

Extended Operating Temperature -40°C to +85°C

TN-XFP-LR1-T
10GBase-LR/LW/10G Fibre Channel, XFP w/Digital Diagnostics (DMI)1310nm (LC)
[10 km/6.2 mi.] Link Budget: 6.2 dB

TN-XFP-LR2-T
10GBase-LR/LW/10G Fibre Channel, XFP w/Digital Diagnostics (DMI) 1310nm (LC)
[20 km/12.4 mi.] Link Budget: 12.0 dB

CWDM Wavelengths

TN-XFP-LR1-Cxx
XFP 10GBASE-LR/10G Fibre Channel single mode (LC)
[10 km/6.2 mi.] Link Budget: 11.4 dB

***TN-XFP-LR4-Cxx**
XFP 10GBASE-ER/10G Fibre Channel single mode (LC)
[40 km/24.9 mi.] Link Budget: 15.0 dB

****TN-XFP-LR7-Cxx**
XFP 10GBASE-ZR single mode (LC)
[70 km/43.6 mi.] Link Budget: 23.0 dB

xx = center wavelength (I_c)

27 = 1270nm	45 = 1450nm
29 = 1290nm	47 = 1470nm
31 = 1310nm	49 = 1490nm
33 = 1330nm	51 = 1510nm
35 = 1350nm	53 = 1530nm
37 = 1370nm	55 = 1550nm
39 = 1390nm	57 = 1570nm
41 = 1410nm	59 = 1590nm
43 = 1430nm	61 = 1610nm

NEW
PRODUCT

xfp modules

TN-XFP-xxx-xxx

XFP Modules: 10G XFP Cisco Compatible

Applications

▸ 10G Ethernet Switches and Routers
▸ 10G Fibre Channel Switch Infrastructure
▸ SONET / SDH Application
▸ Metro Edge Switching

Specifications

Standards	IEEE 802.3ae
Output Wavelength	$-5.5nm < \lambda_c < +7.5nm$
Dimensions	**Width:** 0.52" [13 mm] **Depth:** 2.18" [55 mm] **Height:** 0.33" [8 mm]
Power	3.3V, 5V
Environment	-5°C to 70°C operating -40°C to 85°C storage
Compliance	IEC-60825; FDA 21; CFR 1040.10 and 1040.11
Warranty	Lifetime

Features

▸ Hot-Pluggable XFP Optical Transceiver with LC connector
▸ 10G small Form-Factor Pluggable (XFP) MSA compatible
▸ Compliant with XFP Multi-Sourcing Agreement (MSA)
▸ INF-8077i Digital Diagnostic Function (DMI)
▸ Maximum Link Length of 80KM
▸ Support both +3.3 V and +5 V Power Supply
▸ Low Power Dissipation < 3W
▸ RoHS Compliant (all models)
▸ Class 1 Laser International Safety Standard IEC 60825 Compliant

Additional Features

▸ **TN-XFP-10G-MM-SR Module**
Compliant with IEEE 802.3ae
10GBase-SR/SW
Compliant with 10G Fibre Channel
1200-MX-SN-I

▸ **TN-XFP-10Gxx-OC192xx Module**
Compliant with IEEE 802.3ae
10Base-LR/LW/ER/EW/ZR/ZW
Compliant with 10G Fibre Channel
1200-SM-LL-L Compliant with SONET
OC-192 / SDH STM-64

Ordering Information

Complete list of fiber optic connector specifications [pg 117-123]

TN-XFP-10G-MM-SR
10GBase-SR/SW / 10G Fiber Channel / OC-192 MM (LC)
[62.5/125 uM (OM1): 33 m/108 ft.]
[50/125 uM (OM2): 82 m/269 ft.]
[50/125 uM (OM3): 300 m/985 ft.]
Link Budget: 4.5 dB

TN-XFP-10GLR-OC192SR
10GBase-LR/LW 10G Fibre Channel OC-192 single mode (LC)
[10 km/6.2 mi.] Link Budget: 9.4 dB

TN-XFP-10GER-OC192IR
10GBase-ER/EW 10G Fibre Channel OC-192 single mode (LC)
[40 km/24.9 mi.] Link Budget: 15.5 dB

TN-XFP-10GZR-OC192LR
10GBase-ZR/ZW / 10G Fibre Channel OC-192 single mode (LC)
[80 km/49.7 mi.] Link Budget: 24.0 dB

TN-XFP-10GLR2-OC192S
10GBase-LR/LW / 10G Fibre Channel OC-192 1310nm single mode (LC)
[20 km/12.4 mi.] Link Budget: 14.0 dB

TN-XFP-10G-U
10GBase-LR/LW / 10G Fibre Channel 1270 TX/1330 RX simgle fiber single mode (LC)
[10 km/6.2 mi.] Link Budget: 9.0 dB

TN-XFP-10G-D
10GBase-LR/LW / 10G Fibre Channel 1330TX/1270 RX single fiber single mode (LC)
[10 km/6.2 mi.] Link Budget: 9.0 dB

TN-XFP-10G-U-40
10GBase-BX / 10G Fibre Channel 1270 TX/1330 RX simgle fiber single mode (LC)
[40 km/24.9 mi.] Link Budget: 15.0 dB

TN-XFP-10G-D-40
10GBase-BX / 10G Fibre Channel 1330TX/1270 RX single fiber single mode (LC)
[40 km/24.9 mi.] Link Budget: 15.0 dB

Note: The Transition Networks TN-XFP-xxx-xxx 10G small form factor pluggables (XFPs) are Cisco Compatible and are designed for bi-directional serial optical data communications such as 10G Ethernet, or 10G Fibre Channel.

*Transition Networks' XFP modules fully comply with the Multi-Sourcing Agreement (MSA). This compliance allows our XFP modules to be used in all other MSA compliant XFP platforms. In addition, TN-XFP-xxx-xxx modules are also compatible with all Cisco XFP-based equipment, as well as Cisco's IOS software. TN XFP modules ARE NOT Cisco OEM brand modules.

TN-X2-10GB-xx

X2 Modules: 10G X2 Cisco Compatible

Features

▸ X2 Optical Transceiver with duplex SC connector

▸ 10G X2 MSA Release10.b compatible

▸ SFF8472 Digital Diagnostic Function (DMI)

▸ XAUI Electrical Interface: 4 Lanes @ 3.125 Gbps

▸ Support +5V, +3.3V Power Supply

▸ RoHS Compliant (all models)

▸ Class 1 Laser International Safety Standard IEC 60825 Compliant

Additional Features

▸ **TN-X2-10GB-SR**
Compliant with IEEE 802.3ae 10GBASE-SR

▸ **TN-X2-10GB-LRM**
Compliant with IEEE 802.3aq 10GBASE-LRM

▸ **TN-X2-10GB-LR**
Compliant with IEEE 802.3ae 10GBASE-LR

▸ **TN-X2-10GB-ER**
Compliant with IEEE 802.3ae 10GBASE-ER

▸ **TN-X2-10GB-ZR**
Compliant with IEEE 802.3ae 10GBASE-ZR

Specifications

Complete list of fiber optic connector specifications [pg 117-123]

Standards	IEEE Std. 802.3ae
Dimensions	**Width:** 1.42" [36 mm] **Depth:** 3.58" [91 mm] **Height:** 0.53" [13.46 mm]
Power	+5 V, +3.3 V
Power Consumption	4.0 Watts
Environment	0 – 70°C operating -40 – 80°C storing
Compliance	IEC-60825; FDA21; CFR 1040.10 & 1040.11
Warranty	Lifetime

Note: The Transition Networks' TN-X2-10GB-xx series X2 modules are designed to install in any X2 port allowing for 10GBASE-SR, 10GBASE-LR or 10GBASE-ER interfaces to the network through X2 connector. The TN-X2-10GB-xx modules are Cisco compatible and are designed for bi-directional serial-optical data communication such as 10G Ethernet at speeds up to 10.3 Gbps.

*Transition Networks' X2 modules fully comply with the Multi-Sourcing Agreement (MSA). This compliance allows our X2 modules to be used in all other MSA compliant X2 platforms. In addition, TN X2 modules are also compatible with all Cisco X2-based routes and switches, as well as Cisco's IOS software. TN X2 modules ARE NOT Cisco OEM brand Modules.

Ordering Information

Complete list of fiber optic connector specifications [pg 117-123]

TN-X2-10GB-SR
10GBase-SR
X2 w/Digital Diagnostics (DMI)
850nm MM (SC)
[62.5/125 uM (OM1): 33 m/108 ft.]
[50/125 uM (OM2): 82 m/269 ft.]
[50/125 uM (OM3): 300 m/985 ft.]
Link Budget: 4.1dB

TN-X2-10GB-LRM
10GBase-LRM
X2 w/Digital Diagnostics (DMI)
1310nm MM (SC)
[220 m/722 ft.] Link Budget: 2.0dB

TN-X2-10GB-LR
10GBase-LR
X2 w/Digital Diagnostics (DMI)
1310nm SM (SC)
[10 km/6.2 mi.] Link Budget: 9.4dB

TN-X2-10GB-ER
10GBase-ER
X2 w/Digital Diagnostics (DMI)
1550nm SM (SC)
[40 km/24.9 mi.] Link Budget: 15.5dB

TN-X2-10GB-ZR
10GBase-ZR
X2 w/Digital Diagnostics (DMI)
1550nm SM (SC)
[80 km/49.7 mi.] Link Budget: 24.0dB

NEW PRODUCT

Cisco Compatible 10G SFP+

TN-SFP-10G-xR

10GBase SFP+ Modules: 10GBase SFP+ Cisco Compatible

Features

▸ SFP+ Optical Transceiver with LC connector

▸ 10G small Form-Factor Pluggable (SFP+) MSA compatible

▸ Compliant with IEEE 802.3ae 10GBASE-SR/LR/LW

▸ SFF-8472 Digital Diagnostic Function (DMI)

▸ Maximum Link Length of 80KM

▸ Single +3.3 V Power Supply

▸ RoHS Compliant (all models)

▸ Class 1 Laser International Safety Standard IEC 60825 Compliant

Applications

▸ 10G Ethernet Switches and Routers

▸ Metro Edge Switching

Specifications

Standards	IEEE 802.3z, IEEE 802.3
Output Wavelength	$-5.5nm < \lambda_c < +7.5nm$
Dimensions	**Width:** 0.52" [13 mm] **Depth:** 2.18" [55 mm] **Height:** 0.33" [8 mm]
Power	3.3V
Environment	0°C to 70°C operating -40°C to 85°C storage
Compliance	IEC-60825; FDA 21; CFR 1040.10 and 1040.11
Warranty	Lifetime

Ordering Information

Complete list of fiber optic connector specifications [pg 117-123]

***TN-SFP-10G-SR**
10GBase-SR, SFP+
w/ Digital Diagnostics (DMI) 850nm (LC)
**[300/82/33 m; 985/269/108 ft.]
Link Budget: 4.0 dB**

TN-SFP-10G-LRM
10GBase-LRM, SFP+
w/ Digital Diagnostics (DMI) 1310nm (LC)
[220m; 722 ft.] Link Budget: 1.5 dB

TN-SFP-10G-LR
10GBase-LR, SFP+
w/ Digital Diagnostics (DMI) 1310nm (LC)
[10 km/6.2 mi.] Link Budget: 9.0 dB

TN-SFP-10G-ER
10GBase-ER, SFP+
w/ Digital Diagnostics (DMI) 1550nm (LC)
[40 km/24.9 mi.] Link Budget: 14.1 dB

TN-SFP-10G-ZR
10GBase-ZR, SFP+
w/ Digital Diagnostics (DMI) 1550nm (LC)
[80 km/49.7 mi.] Link Budget: 24.0 dB

*Distance up to 300m on 50/125 OM3 multi-mode fiber, up to 82 m for 50/125 um multi-mode fiber with model.

