2011 SERVICE PROVIDER CATALOG

ETHERNET
TDM & CWDM
SWITCHES
LINK + SERVICE OAM

YOUR NETWORK OVER FIBER. FROM ANYWHERE. TO ANYWHERE.

TRANSITION NETWORKS®

Corporate Overview

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).

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, T1/E1, DS3, ATM, RS232/485, video, Power-over-Ethernet, and many more.

In the fall of 2005, Communication Systems, Inc. announced the integration of MILAN Technologies into Transition Networks. This integration expanded the Transition Networks product portfolio to include a complete line of multilayer switches. The MILAN By Transition Networks 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. Based in Minneapolis, Transition Networks distributes hardware-based connectivity solutions exclusively through a 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 homogenous 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 has 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, 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.

MILAN by Transition Networks

The MILAN by Transition Networks portfolio of multilayer Ethernet switching products are designed to facilitate low-cost network evolution by allowing customers to only pay for the port counts and features that they need. The MILAN by Transition Networks switch line offers customers unique configurations and a high level of service and reliability, all while serving to ease the stress caused on networks by high-bandwidth applications.

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. They have a 99.4 percent customer acceptance rating, meaning that approximately one in 1,000 experience any sort of failure in the field. All Transition Networks branded products carry a lifetime warranty, while MILAN switches by Transition Networks products offer a five-year 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
- **Built to Perfection**
  99.4% of Transition Networks' products are delivered without functional failure
- **ISO 9001 2000**
  Quality System Certified
- **ISO 14001**
  Environmental Certification
- **Lifetime Warranty**
  Hassle-free Lifetime Warranty on Transition Networks brand products (including power supply and fan)
- **100% Channel**
  100% of Transition Networks' products are distributed exclusively through the channel
- **Transition NOW**
  - "Chat" Live via the Web
  - Free Live Web-based training with 8-12 seminars per month

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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 36-52]

Stand-Alone Network Interface Devices (NIDs)

Single point of conversion; Mid to low density applications; Rack or Wall Mountable. [pg 53-713]

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 74-95]

Small Form Factor Pluggables (SFPs)

Copper to Fiber connections via the GBIC or SFP port on switches and routers; Economical; Hot-swappable. [pg 96-104]

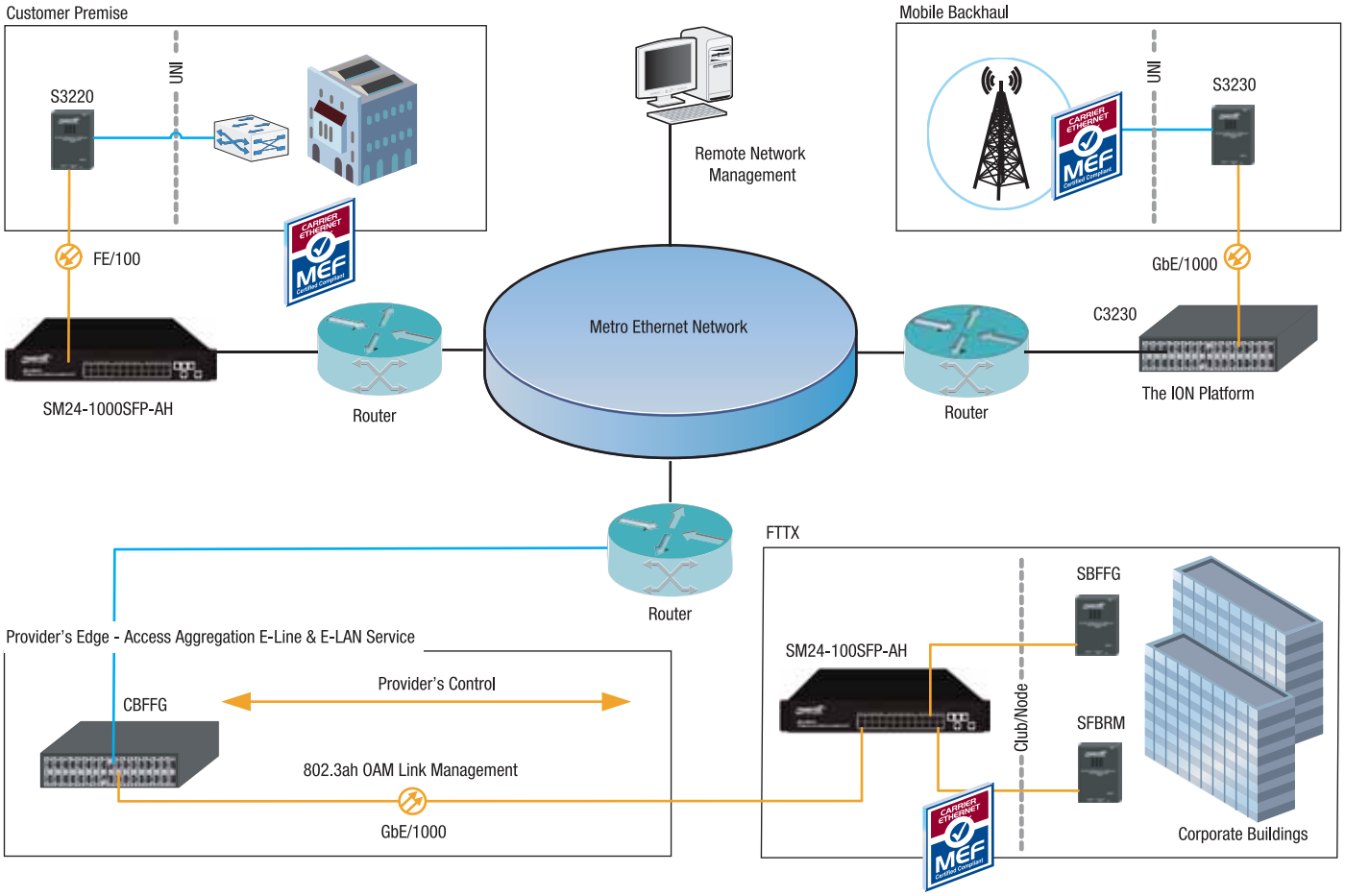
CWDM

While utilizing existing infrastructure, CWDM products allow you to transmit multiple protocols over an existing duplex fiber link. [pg 105]

Switching Solutions

Full selection of low port count to high port count Ethernet switching solutions. [pg 106-112]

Ethernet Access/Metro Ethernet



Application Description

Ethernet Access/Metro Ethernet

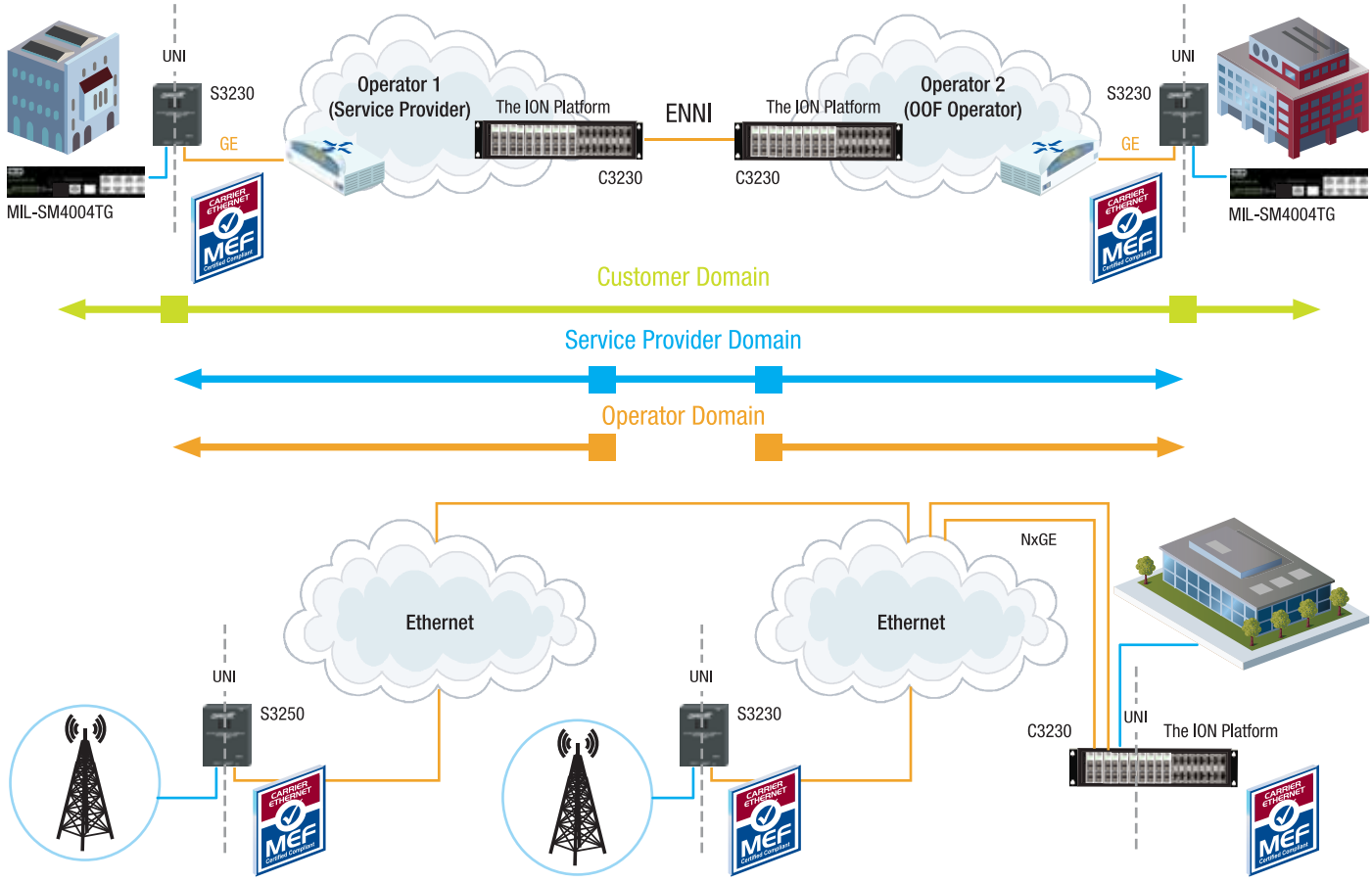
Ethernet services continue to be one of the fastest growing services that customers demand. To effectively deliver these services, while also keeping CapEx and OpEx in line - the use of an intelligent Network Interface Device (NID) is required. NIDs provide a clear demarcation point between the service provider and customer network. In addition, a NID allows the service provider to reduce OpEx through the remote management capabilities. The NID also enables service providers to deliver tiered services for a faster return on investment. As shown in the figure above Ethernet services can be delivered to a customer from the CO/POP using a fiber aggregation switch and then delivering service to many customers for an FTTx deployment. Ethernet services are also viable for mobile backhaul applications where the base station equipment has an Ethernet interface.

Features and Benefits:

- MEF compliant when delivering MEF services
- Remote management utilizing 802.3ah OAM or IP
- Advance features such as; bandwidth allocation, 802.1q VLANs and 802.1p QoS to deliver tiered services
- Intelligent demarcation device to clearly define the UNI

Transition Product Finder	
CBFFG	[pg 43]
CFBRM	[pg 42]
SFBRM	[pg 58-60]
SBFFG	[pg 61]
SM24-100SFP-AH	[pg 106]
SM24-1000SFP-AH	[pg 108]
C323x	[pg 84]
S323x	[pg 92]
S322x	[pg 81]

Ethernet Access/Metro Ethernet



Application Description

Ethernet Access / Metro Ethernet using 802.1ag & Y.1731

Ethernet services continue to be one of the fastest growing services that customers demand. Often there are multiple operators involved in delivering an Ethernet UNI to a customer. Because of this service providers are turning to 802.1ag to deliver the standard specific protocols and procedures to support transport fault management.