Bandwidth 500 MHz-km at 850nm, and up to 33 m for 62.5/125 um multi-mode fiber with model bandwidth 200 MHzkm at 850nm.

* Note: The Transition Networks TN-SFP-10G-xx series 10G SFP+ transceiver modules are designed to install in any SFP+ port allowing for 10GBase-X interfaces to the network through the SFP+ connector. The TN-SFP-10G-xx transceivers are Cisco compatible* and are designed for bi-directional serial-optical data communication such as 10G Ethernet at speeds up to 10.3 Gbps.

*Transition Networks' SFP+ modules fully comply with the Multi-Sourcing Agreement (MSA). This compliance allows our SFP+ modules to be used in all other MSA compliant SFP+ platforms. In addition, TN SFP modules are also compatible with all Cisco SFP+ based routers and switches, as well as Cisco's IOS software. TN SFP+ modules ARE NOT Cisco OEM brand module

CWDM

CWDM-xxxxxxxR

Coarse Wavelength Division Multiplexing (CWDM)

Ordering Information

CWDM- _____ R

Module Type	
A	Add/Drop Mux
M	Mux/Demux

Connectors	
LC	LC/PC
SC	SC/PC

East/West Lines with LC Connector
(Module Type A Only)

2A847	1 Ch. Add/Drop 1470 port with E/W Lines
2A849	1 Ch. Add/Drop 1490 port with E/W Lines
2A851	1 Ch. Add/Drop 1510 port with E/W Lines
2A853	1 Ch. Add/Drop 1530 port with E/W Lines
2A855	1 Ch. Add/Drop 1550 port with E/W Lines
2A857	1 Ch. Add/Drop 1570 port with E/W Lines
2A859	1 Ch. Add/Drop 1590 port with E/W Lines
2A861	1 Ch. Add/Drop 1610 port with E/W Lines

Accessory *(sold separately)*

CWDM-MB19R1
19" Rack Mount Bracket, 1RU High, holds
2 CWDM Modules

Examples

CWDM-M455LCR
CWDM Mux/Demux Module,
4 channel, 1550nm ~ 1610nm

CWDM-A2A847LCR
CWDM Add/Drop Mux Module,
1 -1470 drop port
1470 add port
Passes 1310-1450 and 1490-1610

Features

▸ Increase bandwidth on existing fiber infrastructure [pg 17]

▸ Alleviate fiber exhaustion

▸ Transmit multiple protocols over an existing duplex fiber link by combining the fiber outputs of multiple media converters

▸ Provide scalable bandwidth of up to 10 Gbps per channel over existing fiber links [pg 17]

▸ "Plug and Play," no configuration of CWDM components

▸ Use existing standard optical ports on switches and routers

  • Utilize Optical Line Converter as transponder

▸ Lifetime Warranty

Specifications

4 Channel Mux/Demux Specific Optical Specs
Operating Wavelength:	1500nm ~ 1620nm
Center Wavelength (λ_c):	1510nm ~ 1610nm
Max Insertion Loss*:	1.7 dB/channel

5 Channel Mux/Demux Specific Optical Specs
CWDM Operating Wavelength:	1500nm ~ 1620nm
CWDM Center Wavelength (λ_c):	1510nm ~ 1610nm
1310nm Ch. Operating Wavelength:	1260nm ~ 1360nm
1310nm Ch. Center Wavelength (λ_c):	1310nm
CWDM Max. Insertion Loss*:	2.0 dB/channel
1310nm Ch. Max Insertion Loss*:	1.0 dB/channel
1310nm Ch. Port Isolation:	30 dB Min. (@CWDM bands)

8 Channel Mux/Demux Specific Optical Specs
Operating Wavelength:	1460nm ~ 1620nm
Center Wavelength (λ_c):	1470nm ~ 1610nm
Max Insertion Loss*:	3.0 dB/channel

9 Channel Mux/Demux Specific Optical Specs
CWDM Operating Wavelength:	1460nm ~ 1620nm
CWDM Center Wavelength (λ_c):	1470nm ~ 1610nm
1310nm Ch. Operating Wavelength:	1260nm ~ 1360nm
1310nm Ch. Center Wavelength (λ_c):	1310nm
CWDM Max. Insertion Loss*:	3.3 dB/channel
1310nm Ch. Max Insertion Loss*:	1.0 dB/channel
1310nm Ch. Port Isolation:	30 dB Min. (@CWDM bands)

16 Channel Mux/Demux Specific Optical Specs
Operating Wavelength:	1300nm ~ 1620nm
Center Wavelength (λ_c):	1310nm ~ 1610nm
Max Insertion Loss*:	3.7 dB/channel

*Note: All Insertion Loss values include one connector pair

1 Channel Add/Drop Specific Optical Specs
Operating Wavelength:	1303.5nm ~ 1616.5nm
Center Wavelength (λ_c):	1470nm ~ 1610nm
Add/Drop Ch. Max Insertion Loss*:	1.1 dB

General Optical Specs (applies to all CWDM configurations)
CWDM Channel Spacing:	20nm
CWDM Channel Passband:	$-5.5\text{nm} < \lambda_c < +7.5\text{nm}$
Passband Ripple:	0.5 dB max.
Adjacent Channel Isolation:	30 dB min.
Non-adjacent Channel Isolation:	40 dB min.
Directivity:	50 dB min.
Return Loss:	45 dB min.
Polarization Dependent Loss (PDL):	0.2 dB max.
Optical Operating Power:	300 mW max.

Fiber Type	Corning SMF-28

Dimensions	Module	Rack Mount Bracket
	Width: 8.3" [212 mm]	**Width:** 18.9" [481 mm]
	Depth: 7.6" [192 mm]	**Depth**: 1.6" [40 mm]
	Height: 1.7" [43 mm]	**Height**: 1.7" [44 mm]

Environment	0°C to +70°C operating temperature
	-40°C to +85°C storage temperature

Warranty	Lifetime

Channel Configuration
(Module Type M Only)

451	4 Ch. 1510/1530/1550/1570nm
453	4 Ch. 1530/1550/1570/1590nm
455	4 Ch. 1550/1570/1590/1610nm
551	5 Ch. 1510/1530/1550/1570nm + 1310nm
553	5 Ch. 1530/1550/1570/1590nm + 1310nm
555	5 Ch. 1550/1570/1590/1610nm + 1310nm
847	8 Ch. 1470 ~ 1610nm
947	9 Ch. 1470 ~ 1610nm + 1310nm
1631	16 Ch. 1310 ~ 1610nm

*Note: 1310nm channel is wideband (+/- 50nm)

Other channel configurations may be available upon request.
Please contact Transition Networks.

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networking cables

CPC-xxxx-xxF

Copper Patch Cords

Features

▸ Snagless, molded boots provide strain relief and prevent kinking as well as snagless cable mining.

▸ All CAT5e cables tested to 350 MHz; CAT6 cables tested to 250 MHz. construction with RJ-45 connectors.

▸ Available in both straight or crossover pinning.

▸ Lifetime Warranty

Specifications

Standards	TIA/EIA-568-A, B
Cable Specs	CAT 5e
Cable Type	4-pair UTP
Conductor Gauge	24 AWG, stranded
Jacket	PVC, 80C, OD=5.3 mm
Frequency	up to 350 MHz
Impedance	100 +/- 15 ohms
Attenuation (max.)	24 dB/100 m @ 100 MHz; 49 dB/100 m @ 350 MHz
Cable Specs	CAT 6
Cable Type	4-pair UTP
Conductor Gauge	24 AWG, stranded
Jacket	PVC, 80C, OD=6.2 mm
Frequency	up to 250 MHz
Impedance	100 +/- 15 ohms @ 100 MHz
Attenuation (max.)	24 dB/100 m @ 100 MHz; 39 dB/100 m @ 250 MHz
Length Tolerance	Length specified +/- 2%
Environment Operating Temperature: Humidity:	-40°C to +85°C 5% – 95% non-condensing
Warranty	Lifetime

Ordering Information

CPC-____-__F
Cable Type   Length

Cable Type	
5EB	CAT 5e Straight-through
X5ER	CAT 5e Crossover
6B	CAT 6 Straight-through
X6R	CAT 6 Crossover

Length	
xx	Length in ft.

03 = 3 ft. [0.91 m]
Available lengths:
1, 2, 3, 5, 7 and 10 ft.

*Note:
All cables include molded boot; same color as the cable.
Standard color for straight-through cables is black.
Standard color for crossover cables is red.
Custom colors and lengths may be available upon request.

FPC-xxx-xxxx-xxM

Fiber Optic Patch Cords

Features

▶ 10-Gigabit Ethernet laser-optimized multimode cable for runs up to 550 meters. Ideal for campus LAN backbone and storage area network (SAN) applications.

▶ Factory terminated and 100% optical testing to guarantee test results.

▶ Individually packaged with IL and RL test results included.

▶ Available fiber types include single mode 8/125 µm and multimode 50/125 µm or 62.5/125 µm.

▶ Lifetime Warranty
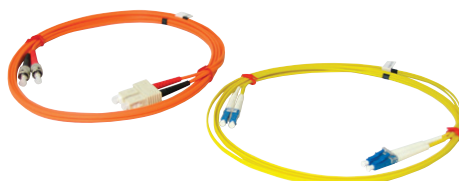
Transition Networks' high-quality fiber optic patch cords are designed to meet or exceed industry specifications and are offered in a wide variety of connector styles, fiber types and lengths. Each cable assembly is 100% optically inspected, tested and individually packaged with descriptive labeling and test results included.

Ordering Information

FPC - ____ - ____ - __ M

Cable Type *Connector Type* *Length*

Examples:

FPC-MD6-LCMT-03M *Fiber Patch Cord, duplex multimode 62.5/125 µm, LC to MT-RJ, 3 m long*

FPC-SD-SCSC-01M *Fiber Patch Cord, duplex single mode 8/125 µm, SC to SC, 1 mlong*

Cable Type	
MD5	Multimode 50/125 µm duplex
MD6	Multimode 62.5/125 µm duplex
SD	Single Mode 8/125 µm duplex
MD5G	Multimode 50/125 µm duplex (10-Gigabit Optimized)

Connector Type	
LC	LC/PC
MT	MT-RJ/PC
SC	SC/PC
ST	ST/PC

(List each end separately)

Length	
xx	Length in meters

Available lengths: 1, 2, 3 and 5 meters

Note: Other lengths may be available upon request.

Specifications
Multimode Fiber

Standards	ITU-T G.651; IEC 60793-2-10 Type A1A.1, A1B
Fiber Optic Connector Specs	**Max. Insertion Loss:** < 0.5 dB **Max. Insertion Loss:** < 0.7 dB (MT-RJ only) **Typical Insertion Loss:** < 0.3 dB
Core/Cladding Diameter	50/125 µm or 62.5/125 µm
Jacketing	2 mm or 3 mm tight buffered, OFNR, orange PVC (diameter will depend on connector type)
Bandwidth	**50/125 µm:** 500 MHz/km @ 850nm; 500 MHz/km @ 1300nm **62.5/125 µm:** 160 MHz/km @ 850nm; 500 MHz/km @ 1300nm
Attenuation	**Max:** 3.5 dB/km @850nm; 1.5 dB/km @1300nm **Typical:** 3.0 dB/km @850nm; 1.0 dB/km @1300nm
Length Tolerance	**Length specified:** + 0.15m (+6.0")/-0.0m (-0.0")
Environment	-40°C to +85°C operating temperature, 5% – 95% humidity non-condensing
Warranty	Lifetime

Specifications
Multimode Fiber (10-Gigabit Optimized)

Standards	TIA/EIA-492-AAAC; IEC 60793-2-10 Type A1A.2; ISO/IEC 11801 OM-3
Fiber Optic Connector Specs	**Max. Insertion Loss:** < 0.5 dB **Max. Insertion Loss:** < 0.7 dB (MT-RJ only) **Typical Insertion Loss:** < 0.3 dB
Core/Cladding Diameter	50/125 µm
Jacketing	2 mm or 3 mm tight buffered, OFNR, purple PVC (diameter will depend on connector type)
Bandwidth	**LED w/OFL:** 3500 MHz/km @ 850nm; 500 MHz/km @ 1300nm **Laser:** 4700 MHz/km @ 850nm; 500 MHz/km @ 1300nm
Attenuation	**Max:** 2.4 dB/km @ 850nm; 0.6 dB/km @ 1300nm **Typical:** 2.0 dB/km @ 850nm; 0.5 dB/km @ 1300nm
Length Tolerance	**Length specified:** + 0.15m (+6.0")/-0.0m (-0.0")
Environment	-40°C to +85°C operating temperature, 5% – 95% humidity non-condensing
Warranty	Lifetime

Specifications
Single Mode Fiber

Standards	Telcordia GR-20, GR-326-CORE; TIA/EIA-492-CAAB; ITU-T G.652.D; IEC 60793-2-50 Type B1.3
Fiber Optic Connector Specs	**Max. Insertion Loss:** < 0.3 dB **Typical Insertion Loss:** < 0.2 dB **Max. Reflectance:** < -55.0 dB **Typical Reflectance:** < -57.0 dB
Core/Cladding Diameter	8.3/125 µm
Jacketing	2 mm or 3 mm tight buffered, OFNR, yellow PVC (diameter will depend on connector type)
Attenuation	**Max:** 0.35 dB/km @ 1310nm; 0.21 dB/km @ 1550nm
Length Tolerance	**Length specified:** + 0.15 m (+6.0")/-0.0 m (-0.0")
Environment	-40°C to +85°C operating temperature, 5% – 95% humidity non-condensing
Warranty	Lifetime

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Fiber Optic Reference Guide

Calculating Fiber Loss and Distance Estimates

There are a number of ways to tackle the problem of determining the power requirements for a particular fiber optic link. The easiest and most accurate way is to perform an Optical Time Domain Reflectometer (OTDR) trace of the actual link. This will give you the actual loss values for all events (connectors, splices and fiber loss) in the link. In the absence of an actual OTDR trace, there are two alternatives that can be used to estimate the power requirements of the link:

1. Estimate the total link loss across an existing fiber optic link if the fiber length and loss variables are known.

2. Estimate the maximum fiber distance if optical budget and loss variable are known.

Loss variables are connectors, splices and attenuation per kilometer of the fiber. If actual values for all of the loss variables are not known, an estimation for each is needed to complete the calculations. In this case, one would want to take a worst case approach to assure that there is adequate power available for the link. The following table includes commonly accepted loss values used in these calculations:

Fiber Type	Wavelength	Fiber attenuation / km *	Fiber attenuation / km #	Connector Loss	Splice Loss
Multimode 50/125 µm	850nm	3.5 dB	2.5 dB	0.75 dB	0.3 dB
	1300nm	1.5 dB	0.8 dB	0.75 dB	0.3 dB
Multimode 62.5/125 µm	850nm	3.5 dB	3.0 dB	0.75 dB	0.3 dB
	1300nm	1.5 dB	0.7 dB	0.75 dB	0.3 dB
Single Mode 9 µm	1310nm	0.4 dB	0.35 dB	0.75 dB	0.3 dB
Single Mode 9 µm	1550nm	0.3 dB	0.22 dB	0.75 dB	0.3 dB

*These values are per TIA/EIA and other industry specifications and are the values used by Transition Networks in all link loss calculations.

#These values are one example of the performance that can be obtained with a new fiber installation.

The IEEE also recommends maximum cable distances as defined in the table below:

Standard	Data Rate (Mbps)	Cable Type	IEEE Standard Distance
10BASE-FL	10	850nm Multimode 50/125 µm or 62.5/125 µm	2 km
100BASE-FX	100	1300nm Multimode 50/125 µm or 62.5/125 µm	2 km
100BASE-SX	100	850nm Multimode 50/125 µm or 62.5/125 µm	300 m
1000BASE-SX	1000	850nm Multimode 50/125 µm	550 m
		850nm Multimode 62.5/125 µm	220 m
1000BASE-LX	1000	1300nm Multimode 50/125 µm or 62.5/125 µm	550 m
		1310nm Single mode 9/125 µm	5 km
1000BASE-LH	1000	1550nm Single mode 9/125 µm	70 km

Transition Networks assumes the multimode standard distances defined by IEEE for all of its products.

Fiber Optic Definitions

Before discussing actual fiber optic budget calculations, please review the following commonly used terms:

▸ **Maximum Transmit Power**
The maximum output power in dBm (decibels relative to 1mW) of the optical transmitter/transceiver. This is abbreviated as Max TX PWR in the connector specifications listed in this catalog.

▸ **Minimum Transmit Power**
The minimum output power in dBm (decibels relative to 1mW) of the optical transmitter/transceiver. This is abbreviated as Min. TX PWR in the connector specifications listed in this catalog.

▸ **Launch Power**
The actual output power in dBm (decibels relative to 1mW) of the optical transmitter/transceiver. This value will reside somewhere within the max. and min. transmit power levels listed.

▸ **Receive Sensitivity**
The minimum input power in dBm (decibels relative to 1mW) necessary to correctly drive the optical receiver. This is abbreviated as RX Sensitivity in the connector specifications listed in this catalog.

▸ **Maximum Receive Power**
The maximum input power in dBm (decibels relative to 1mW) the optical receiver can safely accept without overdriving the receiver. This is abbreviated as Max In PWR in the connector specifications listed in this catalog.

▸ **Link Budget**
The amount of power available for dissipation over the fiber link between end devices. It is calculated using worst case assumptions by subtracting the receive sensitivity from the minimum transmit power.

▸ **Link Loss**
The total amount of power dissipation over the fiber link between end devices. It is calculated using maximum loss values for distance, splices and connectors.

▸ **Splice Loss**
The amount of power loss attributable to a fiber optic spliced connection.

▸ **Connector Loss**
The amount of power loss attributable to a fiber optic connector pair.

▸ **Attenuation**
The amount of power loss per kilometer over the fiber link. Attenuation is wavelength specific and will depend greatly on type and condition of the optical fiber found in the link.

▸ **Safety Margin**
It is common practice to add a couple of dB loss as a safety buffer to account for items such as fiber aging, splice and connector degradation over time and environmental factors such as temperature and humidity.

Calculating Fiber Loss & Distance Estimates

Estimate Total Link Loss

This calculation will estimate the total link loss through a particular fiber optic link where the fiber length, as well as the number of splices and connectors, are known. This calculation is simply the sum of all worst-case loss variables in the link:

**Link Loss = [fiber length (km) x fiber attenuation per km] +
[splice loss x # of splices] +
[connector loss x # of connectors] + [safety margin]**

For example: Assume a 40 km single mode link at 1310nm with 2 connector pairs and 5 splices.

**Link Loss = [40 km x 0.4 dB/km] + [0.3 dB x 5] + [0.75 dB x 2] + [3.0 dB]
= 21.0 dB**

In this example, an estimated 21.0 dB of power would be required to transmit across this link. Of coarse, it is very important to measure and verify the actual link loss values once the link is established to identify any potential performance issues.

Estimate Fiber Distance

This calculation will estimate the maximum distance of a particular fiber optic link given the optical budget and the number of connectors and splices contained in the link:

Fiber Length = [Optical budget] - [link loss]
$$\frac{}{}$$
[fiber loss/km]

**Fiber Length = {[(min. TX PWR) - (RX sensitivity)]
- [splice loss x # of splices]
- [connector loss x # of connectors]
- [safety margin]}
÷ [fiber lost/km]**

For example: Assume a Fast Ethernet Single mode link at 1310nm with 2 connector pairs and 5 splices.

Fiber Length = [(-8.0 dB) - (-34.0 dB)] - [0.3 dB x 5] - [0.75 dB x 2] - [3.0 dB]
[0.4 dB/km]

Fiber Length = [26.0 dB] - [0.5 dB] - [1.5 dB] - [3.0 dB] = 52.5 km
[0.4 dB/km]

In this example, an estimated 52.5 km distance is possible before dissipating the optical power to a value below the RX sensitivity. As always, it is very important to measure and verify the actual link loss values once the link is established to identify any potential performance issues. Actual maximum distances will very depending on:

- Actual optical fiber attenuation per km
- Optical fiber design and age
- Quality of connectors and actual loss per pair
- Quality of splices and actual loss per splice
- Quantity of splices and connectors in the link

Note: The recommended fiber distances listed in this catalog are based on calculations similar to those shown above. These distances are a suggestion at best and are no substitute for actual measurements of link loss using an OTDR or other similar optical loss test sets. Transition Networks has no way of guaranteeing distance results due to the myriad of variables involved in a fiber link loss calculation.