Since bridges are increasingly used in networks operated by multiple independent organizations, each with restricted management access to each other's equipment. 802.1ag provides capabilities for detecting, verifying and isolating connectivity failures in multiple operator networks.

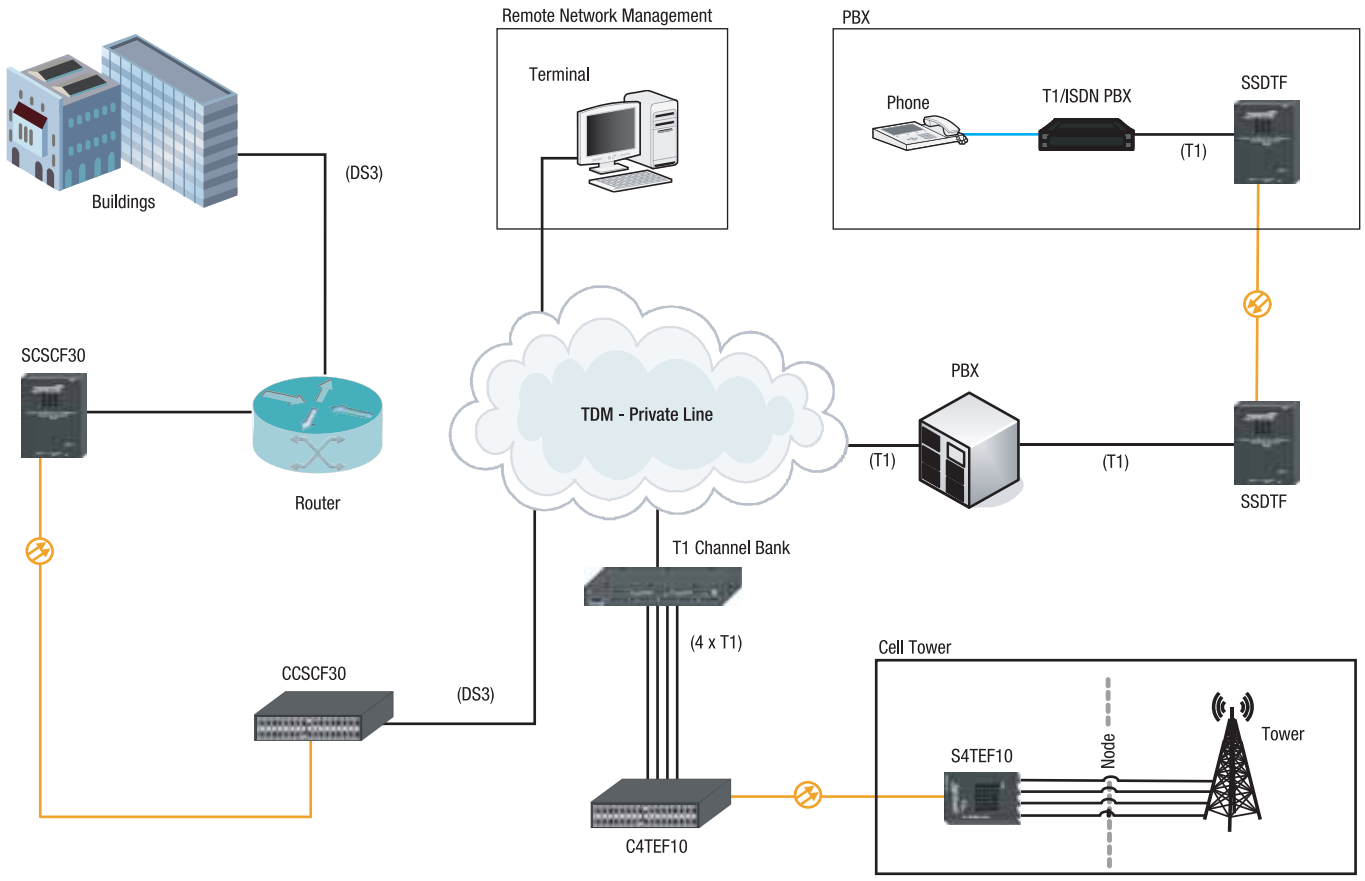
As shown in the figures above, Ethernet services can be delivered to customers with multiple operators and while still providing visibility to detect faults and get performance statistics.

Features and Benefits:

- Remote management utilizing 802.1ag or IP
- Provision and turn-up Ethernet Virtual Circuits (EVCs) traversing multiple operators
- Verify connectivity with 802.1ag continuity checks, link trace and loopbacks
- Perform SLA verification with Y.1731 performance monitoring; Frame Loss Ratio (FLR) and Frame Delay (FD)
- Advance features such as; bandwidth allocation, 802.1q VLANs and 802.1p QoS to deliver tiered services
- Intelligent demarcation device to clearly define the UNI

Transition Product Finder	
C323x	[pg 84]
S323x	[pg 92]
S325x	[pg 93]
ION Chassis	[pg 74]

Private Line/TDM Services



Application Description

Private Line/TDM Services

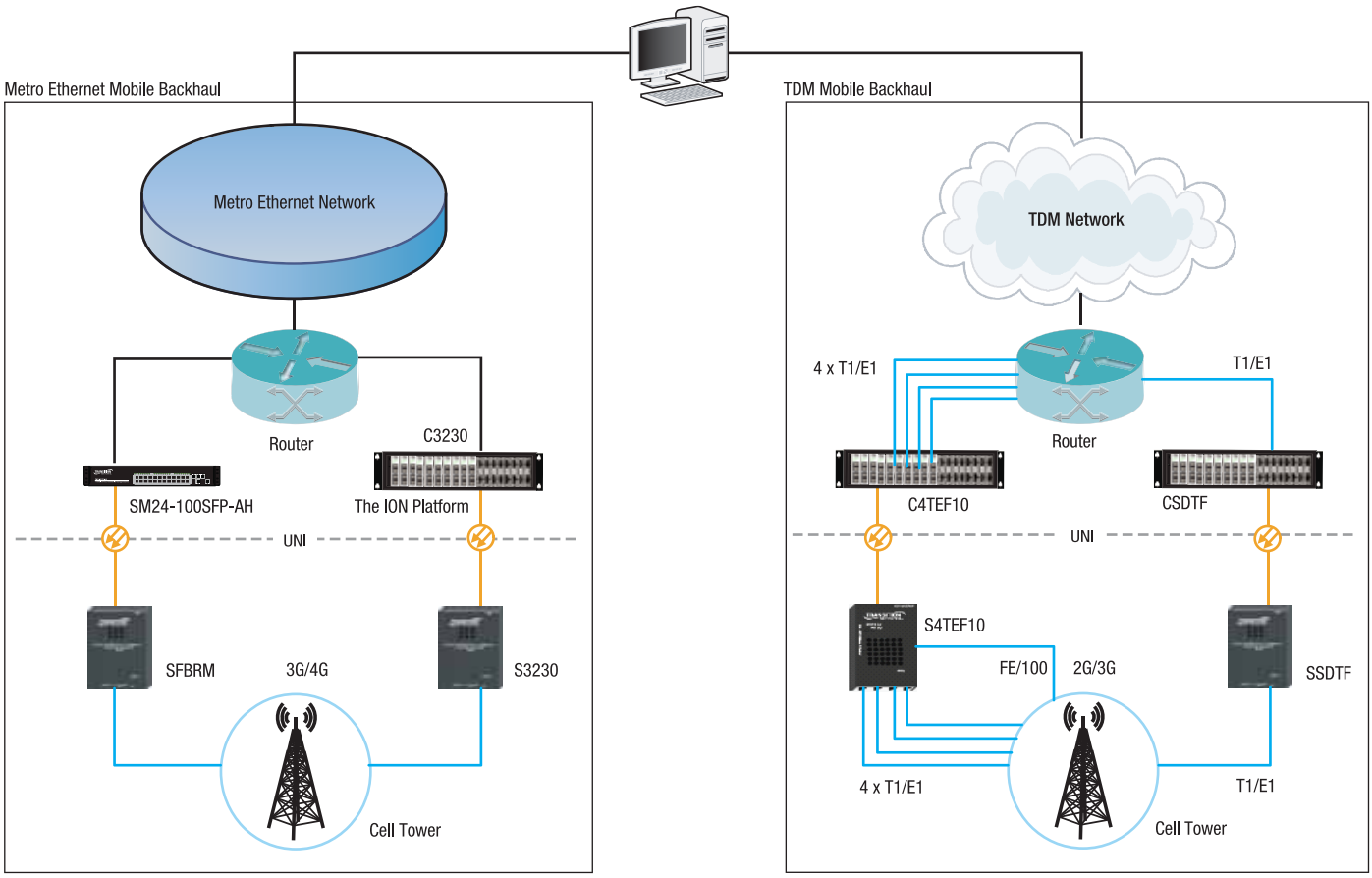
To support the large base of TDM services, Transition Networks offers many different products across many different protocols to enable a variety of services to be extended over fiber. Customers will continue to use TDM services in certain scenarios and applications, so service providers need an economical 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.

Features and Benefits:

- Remote management capabilities
- Products to support a variety of TDM services
- Loopback capabilities
- North American and European line settings

Transition Product Finder	
CCSCF30	[pg 48]
C4TEF10	[pg 51,52]
SCSCF30	[pg 67]
SSDTF	[pg 68]
S4TEF10	[pg 70-73]