Product SKU	Min TX PWR	Max TX PWR	RX Sensitivity	Max In PWR	Link Budget	Page	Product SKU	Min TX PWR	Max TX PWR	RX Sensitivity	Max In PWR	Link Budget	Page
C2220-1011	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	34	C4TEF1015-125	-8.0 dBm	-2.0 dBm	-34.0 dBm	-7.0 dBm	26.0 dB	64
C2220-1011-D	-19.0 dBm	-12.0 dBm	-31.0 dBm	-8.0 dBm	12.0 dB	34	C4TEF1016-120	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	63
C2220-1013	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	34	C4TEF1016-125	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	64
C2220-1013-D	-19.0 dBm	-12.0 dBm	-31.0 dBm	-8.0 dBm	12.0 dB	34	C4TEF1017-120	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	63
C2220-1014	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	34	C4TEF1017-125	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	64
C2220-1014-D	-14.0 dBm	-8.0 dBm	-32.0 dBm	-8.0 dBm	18.0 dB	34	C4TEF1029-120	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	63
C2220-1015	-5.0 dBm	-2.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	34	C4TEF1029-121	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	63
C2220-1015-D	-10.0 dBm	-4.0 dBm	-34.0 dBm	-8.0 dBm	24.0 dB	34	C4TEF1029-122	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	63
C2220-1016	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	34	C4TEF1029-123	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	63
C2220-1017	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	34	C4TEF1029-125	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	64
C2220-1035	0.0 dBm	5.0 dBm	-36.0 dBm	-3.0 dBm	36.0 dB	34	C4TEF1029-126	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	64
C2220-1029-A1	-14.0 dBm	-8.0 dBm	-33.0 dBm	-3.0 dBm	19.0 dB	34	C4TEF1029-127	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	64
C2220-1029-A2	-14.0 dBm	-8.0 dBm	-33.0 dBm	-3.0 dBm	19.0 dB	34	C4TEF1029-128	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	64
C2220-1029-B1	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	34	C4TEF1035-120	0.0 dBm	5.0 dBm	-36.0 dBm	-3.0 dBm	36.0 dB	63
C2220-1029-B2	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	34	C4TEF1035-125	0.0 dBm	5.0 dBm	-36.0 dBm	-3.0 dBm	36.0 dB	64
C2220-1029-DA1	-14.0 dBm	-8.0 dBm	-33.0 dBm	-8.0 dBm	19.0 dB	34	C6010-1011	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	37
C2220-1029-DA2	-14.0 dBm	-8.0 dBm	-33.0 dBm	-8.0 dBm	19.0 dB	34	C6010-1013	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	37
C3220-1013	-9.5 dBm	-4.0 dBm	-18.0 dBm	0.0 dBm	8.5 dB	35	C6010-1014	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	37
C3220-1013-D	-9.0 dBm	-4.0 dBm	-18.0 dBm	0.0 dBm	9.0 dB	35	C6010-1015	-8.0 dBm	-2.0 dBm	-34.0 dBm	-7.0 dBm	26.0 dB	37
C3220-1014	-9.5 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	10.5 dB	35	C6010-1016	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	37
C3220-1014-D	-9.0 dBm	-3.0 dBm	-21.0 dBm	-3.0 dBm	12.0 dB	35	C6010-1017	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	37
C3220-1015	0.0 dBm	0.0 dBm	-20.0 dBm	-3.0 dBm	15.0 dB	35	C6010-1029-A1	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	37
C3220-1015-D	0.0 dBm	0.0 dBm	-24.0 dBm	-3.0 dBm	19.0 dB	35	C6010-1029-A2	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	37
C3220-1017	-3.0 dBm	2.0 dBm	-24.0 dBm	-3.0 dBm	21.0 dB	35	C6010-1029-B1	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	37
C3220-1029-A1	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	35	C6010-1029-B2	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	37
C3220-1029-A2	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	35	C6110-1011	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	38
C3220-1029-B1	-3.0 dBm	2.0 dBm	-23.0 dBm	-3.0 dBm	20.0 dB	35	C6110-1013	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	38
C3220-1029-B2	-3.0 dBm	2.0 dBm	-23.0 dBm	-3.0 dBm	20.0 dB	35	C6110-1014	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	38
C3220-1029-DA1	-9.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	11.0 dB	35	C6110-1015	-5.0 dBm	-2.0 dBm	-34.0 dBm	-3.0 dBm	29.0 dB	38
C3220-1029-DA2	-9.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	11.0 dB	35	C6110-1016	-4.0 dBm	2.0 dBm	-36.0 dBm	-3.0 dBm	32.0 dB	38
C3220-1035	0.0 dBm	5.0 dBm	-27.0 dBm	-3.0 dBm	27.0 dB	35	C6110-1017	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	38
C3230-1013	-9.5 dBm	-4.0 dBm	-18.0 dBm	0.0 dBm	8.5 dB	36	C6110-1035	0.0 dBm	5.0 dBm	-36.0 dBm	-3.0 dBm	36.0 dB	38
C3230-1013-D	-9.0 dBm	-4.0 dBm	-18.0 dBm	0.0 dBm	9.0 dB	36	C6110-1029-A1	-14.0 dBm	-8.0 dBm	-33.0 dBm	-3.0 dBm	19.0 dB	38
C3230-1014	-9.5 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	10.5 dB	36	C6110-1029-A2	-14.0 dBm	-8.0 dBm	-33.0 dBm	-3.0 dBm	19.0 dB	38
C3230-1014-D	-9.0 dBm	-3.0 dBm	-21.0 dBm	-3.0 dBm	12.0 dB	36	C6110-1029-B1	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	38
C3230-1015	0.0 dBm	0.0 dBm	-20.0 dBm	-3.0 dBm	15.0 dB	36	C6110-1029-B2	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	38
C3230-1015-D	0.0 dBm	0.0 dBm	-24.0 dBm	-3.0 dBm	19.0 dB	36	C6120-1011	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	39
C3230-1017	-3.0 dBm	2.0 dBm	-24.0 dBm	-3.0 dBm	21.0 dB	36	C6120-1013	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	39
C3230-1029-A1	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	36	C6120-1014	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	39
C3230-1029-A2	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	36	C6120-1015	-5.0 dBm	-2.0 dBm	-34.0 dBm	-3.0 dBm	29.0 dB	39
C3230-1029-B1	-3.0 dBm	2.0 dBm	-23.0 dBm	-3.0 dBm	20.0 dB	36	C6120-1016	-4.0 dBm	2.0 dBm	-36.0 dBm	-3.0 dBm	32.0 dB	39
C3230-1029-B2	-3.0 dBm	2.0 dBm	-23.0 dBm	-3.0 dBm	20.0 dB	36	C6120-1017	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	39
C3230-1029-DA1	-9.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	11.0 dB	36	C6120-1035	0.0 dBm	5.0 dBm	-36.0 dBm	-3.0 dBm	36.0 dB	39
C3230-1029-DA2	-9.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	11.0 dB	36	C6120-1029-A1	-14.0 dBm	-8.0 dBm	-33.0 dBm	-3.0 dBm	19.0 dB	39
C3230-1035	0.0 dBm	5.0 dBm	-27.0 dBm	-3.0 dBm	27.0 dB	36	C6120-1029-A2	-14.0 dBm	-8.0 dBm	-33.0 dBm	-3.0 dBm	19.0 dB	39
C4TEF1011-120	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	63	C6120-1029-B1	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	39
C4TEF1011-125	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	64	C6120-1029-B2	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	39
C4TEF1013-120	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	63	CBFFG1013-105	-9.5 dBm	-4.0 dBm	-17.0 dBm	0.0 dBm	7.5 dB	58
C4TEF1013-125	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	64	CBFFG1013-115	-9.0 dBm	-4.0 dBm	-18.0 dBm	0.0 dBm	9.0 dB	58
C4TEF1014-120	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	63	CBFFG1014-105	-9.5 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	10.5 dB	58
C4TEF1014-125	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	64	CBFFG1014-115	-9.0 dBm	-3.0 dBm	-21.0 dBm	-3.0 dBm	12.0 dB	58
C4TEF1015-120	-8.0 dBm	-2.0 dBm	-34.0 dBm	-7.0 dBm	26.0 dB	63	CBFFG1015-105	-5.0 dBm	0.0 dBm	-20.0 dBm	-3.0 dBm	15.0 dB	58

fiber specification table

Product SKU	Min TX PWR	Max TX PWR	RX Sensitivity	Max In PWR	Link Budget	Page
CBFFG1015-115	-5.0 dBm	0.0 dBm	-24.0 dBm	-3.0 dBm	19.0 dB	58
CBFFG1017-105	-3.0 dBm	2.0 dBm	-24.0 dBm	-3.0 dBm	21.0 dB	58
CBFFG1024-105	-10.0 dBm	-3.0 dBm	-17.0 dBm	-3.0 dBm	7.0 dB	58
CBFFG1029-105	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	58
CBFFG1029-115	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	58
CBFFG1029-106	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	58
CBFFG1029-116	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	58
CBFFG1029-107	-3.0 dBm	2.0 dBm	-23.0 dBm	-3.0 dBm	20.0 dB	58
CBFFG1029-108	-3.0 dBm	2.0 dBm	-23.0 dBm	-3.0 dBm	20.0 dB	58
CBFFG1035-105	0.0 dBm	5.0 dBm	-27.0 dBm	-3.0 dBm	27.0 dB	58
CCSCF3011-110	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	61
CCSCF3013-110	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	61
CCSCF3014-110	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	61
CCSCF3015-110	-8.0 dBm	-2.0 dBm	-34.0 dBm	-7.0 dBm	26.0 dB	61
CCSCF3016-110	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	61
CCSCF3017-110	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	61
CCSCF3029-110	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	61
CCSCF3029-111	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	61
CCSCF3029-112	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	61
CCSCF3029-113	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	61
CCSCF3029-114	-5.0 dBm	0.0 dBm	-34.0 dBm	-3.0 dBm	29.0 dB	61
CCSCF3029-115	-5.0 dBm	0.0 dBm	-34.0 dBm	-3.0 dBm	29.0 dB	61
CCSCF3029-116	-3.0 dBm	2.0 dBm	-35.0 dBm	-3.0 dBm	32.0 dB	61
CCSCF3029-117	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	61
CFBRM1011-100	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	57
CFBRM1011-110	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	57
CFBRM1013-100	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	57
CFBRM1013-110	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	57
CFBRM1014-100	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	57
CFBRM1014-110	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	57
CFBRM1015-100	-8.0 dBm	-2.0 dBm	-34.0 dBm	-7.0 dBm	26.0 dB	57
CFBRM1015-110	-8.0 dBm	-2.0 dBm	-34.0 dBm	-7.0 dBm	26.0 dB	57
CFBRM1016-100	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	57
CFBRM1017-100	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	57
CFBRM1029-100	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	57
CFBRM1029-101	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	57
CFBRM1029-102	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	57
CFBRM1029-103	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	57
CFBRM1029-110	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	57
CFBRM1029-111	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	57
CFBRM1035-100	0.0 dBm	5.0 dBm	-36.0 dBm	-3.0 dBm	36.0 dB	57
CSDTF1011-120	-19.0 dBm	-14.0 dBm	-32.5 dBm	-14.0 dBm	13.5 dB	62
CSDTF1012-120	-27.0 dBm	-10.0 dBm	-34.0 dBm	-14.0 dBm	7.0 dB	62
CSDTF1013-120	-19.0 dBm	-14.0 dBm	-32.5 dBm	-14.0 dBm	13.5 dB	62
CSDTF1014-120	-19.0 dBm	-14.0 dBm	-34.0 dBm	-3.0 dBm	15.0 dB	62
CSDTF1015-120	-8.0 dBm	-2.0 dBm	-38.0 dBm	-8.0 dBm	30.0 dB	62
CSDTF1016-120	-5.0 dBm	0.0 dBm	-38.0 dBm	-7.0 dBm	33.0 dB	62
CSDTF1017-120	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	62
CSDTF1022-120	-15.0 dBm	-5.0 dBm	-25.0 dBm	-14.0 dBm	10.0 dB	62
CSDTF1027-120	-19.0 dBm	-15.0 dBm	-32.5 dBm	-14.0 dBm	13.5 dB	62
CSDTF1029-120	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	62
CSDTF1029-121	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	62
CSDTF1029-122	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	62
CSDTF1029-123	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	62
CSRFB1011-100	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	56
CSRFB1013-100	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	56
CSRFB1014-100	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	56
CSRFB1029-100	-14.0 dBm	-8.0 dBm	-33.0 dBm	-3.0 dBm	19.0 dB	56
CSRFB1029-101	-14.0 dBm	-8.0 dBm	-33.0 dBm	-3.0 dBm	19.0 dB	56
CSRFB1029-102	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	56
CSRFB1029-103	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	56
S2220-1011	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	41
S2220-1011-D	-19.0 dBm	-12.0 dBm	-31.0 dBm	-8.0 dBm	12.0 dB	41
S2220-1013	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	41
S2220-1013-D	-19.0 dBm	-12.0 dBm	-31.0 dBm	-8.0 dBm	12.0 dB	41
S2220-1014	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	41
S2220-1014-D	-14.0 dBm	-8.0 dBm	-32.0 dBm	-8.0 dBm	18.0 dB	41
S2220-1015	-5.0 dBm	-2.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	41
S2220-1015-D	-10.0 dBm	-4.0 dBm	-34.0 dBm	-8.0 dBm	24.0 dB	41
S2220-1016	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	41
S2220-1017	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	41
S2220-1029-A1	-14.0 dBm	-8.0 dBm	-33.0 dBm	-3.0 dBm	19.0 dB	41
S2220-1029-A2	-14.0 dBm	-8.0 dBm	-33.0 dBm	-3.0 dBm	19.0 dB	41
S2220-1029-B1	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	41
S2220-1029-B2	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	41
S2220-1029-DA1	-14.0 dBm	-8.0 dBm	-33.0 dBm	-8.0 dBm	19.0 dB	41
S2220-1029-DA2	-14.0 dBm	-8.0 dBm	-33.0 dBm	-8.0 dBm	19.0 dB	41
S2220-1035	0.0 dBm	5.0 dBm	-36.0 dBm	-3.0 dBm	36.0 dB	41
S3220-1013	-9.5 dBm	-4.0 dBm	-18.0 dBm	0.0 dBm	8.5 dB	42
S3220-1013-D	-9.0 dBm	-4.0 dBm	-18.0 dBm	0.0 dBm	9.0 dB	42
S3220-1014	-9.5 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	10.5 dB	42
S3220-1014-D	-9.0 dBm	-3.0 dBm	-21.0 dBm	-3.0 dBm	12.0 dB	42
S3220-1015	0.0 dBm	0.0 dBm	-20.0 dBm	-3.0 dBm	15.0 dB	42
S3220-1015-D	0.0 dBm	0.0 dBm	-24.0 dBm	-3.0 dBm	19.0 dB	42
S3220-1017	-3.0 dBm	2.0 dBm	-24.0 dBm	-3.0 dBm	21.0 dB	42
S3220-1029-A1	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	42
S3220-1029-A2	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	42
S3220-1029-B1	-3.0 dBm	2.0 dBm	-23.0 dBm	-3.0 dBm	20.0 dB	42
S3220-1029-B2	-3.0 dBm	2.0 dBm	-23.0 dBm	-3.0 dBm	20.0 dB	42
S3220-1029-DA1	-9.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	11.0 dB	42
S3220-1029-DA2	-9.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	11.0 dB	42
S3220-1035	0.0 dBm	5.0 dBm	-27.0 dBm	-3.0 dBm	27.0 dB	42
S3230-1013	-9.5 dBm	-4.0 dBm	-18.0 dBm	0.0 dBm	8.5 dB	43
S3230-1013-D	-9.0 dBm	-4.0 dBm	-18.0 dBm	0.0 dBm	9.0 dB	43
S3230-1014	-9.5 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	10.5 dB	43
S3230-1014-D	-9.0 dBm	-3.0 dBm	-21.0 dBm	-3.0 dBm	12.0 dB	43
S3230-1015	0.0 dBm	0.0 dBm	-20.0 dBm	-3.0 dBm	15.0 dB	43
S3230-1015-D	0.0 dBm	0.0 dBm	-24.0 dBm	-3.0 dBm	19.0 dB	43
S3230-1017	-3.0 dBm	2.0 dBm	-24.0 dBm	-3.0 dBm	21.0 dB	43
S3230-1029-A1	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	43
S3230-1029-A2	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	43
S3230-1029-B1	-3.0 dBm	2.0 dBm	-23.0 dBm	-3.0 dBm	20.0 dB	43
S3230-1029-B2	-3.0 dBm	2.0 dBm	-23.0 dBm	-3.0 dBm	20.0 dB	43
S3230-1029-DA1	-9.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	11.0 dB	43