Mobile Backhaul - Metro/TDM



Application Description

Mobile Backhaul

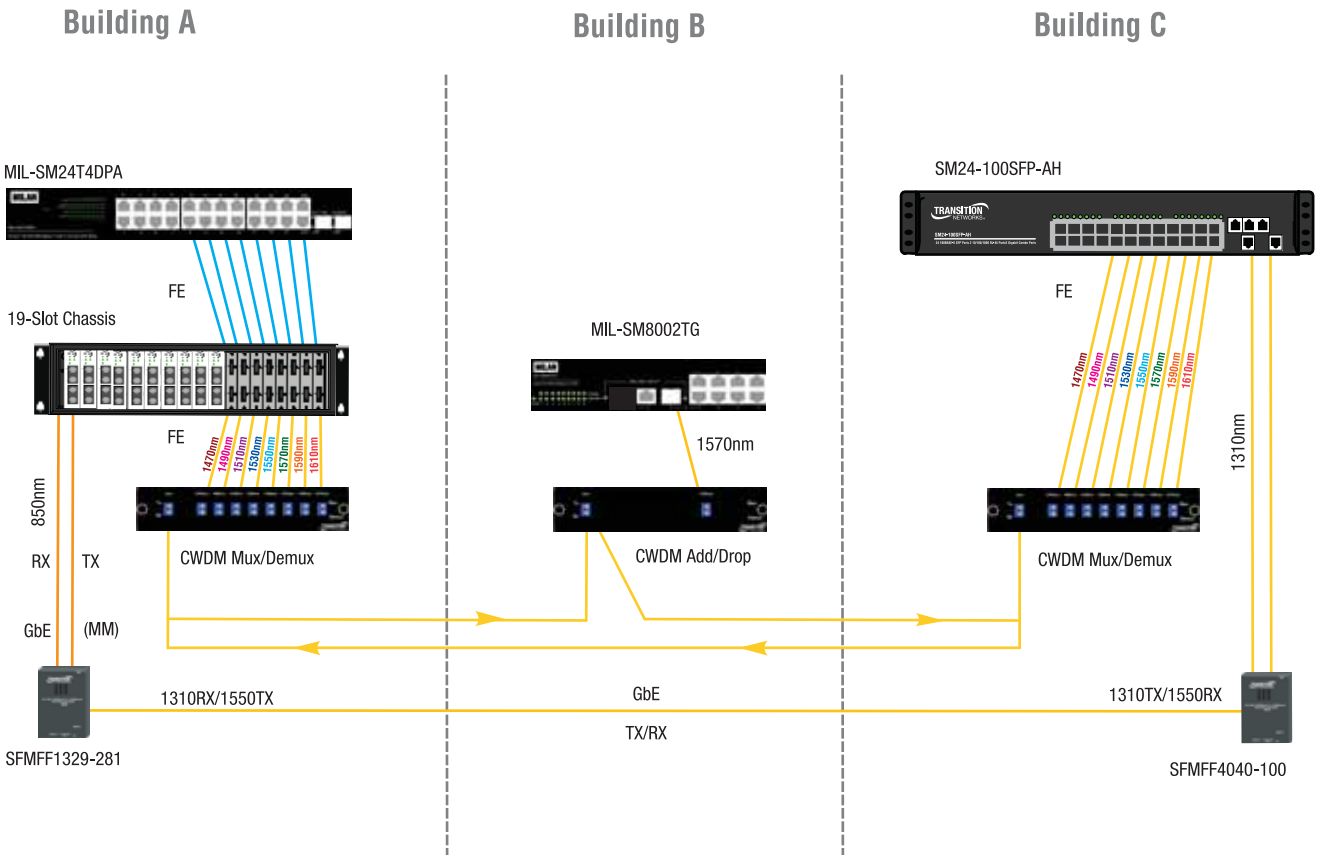
As wireless networks continue to evolve and grow from voice services to voice and data services, there is a need to provide quality and efficient backhaul features. With the existing install base of TDM circuits and the addition of Ethernet services, backhaul solutions need to be able to support TDM and Ethernet. As shown in the figure above Ethernet only services can be backhauled from the cell tower to the CO/POP with MEF compliant products. At the CO/POP a fiber switch or Point System™ chassis can be utilized. For TDM services a single T1/E1 or up to 4 T1/E1s can be carried across fiber to a Point System™ chassis. The 4xT1/E1 product can also carry up to 100Mbps of Ethernet traffic in addition to the standard TDM traffic across the fiber.

Features and Benefits:

- Products to support TDM and Ethernet mobile backhaul
- T1/E1 line settings for North American and European support
- Remote management capabilities
- Loopback capabilities

Transition Product Finder	
CBFFG	[pg 43]
CSDTF	[pg 50]
C4TEF10	[pg 51, 52]
SFBRM	[pg 58-60]
SBFFG	[pg 61]
S4TEF10	[pg 70-73]
SSDTF	[pg 69]
SM24-100SFP-AH	[pg 106]
SM24-1000SFP-AH	[pg 108]
C323x	[pg 84]
S323x	[pg 92]

WDM/CWDM/BWDM - Fiber Exhaustion



Application Description

CWDM/Fiber Exhaustion

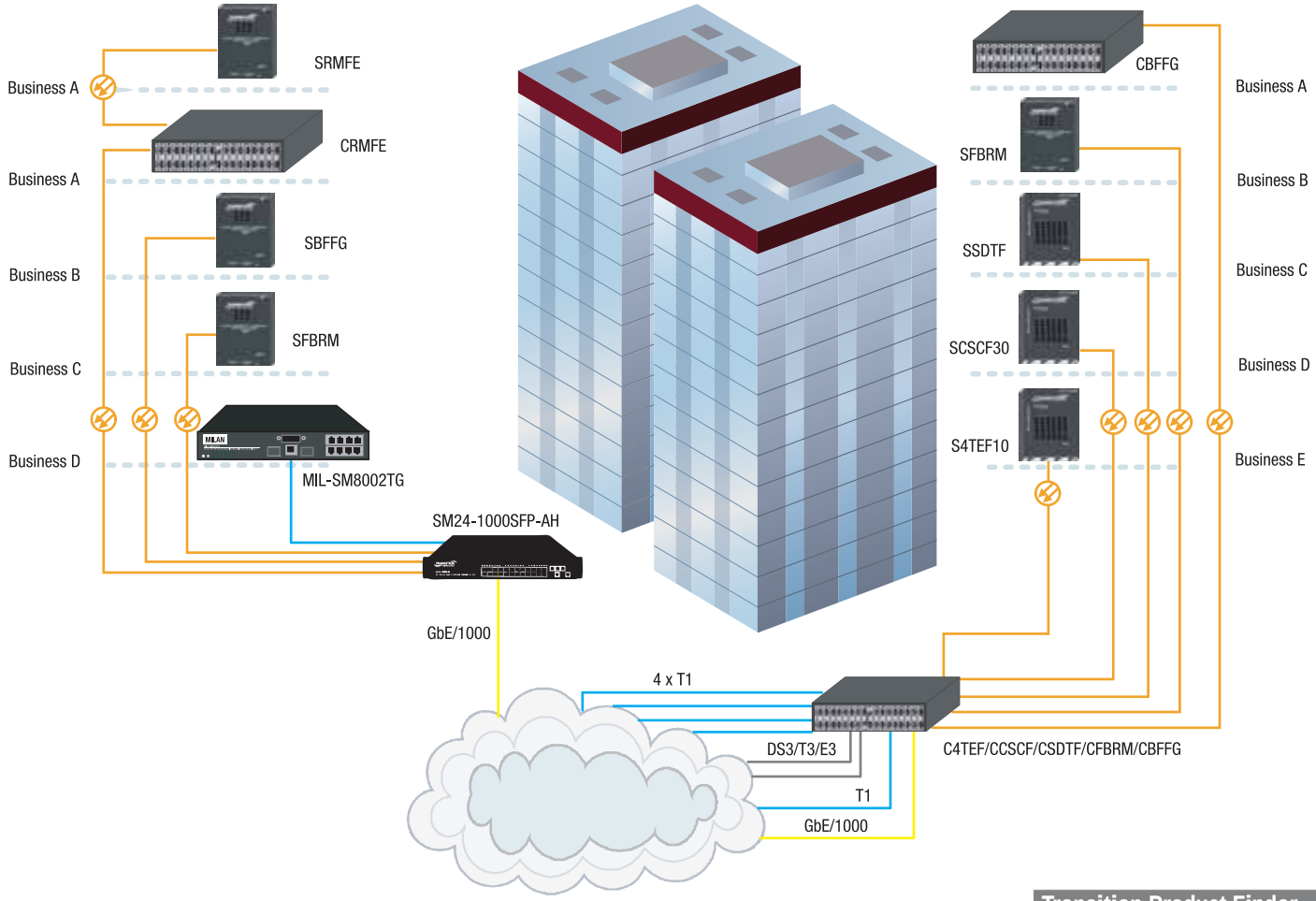
WDM is an excellent method for better utilization of existing fiber infrastructure. It is expensive to install additional fiber optic lines when fiber is exhausted and the result is often a considerable length of time to recognize this addition as a return on investment. For the locations where additional 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:

- Works with existing infrastructure and equipment
- Protocol independent
- CWDM is a passive technology that requires no power or configuration
- Increases existing bandwidth
- Point to Point or Ring Topologies

Transition Product Finder	
CPSMC	[pg 38, 39]
CFBRM	[pg 42]
CBFFG	[pg 43]
SFMFF	[pg 57, 62-64, 66]
TN-SFP	[pg 96, 97, 99]
CWDM	[pg 105]
SM24-1000SFP-AH	[pg 108]
MIL-SM8002TG	[pg 110]
MIL-SM24T4DPA	[pg 109]

MDU/MTU Distribution



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.

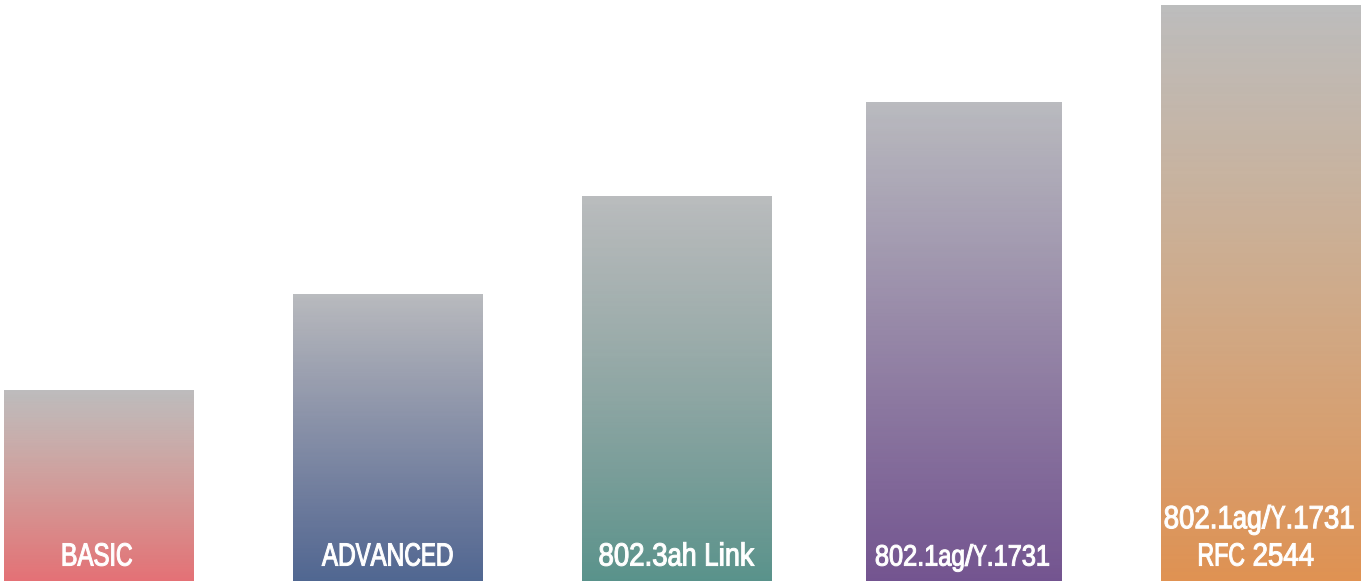
Features and Benefits:

- 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	
CRMFE	[pg 40]
CFBRM	[pg 42]
CBFFG	[pg 43]
CCSCF	[pg 48]
CSDTF	[pg 50]
C4TEF	[pg 51, 52]
SRMFE	[pg 56]
SFBRM	[pg 58-60]
SBFFG	[pg 61]
SCSCF	[pg 67]
SSDTF	[pg 69]
S4TEF	[pg 70-73]
SM24-1000SFP-AH	[pg 108]
MIL-SM8002TG	[pg 110]

Remote Monitoring Matrix

Featuring a matrix of different features that will help you identify and select which Transition products best meet your remote monitoring requirements.



Network Interface Devices

Transition Networks recognizes that service providers and enterprises have varying remote management needs depending on the specific services and support they require. To meet these requirements Transition now offers several different classes of remotely managed devices—ranging from basic remote monitoring, SNMP and Full SOAM monitoring using ITU Y.1731 and 802.1ag. Transition's Carrier Ethernet devices are built on these multiple classes of remote management for improving business agility with assured quality, maximizing your return on investment and the total cost of ownership within your network.

Remote Monitoring Matrix	
Basic	[pg 13]
Advanced	[pg 14, 15]
802.3ah Link	[pg 16, 17]
802.1ag/Y.1731	[pg 18, 19]
802.1ag/Y.1731 RFC2544	[pg 20, 21]

Remote Monitoring Capabilites	x2210/xBFTF	xSRFB	x2220/x322x xFBRM/xBFFG	x323x	S2250/ S325x
	Basic	Advanced	802.3ah Link OAM	802.1ag Service OAM	Y.1731 Performance
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/xBFTF	xSRFB	x2220/x322x xFBRM/xBFFG	x323x	S2250/ S325x
802.1q VLANs			✔	✔	✔
Q-in-Q VLANs			✔	✔	✔
IEEE 802.1P QoS			✔	✔	✔
Bandwidth Allocation		✔	✔	✔	✔
Jumbo Frame			*(BFFG)	✔	✔
MEF 9 certification			✔	✔	✔
MEF 14 certification			✔	✔	✔
IP addressable			✔	✔	✔
RFC2544 Tester					✔
SNMP Management	✔ (via mgmt)	✔ (via mgmt)	✔	✔	✔

Basic Remote Monitoring

Traditionally, service providers who deliver Ethernet services to customers, use a form of remote management that is designed to isolate physical fault conditions by using a technique from reverse engineering. The operator is notified of a fault condition either by a Link Pass Through (LPT) alert or by a Far End Fault (FEF) notification. In both instances the cable connectivity is disrupted, copper for LPT and fiber for the FEF — notifying the management system that this disruption may have been caused by someone disconnecting one of the ports.

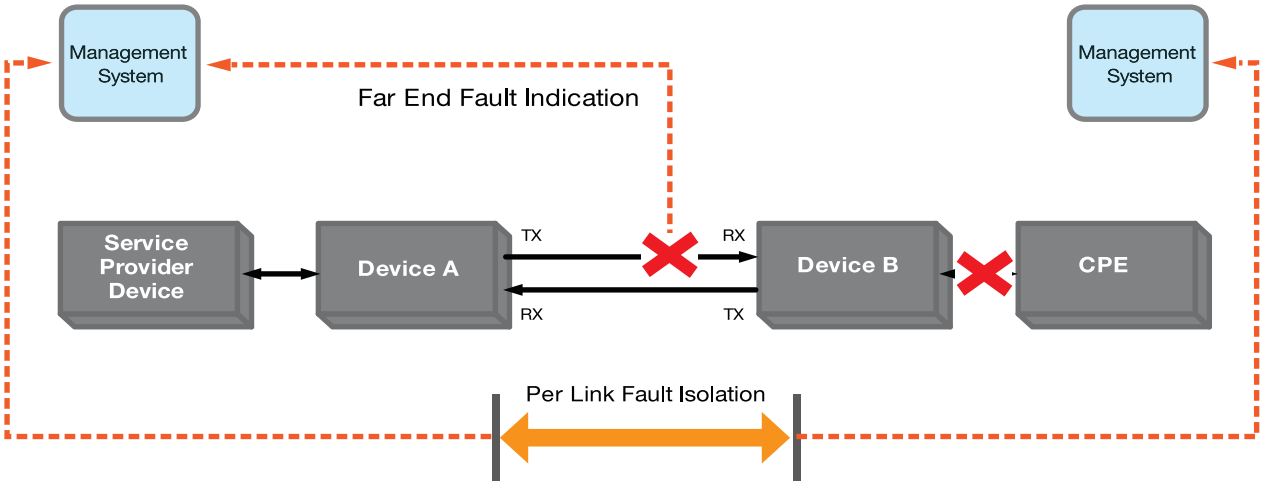
LPT states that if the copper demarcation port loses a signal, the device will then pass the link fault condition through to the next device in the sequence—which then disables the local copper port, therefore alerting the managed switch or router that the demarcation copper port is effectively disconnected. While this deployment strategy does allow for a Network Management System (NMS) to be alerted to a customer failure, it does require some additional manpower to troubleshoot each of the devices and link segments along the service path to the customer—starting with the central office device and connectivity. After the link failure condition has occurred, Automatic Link Restoration will automatically re-establish the link without the need to physically reset the device.

Features

- Far End Fault (FEF) [pg 22]
- Link Pass Through (LPT) [pg 23]
- Auto Link Restoration [pg 24]
- Field Upgradeable Firmware [pg 24]

Application

This basic level of management by an Ethernet service delivery package would be deployed by a service provider that is not bound by a fixed SLA and with sufficient staff resources to troubleshoot failures.



Advanced Remote Monitoring

Advanced Remote Monitoring, or Link Layer Monitoring, is often used by service providers for residential and business services. Advanced Remote Monitoring offers a best-effort service with the addition of Link-Monitoring, which allows for fault detection on the physical link between two devices. When implementing Advanced Remote Monitoring services, remote devices will need to share a simple lower-level protocol that can exchange information on fault conditions, along with the status of each device on a single link.

In an Advanced Remote Monitoring application, the detection of a fault condition may be all that an operator really needs for fault isolation—therefore delivering a notification for the need to restore service. Additional information, if desired, such as the duplex status of each device on the link may also be beneficial to determine limited accompanying fault isolation. For example, Advanced Remote Monitoring equipment provides information like Far End Fault (FEF) notifications—where the far-end device (endpoint) sends an error message to its immediate peer, that it is no longer receiving traffic. The exact cause of this fault could be several different factors including: a cable cut, faulty receiver, or faulty transmitter. Transparent Link Pass Through (TLPT) will then notify the end device of the failure over the fiber link instructing the remote device to shut down the copper port and thus notifying the local device of the failure.

Advanced Remote Monitoring uses an additional feature called Loopback, which is most commonly used as an aid in troubleshooting physical connection problems within the network. With this feature you can quickly pinpoint a problem between two end-points in different locations of a particular segment. By sending a test signal through the circuit in one location, and having the end device at the other location send the signal back through the circuit, you can confirm that the circuit is functioning correctly.

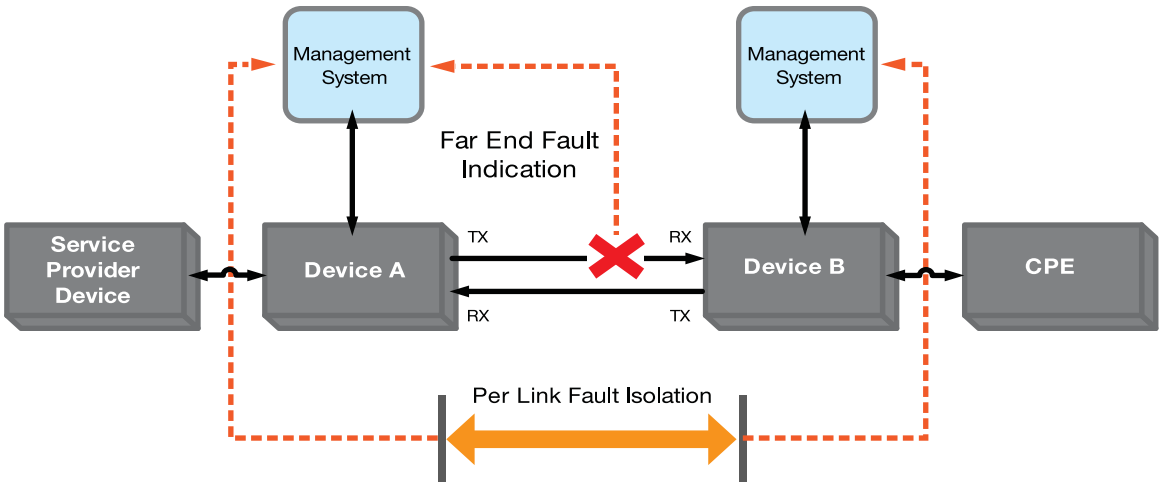
Features

- Far End Fault (FEF) [pg 22]
- Error Message Transmission
- Transparent Link Pass Through (TLPT) [pg 23]
- Loopback [pg 24]
- Dying Gasp
- Automatic Link Restoration [pg 24]
- Field Upgradeable Firmware [pg 24]

Advanced Remote Monitoring

Application

A typical Advanced Remote Monitoring application requires a user who is looking to quickly isolate physical connection faults and will probably deploy this technology with connectivity assurance only—rather than with the use of a detailed Service Level Agreement (SLA).



To determine and fix the actual fault will require several steps that could involve a service dispatch, but the fault has been isolated along the transmitted path and allows the operator to focus their resources on correcting the identified fault conditions.

802.3ah Link OAM

IEEE 802.3ah remote management is tailored to deliver services to small and medium sized businesses. IEEE 802.3ah Link OAM was developed by the IEEE as a standard for detecting link failures on the first hop, point-to-point physical Ethernet links. Often referred to as "Ethernet in the First Mile" (EFM) describes that any Ethernet device that has IEEE 802.3ah capabilities can learn each others OAM capabilities via a 'Discovery' mechanism performed either at the MAC or IP address level. IEEE 802.3ah in addition to discovery capabilities, incorporates Remote Fault Detection, which allows one end-point device to inform the other in both bidirectional and unidirectional links that a link failure has been detected. Once the failure is detected, it can set a device in a loopback mode that will clear when it recovers. An example of IEEE 802.3ah fault detection is Dying Gasp. A Dying Gasp condition occurs if there is an interruption in the end-point's power source. Prior to the device power failure, there is enough power reserved for a Dying Gasp alert to be sent to the network operator's network management system. This helps a service provider identify and isolate the end-point device that has experienced a power failureIEEE 802.3ah also includes Remote Monitoring capabilities. This allows network operators to collect real-time and historical near and far-end link performance statistics similar to those found in SONET/SDH networks.

Although IEEE 802.3ah can provide valuable information to network operators on critical events, IEEE 802.3ah does not provide a method or mechanism for repairing faults as they occur. Moreover, because of the wide range in equipment capabilities, fault isolation may require a network operator to establish conditions and traffic for that specific fault condition. An example of such a generated traffic packet is an IEEE 802.3ah Loopback Message (LBM) packet, which is designed to address and isolate performance issues on specific links within a service provider's network.

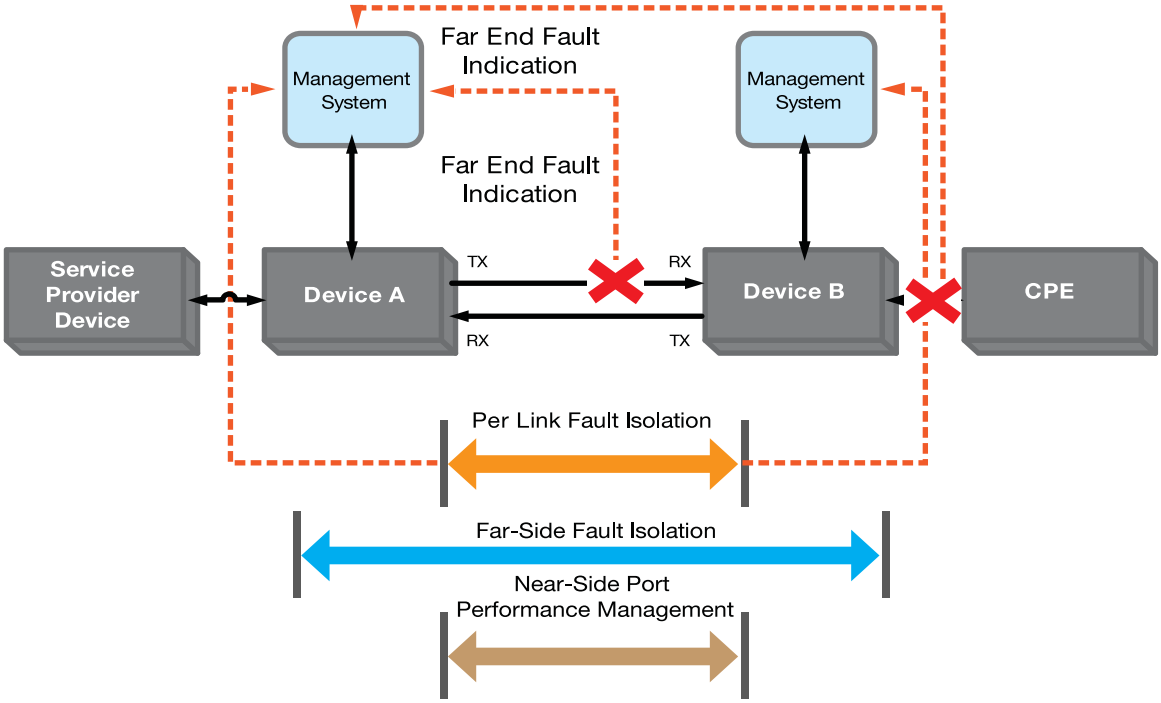
Features

- Discovery
- Far End Fault (FEF) [pg 22]
- Dying Gasp
- Fault Isolation
- Per Link Fault Isolation
- Critical Events
- Local Loopback [pg 24]
- Remote Loopback [pg 24]

Application

Link OAM users generally have very basic SLA requirements and will tend to use IEEE 802.3ah in isolating faults efficiently and quickly. Link OAM devices need to be used at both the service provider's point of presence and at the customer premise (CPE) for effective link reporting.