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Product SKU	Min TX PWR	Max TX PWR	RX Sensitivity	Max In PWR	Link Budget	Page	Product SKU	Min TX PWR	Max TX PWR	RX Sensitivity	Max In PWR	Link Budget	Page
S3230-1029-DA2	-9.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	11.0 dB	43	SBFFG1017-105	-3.0 dBm	2.0 dBm	-24.0 dBm	-3.0 dBm	21.0 dB	72
S3230-1035	0.0 dBm	5.0 dBm	-27.0 dBm	-3.0 dBm	27.0 dB	43	SBFFG1024-105	-10.0 dBm	-3.0 dBm	-17.0 dBm	-3.0 dBm	7.0 dB	72
S4TEF1011-120	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	77	SBFFG1035-105	0.0 dBm	5.0 dBm	-27.0 dBm	-3.0 dBm	27.0 dB	72
S4TEF1011-125	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	78	SBFFG1029-105	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	72
S4TEF1013-120	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	77	SBFFG1029-106	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	72
S4TEF1013-125	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	78	SBFFG1029-107	-3.0 dBm	2.0 dBm	-23.0 dBm	-3.0 dBm	20.0 dB	72
S4TEF1014-120	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	77	SBFFG1029-108	-3.0 dBm	2.0 dBm	-23.0 dBm	-3.0 dBm	20.0 dB	72
S4TEF1014-125	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	78	SBFFG1029-115	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	72
S4TEF1015-120	-8.0 dBm	-2.0 dBm	-34.0 dBm	-7.0 dBm	26.0 dB	77	SBFFG1029-116	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	72
S4TEF1015-125	-8.0 dBm	-2.0 dBm	-34.0 dBm	-7.0 dBm	26.0 dB	78	SCSCF3011-110	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	75
S4TEF1016-120	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	77	SCSCF3013-110	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	75
S4TEF1016-125	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	78	SCSCF3014-110	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	75
S4TEF1017-120	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	77	SCSCF3015-110	-8.0 dBm	-2.0 dBm	-34.0 dBm	-7.0 dBm	26.0 dB	75
S4TEF1017-125	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	78	SCSCF3016-110	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	75
S4TEF1029-120	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	77	SCSCF3017-110	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	75
S4TEF1029-121	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	77	SCSCF3029-110	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	75
S4TEF1029-122	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	77	SCSCF3029-111	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	75
S4TEF1029-123	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	77	SCSCF3029-112	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	75
S4TEF1029-125	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	78	SCSCF3029-113	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	75
S4TEF1029-126	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	78	SCSCF3029-114	-5.0 dBm	0.0 dBm	-34.0 dBm	-3.0 dBm	29.0 dB	75
S4TEF1029-127	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	78	SCSCF3029-115	-5.0 dBm	0.0 dBm	-34.0 dBm	-3.0 dBm	29.0 dB	75
S4TEF1029-128	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	78	SCSCF3029-116	-3.0 dBm	2.0 dBm	-35.0 dBm	-3.0 dBm	32.0 dB	75
S4TEF1035-120	0.0 dBm	5.0 dBm	-36.0 dBm	-3.0 dBm	36.0 dB	78	SCSCF3029-117	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	75
S4TEF1035-125	0.0 dBm	5.0 dBm	-36.0 dBm	-3.0 dBm	36.0 dB	78	SFBRM1011-100	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	69
S6110-1011	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	47	SFBRM1011-110	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	69
S6110-1013	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	47	SFBRM1011-180	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	70
S6110-1014	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	47	SFBRM1011-190	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	70
S6110-1015	-5.0 dBm	-2.0 dBm	-34.0 dBm	-3.0 dBm	29.0 dB	47	SFBRM1013-100	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	69
S6110-1016	-4.0 dBm	2.0 dBm	-36.0 dBm	-3.0 dBm	32.0 dB	47	SFBRM1013-110	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	69
S6110-1017	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	47	SFBRM1013-180	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	70
S6110-1029-A1	-14.0 dBm	-8.0 dBm	-33.0 dBm	-3.0 dBm	19.0 dB	47	SFBRM1013-190	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	70
S6110-1029-A2	-14.0 dBm	-8.0 dBm	-33.0 dBm	-3.0 dBm	19.0 dB	47	SFBRM1014-100	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	69
S6110-1029-B1	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	47	SFBRM1014-110	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	69
S6110-1029-B2	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	47	SFBRM1014-180	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	19.0 dB	70
S6110-1035	0.0 dBm	5.0 dBm	-36.0 dBm	-3.0 dBm	36.0 dB	47	SFBRM1014-190	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	70
S6120-1011	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	48	SFBRM1015-100	-8.0 dBm	-2.0 dBm	-34.0 dBm	-7.0 dBm	26.0 dB	69
S6120-1013	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	48	SFBRM1015-110	-8.0 dBm	-2.0 dBm	-34.0 dBm	-7.0 dBm	26.0 dB	69
S6120-1014	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	48	SFBRM1015-180	-8.0 dBm	-2.0 dBm	-34.0 dBm	-7.0 dBm	26.0 dB	70
S6120-1015	-5.0 dBm	-2.0 dBm	-34.0 dBm	-3.0 dBm	29.0 dB	48	SFBRM1016-100	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	69
S6120-1016	-4.0 dBm	2.0 dBm	-36.0 dBm	-3.0 dBm	32.0 dB	48	SFBRM1016-180	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	70
S6120-1017	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	48	SFBRM1017-100	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	69
S6120-1029-A1	-14.0 dBm	-8.0 dBm	-33.0 dBm	-3.0 dBm	19.0 dB	48	SFBRM1017-180	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	70
S6120-1029-A2	-14.0 dBm	-8.0 dBm	-33.0 dBm	-3.0 dBm	19.0 dB	48	SFBRM1029-100	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	69
S6120-1029-B1	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	48	SFBRM1029-101	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	69
S6120-1029-B2	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	48	SFBRM1029-102	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	69
S6120-1035	0.0 dBm	5.0 dBm	-36.0 dBm	-3.0 dBm	36.0 dB	48	SFBRM1029-103	-8.0 dBm	-3.0 dBm	-32.0 dBm	-3.0 dBm	25.0 dB	69
SBFFG1013-105	-9.5 dBm	-4.0 dBm	-17.0 dBm	0.0 dBm	7.5 dB	72	SFBRM1029-110	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	69
SBFFG1013-115	-9.0 dBm	-4.0 dBm	-18.0 dBm	0.0 dBm	9.0 dB	72	SFBRM1029-111	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	69
SBFFG1014-105	-9.5 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	10.5 dB	72	SFBRM1029-180	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	70
SBFFG1014-115	-9.0 dBm	-3.0 dBm	-21.0 dBm	-3.0 dBm	12.0 dB	72	SFBRM1029-181	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	70
SBFFG1015-105	-5.0 dBm	0.0 dBm	-20.0 dBm	-3.0 dBm	15.0 dB	72	SFBRM1029-182	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	70
SBFFG1015-115	-5.0 dBm	0.0 dBm	-24.0 dBm	-3.0 dBm	19.0 dB	72	SFBRM1029-183	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	70