802.3ah Link OAM



Additional Capabilities

Link OAM also has another option that does not require the deployment of IEEE 802.3ah to receive all of the reportable information. In this option, management reporting is done through the IP address of the NID. This means that rather than a book-end IEEE 802.3ah type deployment—an operator can simply connect the fiber coming from an Access Node switch to a remote NID and manage all of the features and capabilities of the NID, through an individual IP address that is assigned by the operator carrier. This set-up provides an operator with increased visibility beyond IEEE 802.3ah reporting and does not require both items in the link to have IEEE 802.3ah capability.

802.1ag/Y.1731 Service OAM

IEEE 802.3ah OAM is applied specifically to the physical link between an endpoint and a directly connected peer device, whereas IEEE 802.1ag Continuity Fault Management (CFM) takes this function to the next level and examines the logical flows, not only between directly connected links, but also across the path of any two points in an entire network. IEEE 802.1ag provides visibility into the VLAN traffic and uses special continuity check messages that are sent periodically from one end-point to the other, checking availability of the connections. Link Trace is another on demand IEEE 802.3ag tool used by operators to trace the path towards a specific MAC address destination. This is in the form of a MAC layer traceroute, which allows the network operator to detect if a peer is available and what intermediate stations are between the end-point and the detected peer on the network path. The end-point and peer can then decide what is needed for fault isolation and diagnostics—including on demand loopbacks between specific devices. Once a method has been determined, it can then start a loopback between the two end-points on the VLAN path. This provisioning allows users to generate specific per-VLAN continuity checking, loopback, and link trace frames. IEEE 802.1ag also defines the use of maintenance domains. These are simple network areas defined by the service provider in a hierarchical order that will be monitored. These areas or boundaries within the domain are further broken out into messages from one end-point to the other, checking the availability of the connections.

The introduction of ITU Y.1731 Frame Delay (FD) and Frame Delay Variance (FDV)—requires peers to exchange timestamp information every time a peer handles a packet along the logical path. ITU Y.1731 defines both one-way and two-way frame delay. One-Way frame delay requires that there is a unified clock between the two endpoints and is measured in a single direction, such as upstream. The two-way frame delay is done with a round trip calculation and only requires a single clock at the source. Frame Delay (FD) is measured by an end-point transmitting an SOAM frame periodically and having the destination peer report any variance upon receiving the frame.

Frame Delay Variance (FDV) measures the changes or variance in the delays between different packets and determines an average calculation. FD and FDV helps in real-time to determine if the data path is adding excessive or unwanted time variances in each frame delivery. ITU Y.1731 also defines Far End Fault (FEF), which uses an Alarm Indication Signal (AIS) for fault notifications. FEF is complementary to 802.1ag, and allows an end-point to asynchronously inform a peer of a fault condition across a network.

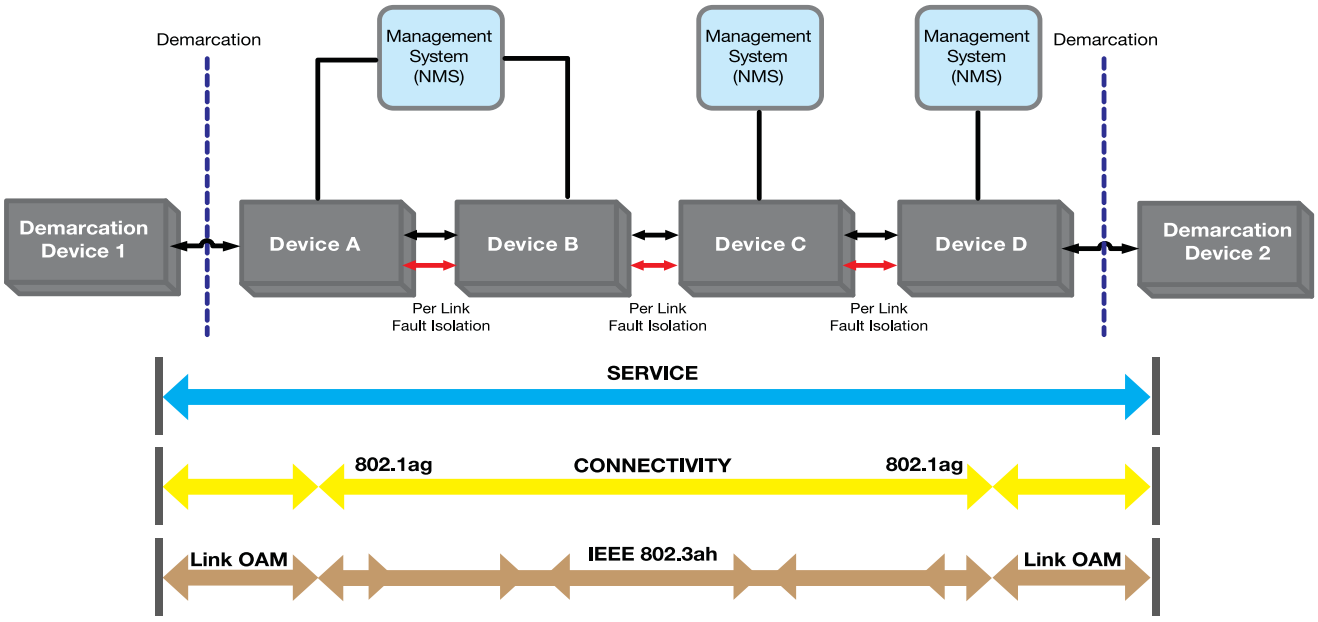
Features

- Far End Fault (FEF) [pg 22]
- Loopback [pg 24]
- Dying Gasp
- Critical Events
- Link Trace
- Discovery
- Per VLAN Continuity Checking
- AIS / RDI / TST
- FD - Frame Delay
- FDV - Frame Delay Variance
- Advanced Fault Isolation

802.1ag/Y.1731 Service OAM

Application

802.1ag is generally used to deliver SLA services to small businesses all the way up to large enterprise applications—for advanced fault isolation. This class also adds some logical flows and frame delay monitoring of Ethernet traffic to ensure SLA assurance.



802.1ag/Y.1731 w/RFC 2544

In ITU Y.1731 the Frame Loss Ratio (FLR) and the Frame Delay Variance (FDV) counters—were designed to monitor traffic that had been generated by applications on the path. Most service providers are required to know what the throughput of a path is at any given time. Monitoring traffic throughput is important to a service provider for diagnostic, monetary and regulatory reasons. Y.1731 defines Test Frames (TST) for monitoring the actual traffic throughput. ITU Y.1731 TST frames are injected by an endpoint into a data path and then removed by a designated peer, which can then report back to the Network Management System (NMS) on the number of frames received and the rate at which they were received.

When used in combination with RFC 2544, TST frames can effectively test the entire circuit's bandwidth at different packet (MTU) sizes. The maximum injection rate can be the maximum known capacity of the path or equal to the Committed Information Rate (CIR). For example: If two devices are connected at 100mbps, the injection rate could be anything up to but not exceeding 100mbps. Most RFC 2544 tests are done out of service because it is preferred that the injected traffic does not interfere with real applications running on the network. To avoid disrupting real traffic, Transition's performance management products with RFC 2544 use an in-service injection of test frames that is purely supplemental to the real traffic rate, up to the defined limit on the path. The amount of real traffic is measured by the end-point and any excess is filled with ITU Y.1731 TST and RFC 2544 frames.

The TST frames are counted and removed from the path at the designated peer. The designated peer then reports the number of real and test frames received for a given interval of time. With this information the designated peer can then compare the received frames to the actual number of transmitted frames, to see if the path is performing as expected. If the number of received frames is different than the number of transmitted frames, predefined alarms or events can be sent to the operator to indicate there is a throughput issue that will need to be resolved.

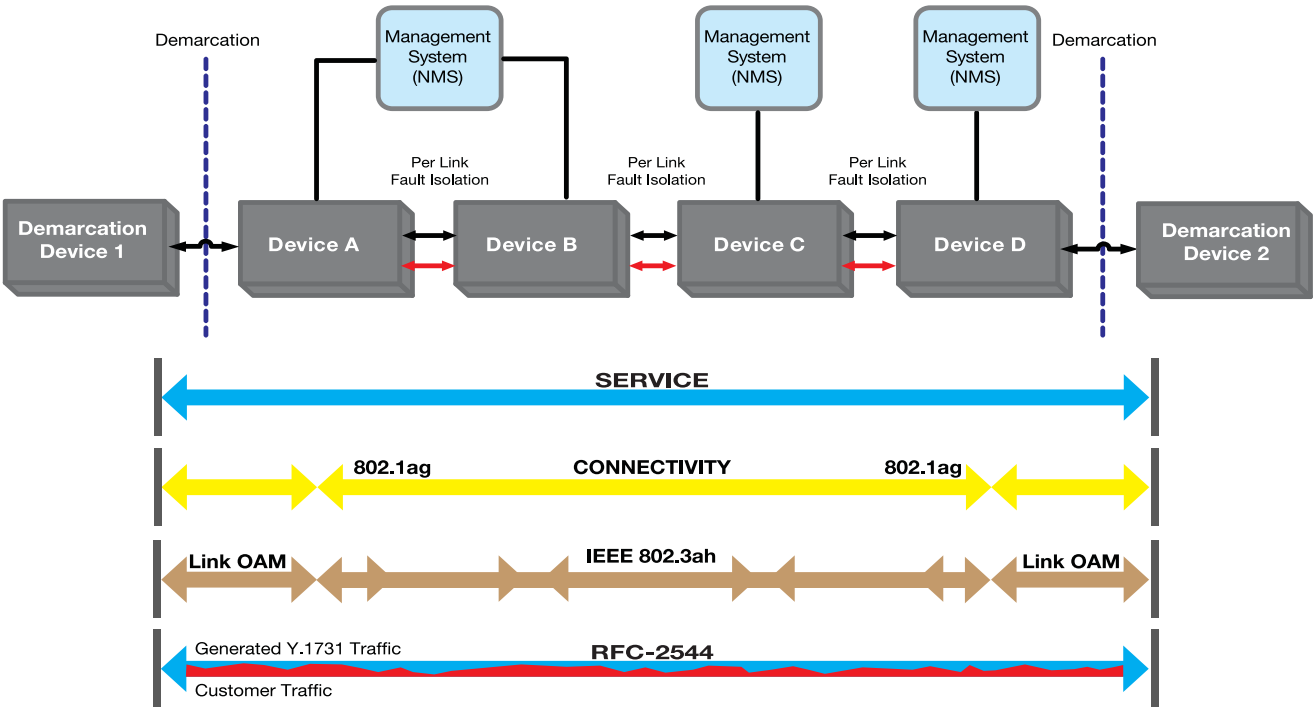
802.1ag/Y.1731 w/RFC 2544

Application

Performance Management is generally used for enterprises who require a guaranteed level of SLA performance and monitoring. For example, a financial institution that needs to have up-to-date information with no delay—as latency can mean the difference in the success of the institution. In these types of SLA agreements, legal contractual obligations are defined and agreed upon by both parties.

Features

- Frame Loss Ratio (FLR)
- Frame Delay Variance (FDV)
- Throughput Monitoring
- RFC2544 Test Frames



Advanced Features

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.

AutoCross™

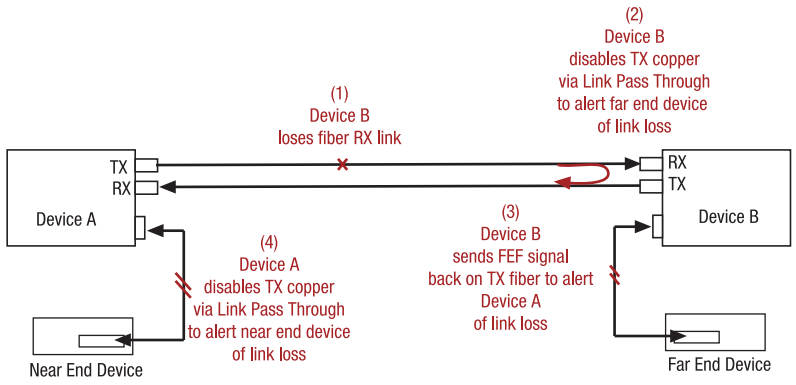
Automatically detects and configures the twisted pair port on the converter to the correct MDI or MDI-X configuration.

- 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 (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



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 devices stand out as "the choice" among industry IT professionals.

Generally, devices 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 devices "visible" to network managers, Transition has designed our full-featured products to include the most advanced features on the market today such as:

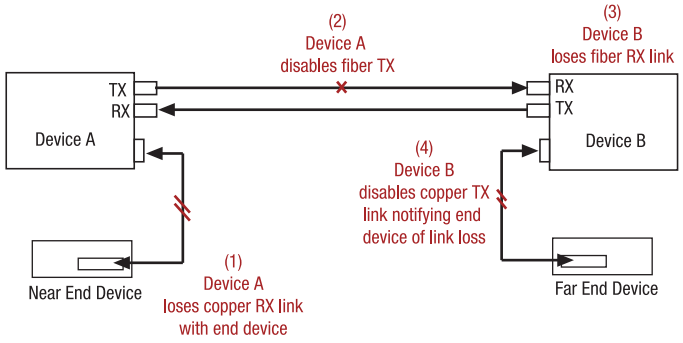
- Auto-Negotiation
- AutoCross™
- Far-End-Fault
- Link Pass Through
- Transparent Link Pass Through
- Pause
- Remote Management
- Automatic Link Restoration
- Loopback
- Bandwidth Allocation
- Field Upgradeable Firmware
- Source Address Change
- Last Gasp
- Single Fiber Optics

Transition Networks' devices 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.

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 ability 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 converter 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 converter and device (see diagram below).

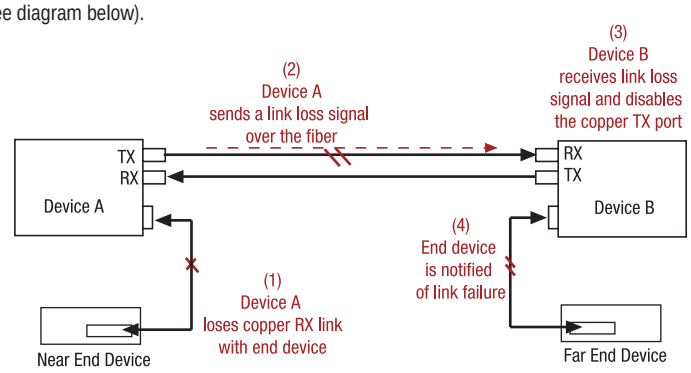
- End device automatically notified of link loss
- Prevents loss of valuable data unknowingly transmitted over an invalid link



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 converter to shut down the copper port thus notifying the end device, while maintaining the fiber link between the two converters (see diagram below).

- End device automatically notified of link loss
- Fiber link remains up as it carries a link loss signal



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 converters 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 converters to pass this signaling on to the other end device.

Remote Management

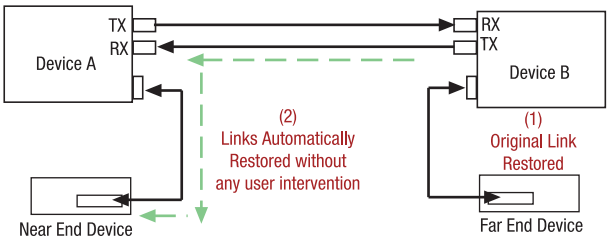
All chassis-based converters from Transition Networks can be managed through SNMP. Select stand-alone products can also be managed through SNMP. Some remotely managed converters are IP addressable, while others must be used in conjunction with a managed chassis based converter. While chassis based products are generally placed in the telecommunications room, stand-alone converters 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

Automatic Link Restoration

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

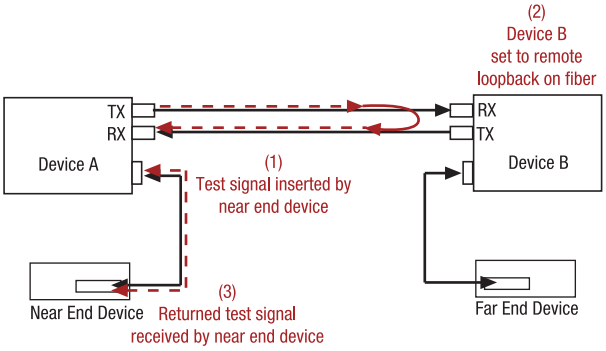
- No need to reset devices: Transition Networks' converters will automatically re-establish the link when connected to switches if link was lost. With other manufacturers' converters the user must reset the converter to re-establish the link.
- Auto-Negotiation Enabled: Automatic Link Restoration allows the users to continue using Auto-Negotiation with Link Loss Notification features. With other manufacturers' converters 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 converters.



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 converter 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 converters 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.



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.

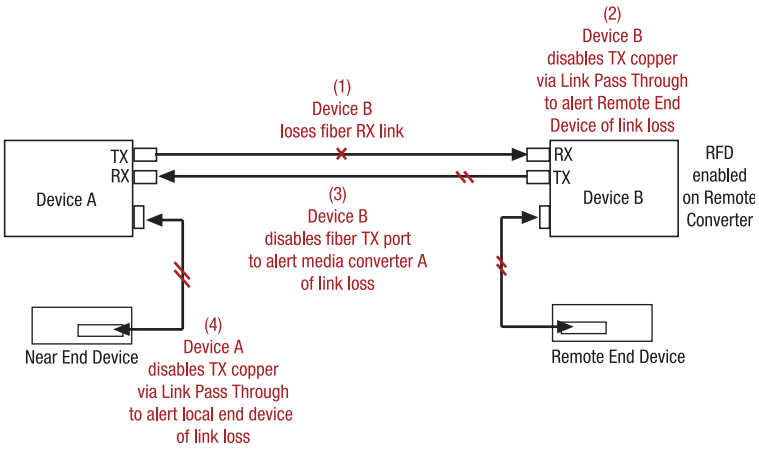
Single Fiber

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 converters in a single fiber scenario "match" each other's wavelengths. Converter A transmits at the wavelength of 1310nm and receives at 1550nm while the other converter transmits at 1550nm and receives at 1310nm. Therefore, converters are usually used in pairs. Single fiber technology is available on all Transition Networks devices in maximum distance ranges from 20 to 120 km.

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 converter. Should the remote converter lose its fiber RX signal, Remote Fault Detect will force the converter 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



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

Source Address Change

Select bridging devices are capable of detecting and reporting changes in the MAC (Ethernet hardware) address of the attached equipment. This feature is very useful when administrators intend that only a particular physical device be attached to a particular port. When the MAC address of a connected device changes (new device is inserted) the administrator receives the trap with the notification of a change.

Certification(s)

Metro Ethernet Forum (MEF)

Many of Transition Networks' families of remotely managed network interface devices 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.

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 be slid 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

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 settings

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.)

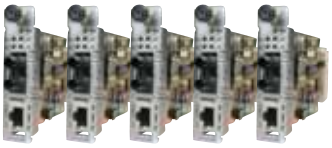
All Point System™ & ION Slide-In-Modules Can Be SNMP Managed

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

Point System™ and ION 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 IEEE802.3ah 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 22]
- AutoCross™enabled/disabled [pg 22]
- Link Pass Through enabled/disabled [pg 23]
- Far-End-Fault enabled/disabled [pg 22]
- Bandwidth Allocation [pg 24]
- Remote Loopback [pg 24]
- Pause enabled/disabled [pg 23]
- 802.1P enabled/disabled
- Port mirroring enabled/disabled
- Source Address Change [pg 25]
- AIS fiber enabled/disable
- AIS Copper enabled/disabled
- Loopback copper enabled/disabled [pg 24]
- Loopback fiber enabled/disabled [pg 24]
- 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.

Point System™ and ION Management Specifications

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, Netscape, Opera)
- Command line interface via:
  - Console Port
  - Telnet

The management capabilities of Focal Point and Web Based are almost identical. Users who already use other management platforms such as HPOV or SNMP can also manage Transition Networks' device with these applications. 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

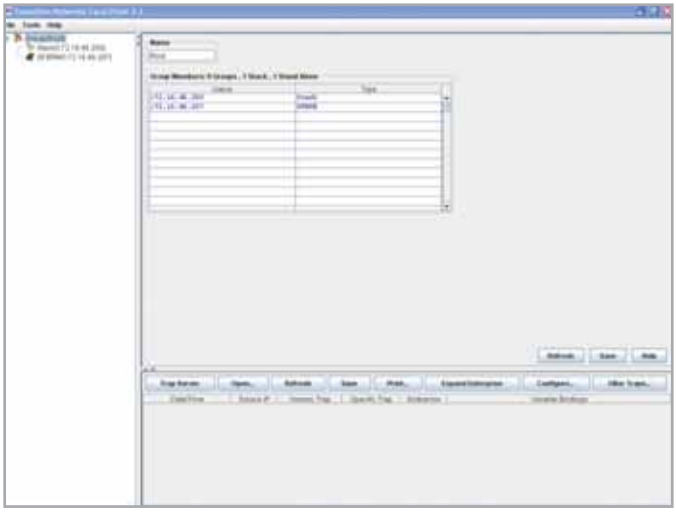
Product Configuration

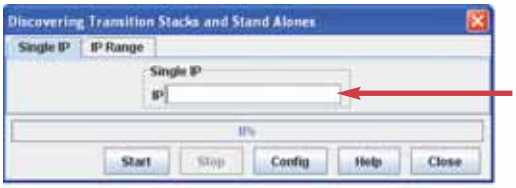
Transition's Focal Point supports the following software platforms:

- MS Windows® XP and Vista.
- HP-UX 10.x or Higher
- Sun Solaris 2.6 or Higher
- Requires Java™ Runtime Environment (JRE™) version 1.5.0 or higher

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.