fiber specification table

Product SKU	Min TX PWR	Max TX PWR	RX Sensitivity	Max In PWR	Link Budget	Page	Product SKU	Min TX PWR	Max TX PWR	RX Sensitivity	Max In PWR	Link Budget	Page
SFBRM1029-190	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	70	SSRFB1029-101	-14.0 dBm	-8.0 dBm	-33.0 dBm	-3.0 dBm	19.0 dB	68
SFBRM1029-191	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	70	SSRFB1029-102	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	68
SFBRM1035-100	0.0 dBm	5.0 dBm	-36.0 dBm	-3.0 dBm	36.0 dB	69	SSRFB1029-103	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	68
SFBRM1035-180	0.0 dBm	5.0 dBm	-36.0 dBm	-3.0 dBm	36.0 dB	70	TN-10GSFP-LR1	-8.0 dBm	0.5 dBm	-14.4 dBm	0.5 dBm	6.4 dB	104
SFBRM1040-180	0.0 dBm	5.0 dBm	-36.0 dBm	-3.0 dBm	36.0 dB	70	TN-10GSFP-LR2	-3.0 dBm	1.0 dBm	-14.4 dBm	1.0 dBm	11.4 dB	104
SGFEB1313-150 MM1	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	71	TN-10GSFP-LR4	1.5 dBm	5.0 dBm	-15.0 dBm	1.0 dBm	16.5 dB	104
SGFEB1313-150 MM2	-10.0 dBm	-4.0 dBm	-17.0 dBm	0.0 dBm	7.0 dB	71	TN-10GSFP-LR7	3.0 dBm	6.0 dBm	-22.0 dBm	-8.0 dBm	25.0 dB	104
SGFEB1314-150 MM	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	71	TN-10GSFP-SR	-7.3 dBm	1.5 dBm	-9.9 dBm	-1.0 dBm	6.4 dB	104
SGFEB1314-150 SM	-13.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	7.0 dB	71	TN-CWDM-SFP-1xx0	-5.0 dBm	0.0 dBm	-24.0 dBm	3.0 dBm	24.0 dBm	102
SGFEB1315-150 MM	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	71	TN-CWDM-100LX-1xx0	-5.0 dBm	0.0 dBm	-34.0 dBm	0.0 dBm	29.0 dBm	102
SGFEB1315-150 SM	-5.0 dBm	0.0 dBm	-20.0 dBm	-3.0 dBm	15.0 dB	71	TN-CWDM-10G-1xx-x0	0.0 dBm	3.0 dBm	-16.0 dBm	-1.0 dBm	16.0 dBm	105
SGFEB1317-150 MM	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	71	TN-CWDM-X2-1xx0-40	-1.0 dBm	-4.0 dBm	-16.5 dBm	0.5 dBm	15.5 dBm	105
SGFEB1317-150 SM	-3.0 dBm	2.0 dBm	-23.0 dBm	-3.0 dBm	20.0 dB	71	TN-CWDM-X2-1xx0-80	0.0 dBm	5.0 dBm	-24.0 dBm	0.5 dBm	24.0 dBm	105
SGFEB1324-150 MM	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	71	TN-CWDM-XFP-1xx0-x0	0.0 dBm	5.0 dBm	-24.0 dBm	0.5 dBm	24.0 dBm	105
SGFEB1324-150 MME	-10.0 dBm	-3.0 dBm	-17.0 dBm	-3.0 dBm	7.0 dB	71	TN-EX-SFP-1FE-FX	-20.0 dBm	-14.0 dBm	-28.0 dBm	-8.0 dBm	8.0 dBm	106
SGFEB1329-150 MM	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	71	TN-EX-SFP-1FE-LX	-9.0 dBm	-3.0 dBm	-18.0 dBm	-3.0 dBm	9.0 dBm	106
SGFEB1329-150 SM	-8.0 dBm	-3.0 dBm	-21.0 dBm	-3.0 dBm	13.0 dB	71	TN-EX-SFP-1GE-LX	-15.0 dBm	-8.0 dBm	-29.0 dBm	-8.0 dBm	14.0 dBm	106
SGFEB1329-151 MM	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	71	TN-EX-SFP-1GE-SX	-9.0 dBm	-3.0 dBm	-18.0 dBm	-3.0 dBm	9.0 dBm	106
SGFEB1329-151 SM	-8.0 dBm	-3.0 dBm	-21.0 dBm	-3.0 dBm	13.0 dB	71	TN-J9150A	-6.5 dBm	-1.0 dBm	-11.1 dBm	-1.0 dBm	4.6 dB	107
SGFEB1329-152 MM	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	71	TN-JX-GE-100FX	-20.0 dBm	-14.0 dBm	-32.0 dBm	-8.0 dBm	12.0 dBm	106
SGFEB1329-152 SM	-3.0 dBm	2.0 dBm	-23.0 dBm	-8.0 dBm	20.0 dB	71	TN-GB-MM5	-9.5 dBm	-4.0 dBm	-18.0 dBm	-3.0 dBm	8.5 dB	97
SGFEB1329-153 MM	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	71	TN-GB-SM5	-9.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	11.0 dB	97
SGFEB1329-153 SM	-3.0 dBm	2.0 dBm	-23.0 dBm	-8.0 dBm	20.0 dB	71	TN-GB-SM53	-5.0 dBm	0.0 dBm	-24.0 dBm	-3.0 dBm	19.0 dB	97
SGFEB1335-150 MM	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	71	TN-GLC-BX-U	-9.0 dBm	-1.0 dBm	-21.0 dBm	-1.0 dBm	12.0 dB	100
SGFEB1335-150 SM	0.0 dBm	5.0 dBm	-27.0 dBm	-3.0 dBm	27.0 dB	71	TN-GLC-BX-D	-9.0 dBm	-1.0 dBm	-21.0 dBm	-1.0 dBm	12.0 dB	100
SGFEB1340-170 MM	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	71	TN-GLC-BX-U-40	-3.0 dBm	2.0 dBm	-23.0 dBm	-1.0 dBm	20.0 dB	100
SGFEB1429-150 SM1	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	71	TN-GLC-BX-D-40	-3.0 dBm	2.0 dBm	-23.0 dBm	-1.0 dBm	20.0 dB	100
SGFEB1429-150 SM2	-8.0 dBm	-3.0 dBm	-21.0 dBm	-3.0 dBm	13.0 dB	71	TN-GLC-BX-U-60	-2.0 dBm	4.0 dBm	-25.0 dBm	-1.0 dBm	23.0 dB	100
SGFEB1429-151 SM1	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	71	TN-GLC-BX-D-60	-2.0 dBm	4.0 dBm	-25.0 dBm	-1.0 dBm	23.0 dB	100
SGFEB1429-151 SM2	-8.0 dBm	-3.0 dBm	-21.0 dBm	-3.0 dBm	13.0 dB	71	TN-GLC-BX-U-80	0.0 dBm	0.0 dBm	0.0 dBm	0.0 dBm	0.0 dB	100
SGFEB1429-152 SM1	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	71	TN-GLC-BX-D-80	0.0 dBm	0.0 dBm	0.0 dBm	0.0 dBm	0.0 dB	100
SGFEB1429-152 SM2	-3.0 dBm	2.0 dBm	-23.0 dBm	-8.0 dBm	20.0 dB	71	TN-GLC-BX-U-120	0.0 dBm	0.0 dBm	0.0 dBm	0.0 dBm	0.0 dB	100
SGFEB1429-153 SM1	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	71	TN-GLC-BX-D-120	0.0 dBm	0.0 dBm	0.0 dBm	0.0 dBm	0.0 dB	100
SGFEB1429-153 SM2	-3.0 dBm	2.0 dBm	-23.0 dBm	-8.0 dBm	20.0 dB	71	TN-GLC-FE-100BX-D	-14.0 dBm	-8.0 dBm	-32.0 dBm	0.0 dBm	18.0 dB	100
SGFEB1440-170 SM	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	71	TN-GLC-FE-100BX-D-20	-14.0 dBm	-8.0 dBm	-34.0 dBm	-3.0 dBm	20.0 dB	100
SSDTF1011-120	-19.0 dBm	-14.0 dBm	-32.5 dBm	-14.0 dBm	13.5 dB	76	TN-GLC-FE-100BX-D-40	-8.0 dBm	-3.0 dBm	-34.0 dBm	-3.0 dBm	26.0 dB	100
SSDTF1012-120	-27.0 dBm	-10.0 dBm	-34.0 dBm	-14.0 dBm	7.0 dB	76	TN-GLC-FE-100BX-D-80	-2.0 dBm	3.0 dBm	-34.0 dBm	-3.0 dBm	32.0 dB	100
SSDTF1013-120	-19.0 dBm	-14.0 dBm	-32.5 dBm	-14.0 dBm	13.5 dB	76	TN-GLC-FE-100BX-U	-14.0 dBm	-8.0 dBm	-32.0 dBm	0.0 dBm	18.0 dB	100
SSDTF1014-120	-19.0 dBm	-14.0 dBm	-34.0 dBm	-3.0 dBm	15.0 dB	76	TN-GLC-FE-100BX-U-20	-14.0 dBm	-8.0 dBm	-34.0 dBm	-3.0 dBm	20.0 dB	100
SSDTF1015-120	-8.0 dBm	-2.0 dBm	-38.0 dBm	-8.0 dBm	30.0 dB	76	TN-GLC-FE-100BX-U-40	-8.0 dBm	-3.0 dBm	-34.0 dBm	-3.0 dBm	26.0 dB	100
SSDTF1016-120	-5.0 dBm	0.0 dBm	-38.0 dBm	-7.0 dBm	33.0 dB	76	TN-GLC-FE-100BX-U-80	-2.0 dBm	3.0 dBm	-34.0 dBm	-3.0 dBm	32.0 dB	100
SSDTF1017-120	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	76	TN-GLC-FE-100FX	-23.5 dBm	-14.0 dBm	-32.0 dBm	-8.0 dBm	8.5 dB	100
SSDTF1022-120	-15.0 dBm	-5.0 dBm	-25.0 dBm	-14.0 dBm	10.0 dB	76	TN-GLC-FE-100LX	-15.0 dBm	-8.0 dBm	-34.0 dBm	0.0 dBm	19.0 dB	100
SSDTF1027-120	-19.0 dBm	-15.0 dBm	-32.5 dBm	-14.0 dBm	13.5 dB	76	TN-GLC-GE-100FX	-23.5 dBm	-14.0 dBm	-32.0 dBm	-8.0 dBm	8.5 dB	100
SSDTF1029-120	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	76	TN-GLC-LH-SM	-9.5 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	10.5 dB	100
SSDTF1029-121	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	76	TN-GLC-LHX-SM	-3.0 dBm	2.0 dBm	-25.0 dBm	-3.0 dBm	22.0 dB	100
SSDTF1029-122	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	76	TN-GLC-SX-MM	-9.5 dBm	-3.5 dBm	-18.0 dBm	-1.0 dBm	8.5 dB	100
SSDTF1029-123	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	76	TN-GLC-SX-MM-2K	-9.0 dBm	-1.0 dBm	-19.0 dBm	-1.0 dBm	10.0 dB	100
SSRFB1011-100	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	68	TN-GLC-ZX-SM	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	100
SSRFB1013-100	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	68	TN-GLC-ZX-SM-15	2.0 dBm	7.0 dBm	-35.0 dBm	-10.0 dBm	37.0 dB	100
SSRFB1014-100	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	68	TN-J4858C	-9.0 dBm	-3.0 dBm	-18.0 dBm	-3.0 dBm	9.0 dB	103
SSRFB1029-100	-14.0 dBm	-8.0 dBm	-33.0 dBm	-3.0 dBm	19.0 dB	68	TN-J4859C	-9.0 dBm	-3.0 dBm	-25.0 dBm	-3.0 dBm	16.0 dB	103