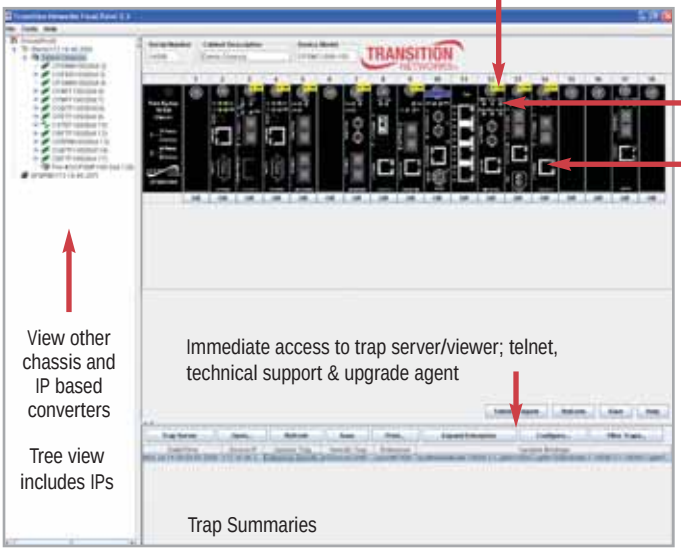


Type in new IPs

Type in new IP range

Focal Point View Screen

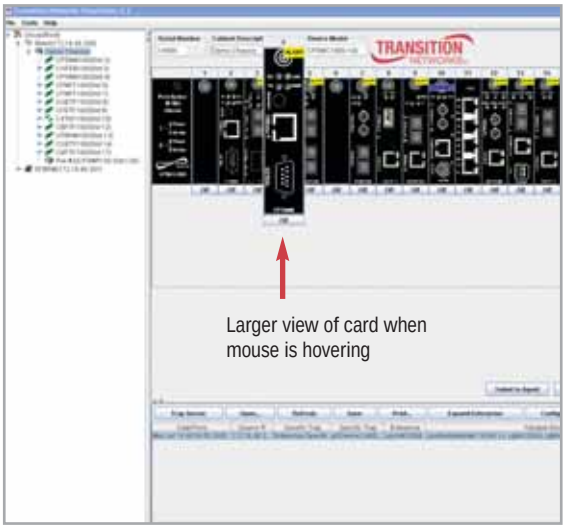
Displays the selected chassis information. Each converter is displayed with connectors, LEDs, and status (e.g. ALERT).



An Alert is displayed if a link is lost or if there is another problem

LEDs display actual status

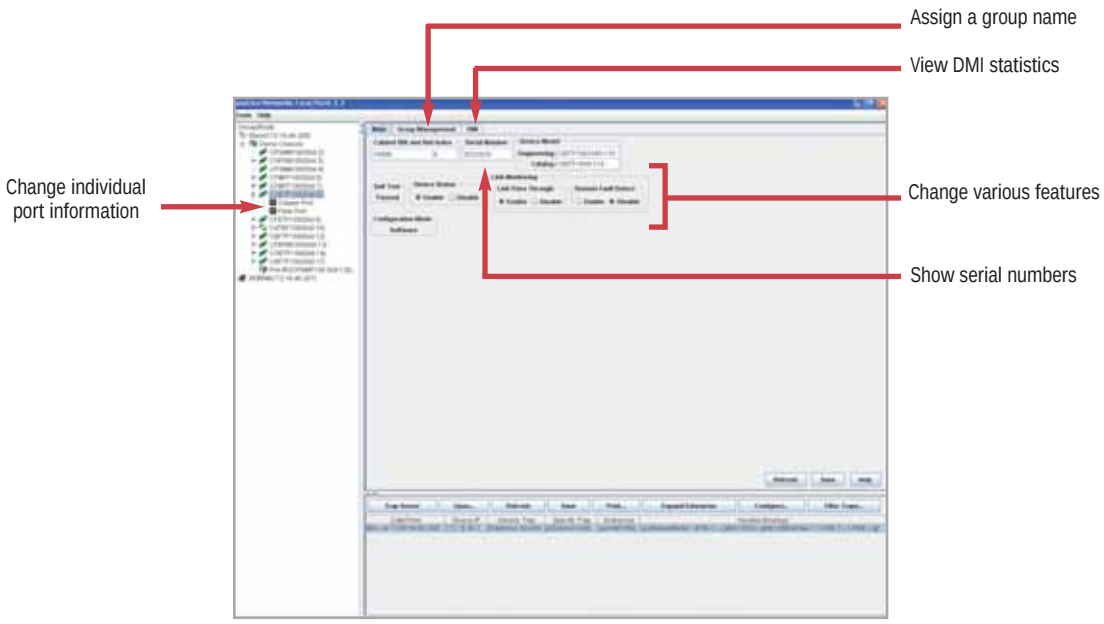
Specific cards with connectors are displayed



* Above screen shots are from Point System™

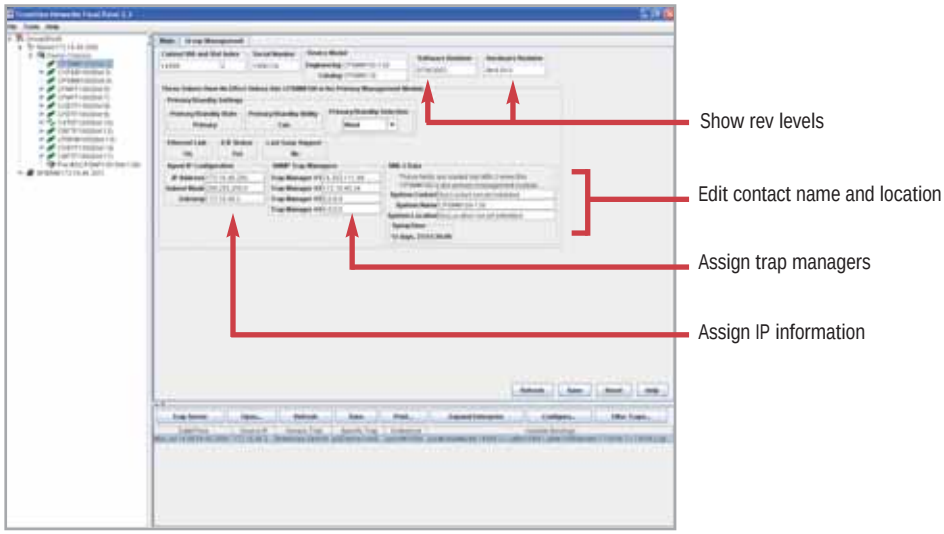
Focal Point Card Screen

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.



Focal Point Management Module Screen

Displays the interface for the management card.