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Product SKU	Min TX PWR	Max TX PWR	RX Sensitivity	Max In PWR	Link Budget	Page	Product SKU	Min TX PWR	Max TX PWR	RX Sensitivity	Max In PWR	Link Budget	Page
TN-J4860C	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	103	TN-SFP-LX8-C39	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	101
TN-SFP-10G-ER	0.0 dBm	3.0 dBm	-15.8 dBm	-1.0 dBm	15.8 dB	111	TN-SFP-LX8-C41	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	101
TN-SFP-10G-LR	-6.0 dBm	-1.0 dBm	-15.0 dBm	0.5 dBm	9.0 dB	111	TN-SFP-LX8-C43	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	101
TN-SFP-10G-LRM	-6.5 dBm	0.5 dBm	-8.0 dBm	-1.5 dBm	1.5dB	111	TN-SFP-LX8-C45	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	101
TN-SFP-10G-SR	-6.0 dBm	-1.0 dBm	-10.0 dBm	0.5 dBm	4.0 dB	111	TN-SFP-LX8-C47	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	101
TN-SFP-10G-ZR	0.0 dBm	4.0 dBm	-24.0 dBm	-8.0 dBm	24.0 dB	111	TN-SFP-LX8-C49	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	101
TN-SFP-BXD	-9.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	11.0 dB	98	TN-SFP-LX8-C51	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	101
TN-SFP-BXD2	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	98	TN-SFP-LX8-C53	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	101
TN-SFP-BXU	-9.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	11.0 dB	98	TN-SFP-LX8-C55	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	101
TN-SFP-BXU2	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	98	TN-SFP-LX8-C57	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	101
TN-SFP-ELX1	-9.5 dBm	-3.0 dBm	-21.0 dBm	-3.0 dBm	11.5 dB	99	TN-SFP-LX8-C59	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	101
TN-SFP-ESX5	-10.0 dBm	-3.0 dBm	-18.0 dBm	-3.0 dBm	8.0 dB	99	TN-SFP-LX8-C61	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	101
TN-SFP-ESX6	-10.0 dBm	-3.0 dBm	-18.0 dBm	-3.0 dBm	8.0 dB	99	TN-SFP-LXB11	-9.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	11.0 dB	98
TN-SFP-FC2XM	-9.0 dBm	-4.0 dBm	-15.0 dBm	-3.0 dBm	6.0 dB	99	TN-SFP-LXB11T	-9.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	11.0 dB	98
TN-SFP-FC2XS15	-5.0 dBm	0.0 dBm	-18.0 dBm	0.0 dBm	13.0 dB	99	TN-SFP-LXB12	-9.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	11.0 dB	98
TN-SFP-FC2XS2	-9.5 dBm	-3.0 dBm	-18.0 dBm	-3.0 dBm	8.5 dB	99	TN-SFP-LXB12T	-9.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	11.0 dB	98
TN-SFP-FC2XS40	-2.0 dBm	3.0 dBm	-28.0 dBm	-9.0 dBm	26.0 dB	99	TN-SFP-LXB121	-2.0 dBm	3.0 dBm	-33.0 dBm	-9.0 dBm	31.0 dB	98
TN-SFP-GE-S	-9.0 dBm	-3.0 dBm	-17.0 dBm	-3.0 dBm	9.0 dB	100	TN-SFP-LXB122	-2.0 dBm	3.0 dBm	-33.0 dBm	-9.0 dBm	31.0 dB	98
TN-SFP-GE-L	-9.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	11.0 dB	100	TN-SFP-LXB21	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	98
TN-SFP-GE-Z	0.0 dBm	5.0 dBm	-23.0 dBm	-3.0 dBm	23.0 dB	100	TN-SFP-LXB21T	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	98
TN-SFP-LX1	-9.5 dBm	-3.0 dBm	-21.0 dBm	-3.0 dBm	11.5 dB	99	TN-SFP-LXB22	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	98
TN-SFP-LX12	0.0 dBm	5.0 dBm	-32.0 dBm	-9.0 dBm	32.0 dB	99	TN-SFP-LXB22T	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	98
TN-SFP-LX16	1.0 dBm	5.0 dBm	-36.0 dBm	-10.0 dBm	37.0 dB	99	TN-SFP-LXB41	-3.0 dBm	2.0 dBm	-23.0 dBm	-3.0 dBm	20.0 dB	98
TN-SFP-LX1T	-9.5 dBm	-3.0 dBm	-21.0 dBm	-3.0 dBm	11.5 dB	99	TN-SFP-LXB42	-3.0 dBm	2.0 dBm	-23.0 dBm	-3.0 dBm	20.0 dB	98
TN-SFP-LX20	5.0 dBm	8.0 dBm	-36.0 dBm	-10.0 dBm	41.0 dB	99	TN-SFP-LXB61	-1.0 dBm	4.0 dBm	-26.0 dBm	-3.0 dBm	25.0 dB	98
TN-SFP-LX3	-5.0 dBm	0.0 dBm	-24.0 dBm	-3.0 dBm	19.0 dB	99	TN-SFP-LXB62	-3.0 dBm	2.0 dBm	-26.0 dBm	-3.0 dBm	23.0 dB	98
TN-SFP-LX5	-5.0 dBm	0.0 dBm	-24.0 dBm	-3.0 dBm	19.0 dB	99	TN-SFP-LXB81	-2.0 dBm	3.0 dBm	-26.0 dBm	-3.0 dBm	24.0 dB	98
TN-SFP-LX8	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	99	TN-SFP-LXB82	-2.0 dBm	3.0 dBm	-26.0 dBm	-3.0 dBm	24.0 dB	98
TN-SFP-LX16-C27	1.0 dBm	5.0 dBm	-36.0 dBm	-10.0 dBm	37.0 dB	101	TN-SFP-LXMB11	-9.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	11.0 dB	98
TN-SFP-LX16-C29	1.0 dBm	5.0 dBm	-36.0 dBm	-10.0 dBm	37.0 dB	101	TN-SFP-LXMB12	-9.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	11.0 dB	98
TN-SFP-LX16-C31	1.0 dBm	5.0 dBm	-36.0 dBm	-10.0 dBm	37.0 dB	101	TN-SFP-OC12M	-19.0 dBm	-12.0 dBm	-26.0 dBm	-8.0 dBm	7.0 dB	99
TN-SFP-LX16-C33	1.0 dBm	5.0 dBm	-36.0 dBm	-10.0 dBm	37.0 dB	101	TN-SFP-OC12S	-14.0 dBm	-8.0 dBm	-28.0 dBm	-5.0 dBm	14.0 dB	99
TN-SFP-LX16-C35	1.0 dBm	5.0 dBm	-36.0 dBm	-10.0 dBm	37.0 dB	101	TN-SFP-OC12S4	-3.0 dBm	2.0 dBm	-28.0 dBm	-8.0 dBm	25.0 dB	99
TN-SFP-LX16-C37	1.0 dBm	5.0 dBm	-36.0 dBm	-10.0 dBm	37.0 dB	101	TN-SFP-OC12S8	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	99
TN-SFP-LX16-C39	1.0 dBm	5.0 dBm	-36.0 dBm	-10.0 dBm	37.0 dB	101	TN-SFP-OC12SB41	-5.0 dBm	0.0 dBm	-28.0 dBm	-8.0 dBm	23.0 dB	98
TN-SFP-LX16-C41	1.0 dBm	5.0 dBm	-36.0 dBm	-10.0 dBm	37.0 dB	101	TN-SFP-OC12SB42	-5.0 dBm	0.0 dBm	-28.0 dBm	-8.0 dBm	23.0 dB	98
TN-SFP-LX16-C43	1.0 dBm	5.0 dBm	-36.0 dBm	-10.0 dBm	37.0 dB	101	TN-SFP-OC12S-C27	0.0 dBm	5.0 dBm	-29.0 dBm	-8.0 dBm	29.0 dB	101
TN-SFP-LX16-C45	1.0 dBm	5.0 dBm	-36.0 dBm	-10.0 dBm	37.0 dB	101	TN-SFP-OC12S-C29	0.0 dBm	5.0 dBm	-29.0 dBm	-8.0 dBm	29.0 dB	101
TN-SFP-LX16-C47	1.0 dBm	5.0 dBm	-36.0 dBm	-10.0 dBm	37.0 dB	101	TN-SFP-OC12S-C31	0.0 dBm	5.0 dBm	-29.0 dBm	-8.0 dBm	29.0 dB	101
TN-SFP-LX16-C49	1.0 dBm	5.0 dBm	-36.0 dBm	-10.0 dBm	37.0 dB	101	TN-SFP-OC12S-C33	0.0 dBm	5.0 dBm	-29.0 dBm	-8.0 dBm	29.0 dB	101
TN-SFP-LX16-C51	1.0 dBm	5.0 dBm	-36.0 dBm	-10.0 dBm	37.0 dB	101	TN-SFP-OC12S-C35	0.0 dBm	5.0 dBm	-29.0 dBm	-8.0 dBm	29.0 dB	101
TN-SFP-LX16-C53	1.0 dBm	5.0 dBm	-36.0 dBm	-10.0 dBm	37.0 dB	101	TN-SFP-OC12S-C37	0.0 dBm	5.0 dBm	-29.0 dBm	-8.0 dBm	29.0 dB	101
TN-SFP-LX16-C55	1.0 dBm	5.0 dBm	-36.0 dBm	-10.0 dBm	37.0 dB	101	TN-SFP-OC12S-C39	0.0 dBm	5.0 dBm	-29.0 dBm	-8.0 dBm	29.0 dB	101
TN-SFP-LX16-C57	1.0 dBm	5.0 dBm	-36.0 dBm	-10.0 dBm	37.0 dB	101	TN-SFP-OC12S-C41	0.0 dBm	5.0 dBm	-29.0 dBm	-8.0 dBm	29.0 dB	101
TN-SFP-LX16-C59	1.0 dBm	5.0 dBm	-36.0 dBm	-10.0 dBm	37.0 dB	101	TN-SFP-OC12S-C43	0.0 dBm	5.0 dBm	-29.0 dBm	-8.0 dBm	29.0 dB	101
TN-SFP-LX16-C61	1.0 dBm	5.0 dBm	-36.0 dBm	-10.0 dBm	37.0 dB	101	TN-SFP-OC12S-C45	0.0 dBm	5.0 dBm	-29.0 dBm	-8.0 dBm	29.0 dB	101
TN-SFP-LX8-C27	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	101	TN-SFP-OC12S-C47	0.0 dBm	5.0 dBm	-29.0 dBm	-8.0 dBm	29.0 dB	101
TN-SFP-LX8-C29	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	101	TN-SFP-OC12S-C49	0.0 dBm	5.0 dBm	-29.0 dBm	-8.0 dBm	29.0 dB	101
TN-SFP-LX8-C31	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	101	TN-SFP-OC12S-C51	0.0 dBm	5.0 dBm	-29.0 dBm	-8.0 dBm	29.0 dB	101
TN-SFP-LX8-C33	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	101	TN-SFP-OC12S-C53	0.0 dBm	5.0 dBm	-29.0 dBm	-8.0 dBm	29.0 dB	101
TN-SFP-LX8-C35	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	101	TN-SFP-OC12S-C55	0.0 dBm	5.0 dBm	-29.0 dBm	-8.0 dBm	29.0 dB	101
TN-SFP-LX8-C37	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	101	TN-SFP-OC12S-C57	0.0 dBm	5.0 dBm	-29.0 dBm	-8.0 dBm	29.0 dB	101

fiber specification table

Product SKU	Min TX PWR	Max TX PWR	RX Sensitivity	Max In PWR	Link Budget	Page	Product SKU	Min TX PWR	Max TX PWR	RX Sensitivity	Max In PWR	Link Budget	Page
TN-SFP-OC12S-C59	0.0 dBm	5.0 dBm	-29.0 dBm	-8.0 dBm	29.0 dB	101	TN-SFP-OC3S8-C59	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	101
TN-SFP-OC12S-C61	0.0 dBm	5.0 dBm	-29.0 dBm	-8.0 dBm	29.0 dB	101	TN-SFP-OC3S8-C61	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	101
TN-SFP-OC3M	-19.0 dBm	-12.0 dBm	-30.0 dBm	-8.0 dBm	11.0 dB	99	TN-SFP-OC48S-C27	-2.0 dBm	3.0 dBm	-20.0 dBm	0.0 dBm	18.0 dB	101
TN-SFP-OC3MT	-19.0 dBm	-12.0 dBm	-30.0 dBm	-8.0 dBm	11.0 dB	99	TN-SFP-OC48S-C29	-2.0 dBm	3.0 dBm	-20.0 dBm	0.0 dBm	18.0 dB	101
TN-SFP-OC3S	-14.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	17.0 dB	99	TN-SFP-OC48S-C31	-2.0 dBm	3.0 dBm	-20.0 dBm	0.0 dBm	18.0 dB	101
TN-SFP-OC3S16-C27	2.0 dBm	5.0 dBm	-35.0 dBm	-10.0 dBm	37.0 dB	101	TN-SFP-OC48S-C33	-2.0 dBm	3.0 dBm	-20.0 dBm	0.0 dBm	18.0 dB	101
TN-SFP-OC3S16-C29	2.0 dBm	5.0 dBm	-35.0 dBm	-10.0 dBm	37.0 dB	101	TN-SFP-OC48S-C35	-2.0 dBm	3.0 dBm	-20.0 dBm	0.0 dBm	18.0 dB	101
TN-SFP-OC3S16-C31	2.0 dBm	5.0 dBm	-35.0 dBm	-10.0 dBm	37.0 dB	101	TN-SFP-OC48S-C37	-2.0 dBm	3.0 dBm	-20.0 dBm	0.0 dBm	18.0 dB	101
TN-SFP-OC3S16-C33	2.0 dBm	5.0 dBm	-35.0 dBm	-10.0 dBm	37.0 dB	101	TN-SFP-OC48S-C39	-2.0 dBm	3.0 dBm	-20.0 dBm	0.0 dBm	18.0 dB	101
TN-SFP-OC3S16-C35	2.0 dBm	5.0 dBm	-35.0 dBm	-10.0 dBm	37.0 dB	101	TN-SFP-OC48S-C41	-2.0 dBm	3.0 dBm	-20.0 dBm	0.0 dBm	18.0 dB	101
TN-SFP-OC3S16-C37	2.0 dBm	5.0 dBm	-35.0 dBm	-10.0 dBm	37.0 dB	101	TN-SFP-OC48S-C43	-2.0 dBm	3.0 dBm	-20.0 dBm	0.0 dBm	18.0 dB	101
TN-SFP-OC3S16-C39	2.0 dBm	5.0 dBm	-35.0 dBm	-10.0 dBm	37.0 dB	101	TN-SFP-OC48S-C45	-2.0 dBm	3.0 dBm	-20.0 dBm	0.0 dBm	18.0 dB	101
TN-SFP-OC3S16-C41	2.0 dBm	5.0 dBm	-35.0 dBm	-10.0 dBm	37.0 dB	101	TN-SFP-OC48S-C47	-2.0 dBm	3.0 dBm	-20.0 dBm	0.0 dBm	18.0 dB	101
TN-SFP-OC3S16-C43	2.0 dBm	5.0 dBm	-35.0 dBm	-10.0 dBm	37.0 dB	101	TN-SFP-OC48S-C49	-2.0 dBm	3.0 dBm	-20.0 dBm	0.0 dBm	18.0 dB	101
TN-SFP-OC3S16-C45	2.0 dBm	5.0 dBm	-35.0 dBm	-10.0 dBm	37.0 dB	101	TN-SFP-OC48S-C51	-2.0 dBm	3.0 dBm	-20.0 dBm	0.0 dBm	18.0 dB	101
TN-SFP-OC3S16-C47	2.0 dBm	5.0 dBm	-35.0 dBm	-10.0 dBm	37.0 dB	101	TN-SFP-OC48S-C53	-2.0 dBm	3.0 dBm	-20.0 dBm	0.0 dBm	18.0 dB	101
TN-SFP-OC3S16-C49	2.0 dBm	5.0 dBm	-35.0 dBm	-10.0 dBm	37.0 dB	101	TN-SFP-OC48S-C55	-2.0 dBm	3.0 dBm	-20.0 dBm	0.0 dBm	18.0 dB	101
TN-SFP-OC3S16-C51	2.0 dBm	5.0 dBm	-35.0 dBm	-10.0 dBm	37.0 dB	101	TN-SFP-OC48S-C57	-2.0 dBm	3.0 dBm	-20.0 dBm	0.0 dBm	18.0 dB	101
TN-SFP-OC3S16-C53	2.0 dBm	5.0 dBm	-35.0 dBm	-10.0 dBm	37.0 dB	101	TN-SFP-OC48S-C59	-2.0 dBm	3.0 dBm	-20.0 dBm	0.0 dBm	18.0 dB	101
TN-SFP-OC3S16-C55	2.0 dBm	5.0 dBm	-35.0 dBm	-10.0 dBm	37.0 dB	101	TN-SFP-OC48S-C61	-2.0 dBm	3.0 dBm	-20.0 dBm	0.0 dBm	18.0 dB	101
TN-SFP-OC3S16-C57	2.0 dBm	5.0 dBm	-35.0 dBm	-10.0 dBm	37.0 dB	101	TN-SFP-FC4XS-C27	0.0 dBm	4.0 dBm	-18.0 dBm	0.0 dBm	18.0 dB	101
TN-SFP-OC3S16-C59	2.0 dBm	5.0 dBm	-35.0 dBm	-10.0 dBm	37.0 dB	101	TN-SFP-FC4XS-C29	0.0 dBm	4.0 dBm	-18.0 dBm	0.0 dBm	18.0 dB	101
TN-SFP-OC3S16-C61	2.0 dBm	5.0 dBm	-35.0 dBm	-10.0 dBm	37.0 dB	101	TN-SFP-FC4XS-C31	0.0 dBm	4.0 dBm	-18.0 dBm	0.0 dBm	18.0 dB	101
TN-SFP-OC3ST	-14.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	17.0 dB	99	TN-SFP-FC4XS-C33	0.0 dBm	4.0 dBm	-18.0 dBm	0.0 dBm	18.0 dB	101
TN-SFP-OC3SB21	-14.0 dBm	-8.0 dBm	-33.0 dBm	-8.0 dBm	19.0 dB	98	TN-SFP-FC4XS-C35	0.0 dBm	4.0 dBm	-18.0 dBm	0.0 dBm	18.0 dB	101
TN-SFP-OC3SB22	-14.0 dBm	-8.0 dBm	-33.0 dBm	-8.0 dBm	19.0 dB	98	TN-SFP-FC4XS-C37	0.0 dBm	4.0 dBm	-18.0 dBm	0.0 dBm	18.0 dB	101
TN-SFP-OC3SB41	-8.0 dBm	-3.0 dBm	-33.0 dBm	-8.0 dBm	25.0 dB	98	TN-SFP-FC4XS-C39	0.0 dBm	4.0 dBm	-18.0 dBm	0.0 dBm	18.0 dB	101
TN-SFP-OC3SB42	-8.0 dBm	-3.0 dBm	-33.0 dBm	-8.0 dBm	25.0 dB	98	TN-SFP-FC4XS-C41	0.0 dBm	4.0 dBm	-18.0 dBm	0.0 dBm	18.0 dB	101
TN-SFP-OC3SB61	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	98	TN-SFP-FC4XS-C43	0.0 dBm	4.0 dBm	-18.0 dBm	0.0 dBm	18.0 dB	101
TN-SFP-OC3SB62	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	98	TN-SFP-FC4XS-C45	0.0 dBm	4.0 dBm	-18.0 dBm	0.0 dBm	18.0 dB	101
TN-SFP-OC3SB81	-2.0 dBm	3.0 dBm	-34.0 dBm	-8.0 dBm	32.0 dB	98	TN-SFP-FC4XS-C47	0.0 dBm	4.0 dBm	-18.0 dBm	0.0 dBm	18.0 dB	101
TN-SFP-OC3SB82	-3.0 dBm	2.0 dBm	-34.0 dBm	-8.0 dBm	31.0 dB	98	TN-SFP-FC4XS-C49	0.0 dBm	4.0 dBm	-18.0 dBm	0.0 dBm	18.0 dB	101
TN-SFP-OC3MB1	-15.0 dBm	-8.0 dBm	-30.0 dBm	-8.0 dBm	15.0 dB	98	TN-SFP-FC4XS-C51	0.0 dBm	4.0 dBm	-18.0 dBm	0.0 dBm	18.0 dB	101
TN-SFP-OC3MB2	-15.0 dBm	-8.0 dBm	-30.0 dBm	-8.0 dBm	15.0 dB	98	TN-SFP-FC4XS-C53	0.0 dBm	4.0 dBm	-18.0 dBm	0.0 dBm	18.0 dB	101
TN-SFP-OC3S3	-14.0 dBm	-8.0 dBm	-34.0 dBm	-8.0 dBm	20.0 dB	99	TN-SFP-FC4XS-C55	0.0 dBm	4.0 dBm	-18.0 dBm	0.0 dBm	18.0 dB	101
TN-SFP-OC3S8	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	99	TN-SFP-FC4XS-C57	0.0 dBm	4.0 dBm	-18.0 dBm	0.0 dBm	18.0 dB	101
TN-SFP-OC3S8-C27	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	101	TN-SFP-FC4XS-C59	0.0 dBm	4.0 dBm	-18.0 dBm	0.0 dBm	18.0 dB	101
TN-SFP-OC3S8-C29	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	101	TN-SFP-FC4XS-C61	0.0 dBm	4.0 dBm	-18.0 dBm	0.0 dBm	18.0 dB	101
TN-SFP-OC3S8-C31	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	101	TN-SFP-SX	-9.0 dBm	4.0 dBm	-17.0 dBm	-3.0 dBm	8.0 dB	99
TN-SFP-OC3S8-C33	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	101	TN-SFP-SXB1	-10.0 dBm	4.0 dBm	-17.0 dBm	-3.0 dBm	7.0 dB	98
TN-SFP-OC3S8-C35	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	101	TN-SFP-SXB2	-10.0 dBm	4.0 dBm	-17.0 dBm	-3.0 dBm	7.0 dB	98
TN-SFP-OC3S8-C37	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	101	TN-SFP-SXD	-9.0 dBm	-4.0 dBm	-17.0 dBm	-3.0 dBm	8.0 dB	99
TN-SFP-OC3S8-C39	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	101	TN-XFP-10G-MM-SR	-5.0 dBm	-1.0 dBm	-9.5 dBm	0.5 dBm	4.5 dB	109
TN-SFP-OC3S8-C41	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	101	TN-XFP-10GLR-OC192SR	-5.0 dBm	0.5 dBm	-14.4 dBm	0.5 dBm	9.4 dB	109
TN-SFP-OC3S8-C43	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	101	TN-XFP-10GER-OC192IR	-1.0 dBm	4.0 dBm	-16.5 dBm	0.5 dBm	15.5 dB	109
TN-SFP-OC3S8-C45	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	101	TN-XFP-10GZR-OC192LR	0.0 dBm	5.0 dBm	-24.0 dBm	5.0 dBm	24.0 dB	109
TN-SFP-OC3S8-C47	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	101	TN-XFP-10GLR2-OC192S	-6.0 dBm	-1.0 dBm	-15.0 dBm	0.5 dBm	9.0 dB	109
TN-SFP-OC3S8-C49	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	101	TN-XFP-10G-U	-6.0 dBm	-1.0 dBm	-15.0 dBm	0.5 dBm	9.0 dB	109
TN-SFP-OC3S8-C51	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	101	TN-XFP-10G-D	-6.0 dBm	-1.0 dBm	-15.0 dBm	0.5 dBm	9.0 dB	109
TN-SFP-OC3S8-C53	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	101	TN-XFP-10G-U-40	-5.0 dBm	-1.0 dBm	-9.5 dBm	0.5 dBm	15.0 dB	109
TN-SFP-OC3S8-C55	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	101	TN-XFP-10G-D-40	-5.0 dBm	-1.0 dBm	-9.5 dBm	0.5 dBm	15.0 dB	109
TN-SFP-OC3S8-C57	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	101	TN-XFP-ER	-1.0 dBm	4.0 dBm	-16.5 dBm	0.5 dBm	15.5 dB	108

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Product SKU	Min TX PWR	Max TX PWR	RX Sensitivity	Max In PWR	Link Budget	Page
TN-XFP-LR	-5.0 dBm	0.5 dBm	-14.4 dBm	0.5 dBm	9.4 dB	108
TN-XFP-SR	-7.0 dBm	-1.3 dBm	-11.1 dBm	0.5 dBm	4.1 dB	108
TN-XFP-LR1	-8.2 dBm	0.5 dBm	-14.4 dBm	-14.4 dBm	6.2 dB	108
TN-XFP-LR10	1.0 dBm	4.0 dBm	-24.0 dBm	-7.0 dBm	25.0 dB	108
TN-XFP-LR1-Cxx	-3.0 dBm	1.0 dBm	-14.4 dBm	0.5 dBm	11.4 dB	108
TN-XFP-LR1-T	-8.2 dBm	0.5 dBm	-14.4 dBm	-14.4 dBm	6.2 dB	108
TN-XFP-LR2	-3.0 dBm	1.0 dBm	-15.0 dBm	-15.0 dBm	12.0 dB	108
TN-XFP-LR2-T	-3.0 dBm	1.0 dBm	-15.0 dBm	-15.0 dBm	12.0 dB	108
TN-XFP-LR4-Cxx	1.0 dBm	5.0 dBm	-15.0 dBm	0.5 dBm	16.0 dB	108
TN-XFP-LR7-Cxx	0.0 dBm	4.0 dBm	-23.0 dBm	-7.0 dBm	23.0dB	108
TN-XFP-LRM	-6.5 dBm	-0.5 dBm	-11.0 dBm	1.0 dBm	4.5 dB	108
TN-XFP-SR	-6.5 dBm	-1.5 dBm	-9.9 dBm	-7.5 dBm	3.4 dB	108
TN-XFP-ZR	-1.0 dBm	4.0 dBm	-23.0 dBm	-23.0 dBm	22.0 dB	108
TN-X2-10GB-ER	-1.0 dBm	4.0 dBm	-16.5 dBm	0.5 dBm	15.5 dB	110
TN-X2-10GB-LR	-5.0 dBm	0.5 dBm	-14.4 dBm	0.5 dBm	9.4 dB	110
TN-X2-10GB-SR	-7.0 dBm	-1.3 dBm	-11.1 dBm	0.5 dBm	4.1 dB	110

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