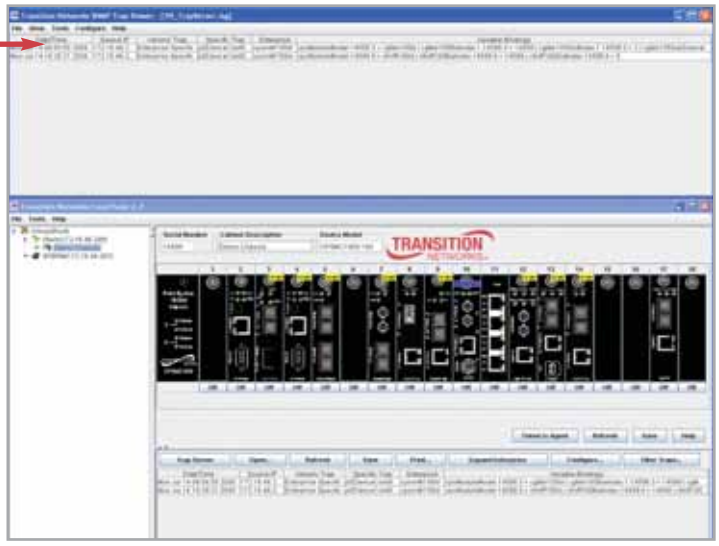


* Above screen shots are from Point System™

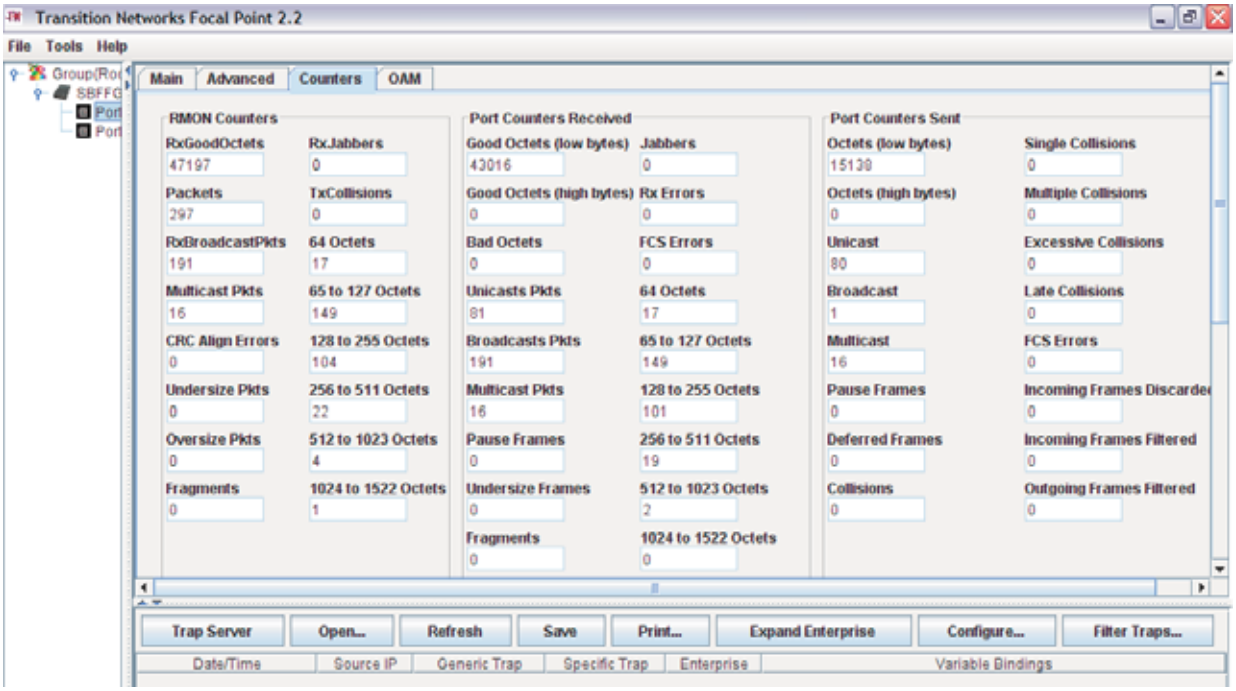
Focal Point TrapViewer Screen

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

See trap history time & date stamp



Focal Point RMON Statistics

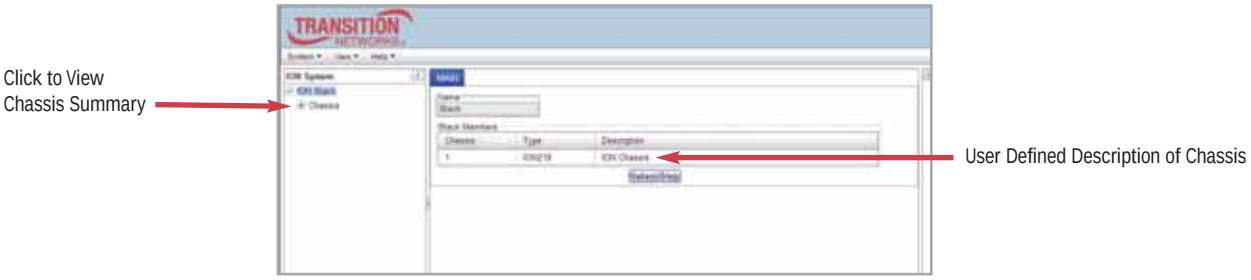


* Above screen shots are from Point System™

Point System™ and ION Management Specifications

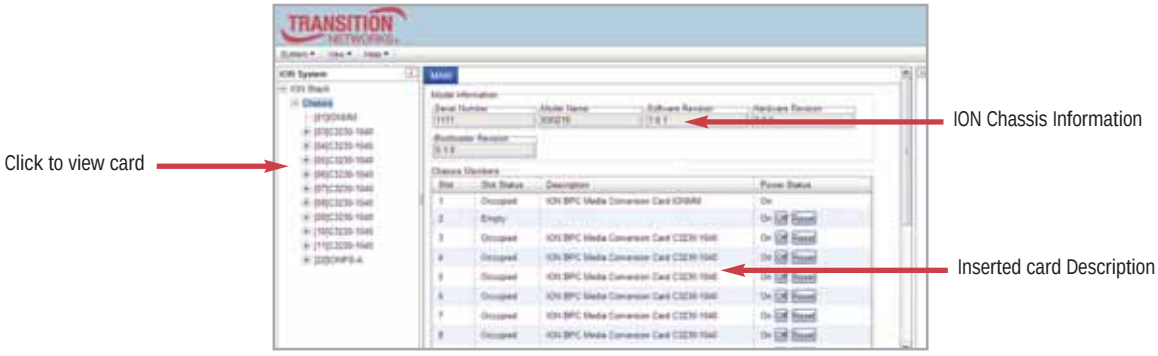
Web Agent Summary Screen

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



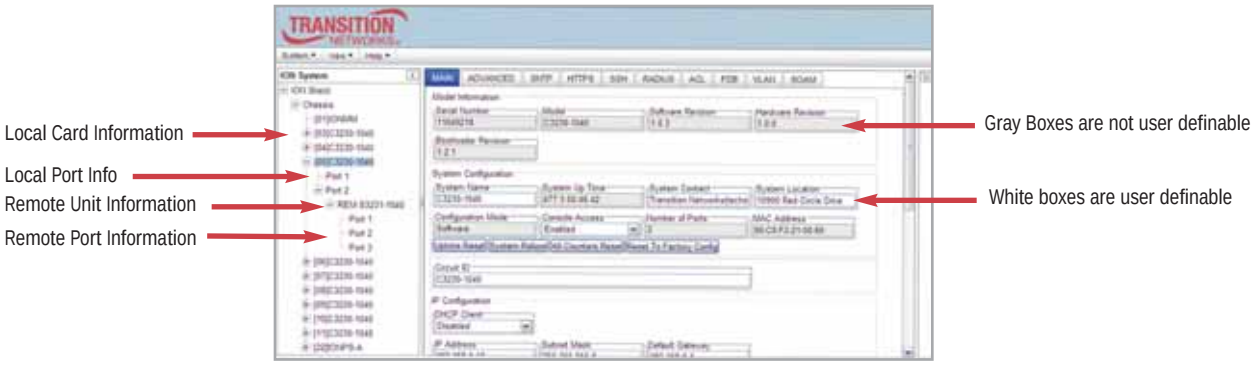
Web Cabinet View Screen

Displays all of the cards in the selected chassis.



Web Card View Screen

Allows user to view and change settings.

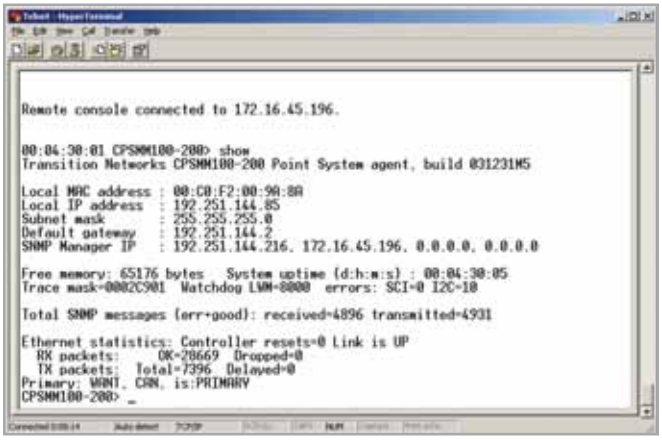


* Above screen shots are from The ION Platform

Point System™ and ION Management Specifications

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.)



Security Features

Point System™ offers a comprehensive approach to SNMP management security. It was designed with several levels of access protection to ensure that network management is accessible only to those who are authorized.

Password (a.k.a. Community Names)

Two levels of access privileges are password protected.

- Read access (monitor ONLY) - a Community Name with a particular set of privileges to monitor the network without the right to change any of its configuration
- Read/Write (View & make changes) - a Community Name with an extended set of privileges to monitor the network as well as actively change any of its configuration

Firewall

Transition Networks' management agent contains an internal IP firewall. This built-in filter examines each incoming packet to determine whether to forward it to the management or to discard it. The decision is based on user-defined rules. These rules are entered in the Command Line Interface. Once the rule is entered the firewall matches packets based on source IP address, destination protocol, destination port, or some combination of the three. Each rule also contains a "drop" or "pass" action, making it possible to configure the filter with either a "default accept" or a "default deny" philosophy.

FILTERMAC

Filtermac can be used in conjunction with its firewall feature. The FILTERMAC allows the user to specify up to four trusted Ethernet Hardware addresses (i.e. MAC addresses) that are permitted to send IP packets to the Agent. Once this feature is used no other MAC addresses are permitted access to the management information.

SNMP Lock

SNMP messages originating from outside of the local subnet are ignored unless the Management Module has a Telnet session connected to the same IP address. This feature is designed to make it much more difficult for outside intruders to make changes to management settings via a method known as "IP Spoofing." In an IP Spoofing attack, the intruder configures an attacking computer to assume the identity of a trusted computer (NMS) in order to bypass firewall security measures. This deters intrusions by making the IP spoofing of SNMP datagrams much more difficult.

Lock/Unlock CLI

LOCK / UNLOCK - The LOCK command allows the CLI to be locked so that no commands can be entered. (Unsolicited log messages are still displayed, and SNMPLOCK functionality is still active when the console is locked.) Once the console is locked, it remains locked to all users regardless of the access method until UNLOCK command is used.

Traps

The Agent sends Coldstart traps when it is rebooted and enterprise specific Error/Error Clear traps when Ethernet link goes down or up. Unexpected receipt of these traps could indicate that an attack is in progress.

* Above screen shots are from Point System™

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.

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 & V2

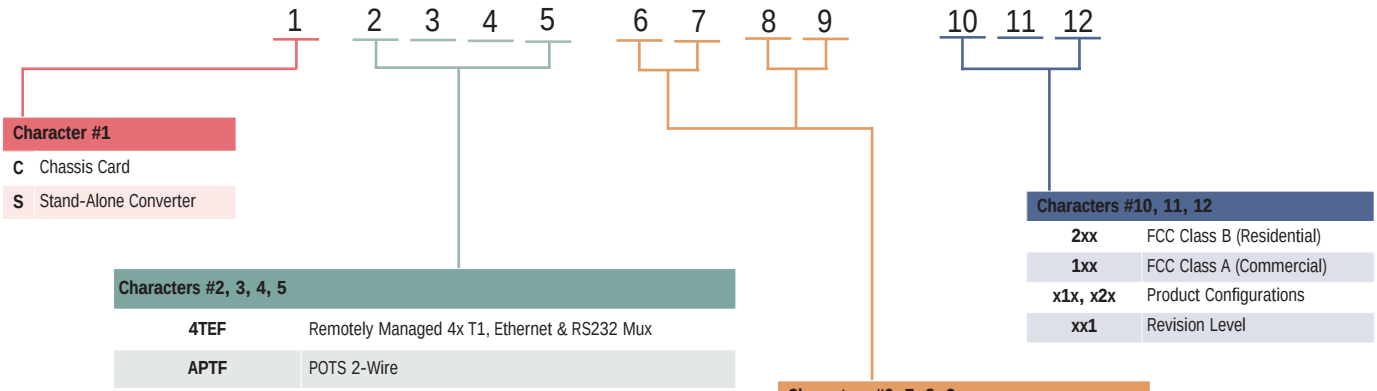
Point System Key Security Features

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.

Point System™ Part Number Key



Character #1	
C	Chassis Card
S	Stand-Alone Converter

Characters #2, 3, 4, 5	
4TEF	Remotely Managed 4x T1, Ethernet & RS232 Mux
APTF	POTS 2-Wire
BFFG	OAM/IP-Based Remotely Managed Bridging Media Converter
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 or Optical Line Converter
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 Bridging Converter
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™ Management Modules Specifications

Point System™ Management Modules

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:** .086" [22 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

Point System™ 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, or CGFEB .

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, 0.5A 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 55]	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 54]	DIN Rail Mount Bracket
WMBP [pg 54]	Wall Mount Bracket
WMBV [pg 54]	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 [pg 37]	Single Slot Master Management Module
CPSMM-210 [pg 33]	Single Slot Expansion Management Module
SPS-2460-SA [pg 55]	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 54]	DIN Rail Mount Bracket
WMBP [pg 54]	Wall Mount Bracket
WMBV [pg 54]	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 [pg 37]	Single Slot Master Management Module
CPSMM-200 [pg 37]	Dual Slot Master Management Module
CPSMM-210 [pg 37]	Single Slot Expansion Management Module
CPSMP-180	Redundant power supply 120/240 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-200 (AC), CPSMP-210 (DC) [rear loading]
18-Slot	Class B*	CPSMP-200 (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

Point System™ 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	(13) slots in front for slide-in-modules (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 37]	Single Slot Master Management Module
CPSMM-200 [pg 37]	Dual Slot Master Management Module
CPSMM-210 [pg 37]	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 37]	Single Slot Master Management Module
CPSMM-200 [pg 37]	Dual Slot Master Management Module
CPSMM-210 [pg 37]	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 37]	Single Slot Master Management Module
CPSMM-200 [pg 37]	Dual Slot Master Management Module
CPSMM-210 [pg 37]	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

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

Fast Ethernet 100BASE-TX to 100BASE-FX with Remote Management & Bandwidth Allocation

see also: Remotely Managed Fast Ethernet Stand-Alone NIDs [pg 56]

CRMFE10xx-20x

Fast Ethernet

Remotely Managed Fast Ethernet NID (Network Interface Device)

With the Remotely Managed Fast Ethernet NID, service providers can now monitor and manage the entire optical link from the Central Office (CO) to the Customer Premise Equipment (CPE). They also have the ability to remotely change the bandwidth offered to the customer and choose the appropriate mode of connection straight from their Network Management Centers.

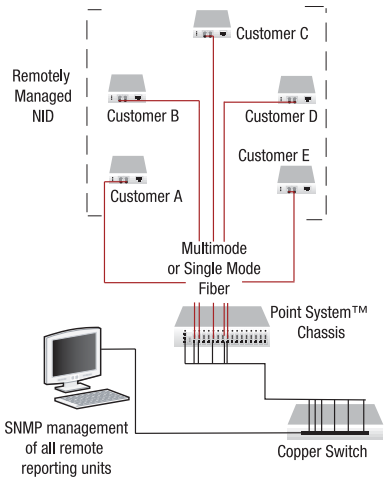
Devices should be used in pairs. Typical installation will include a chassis card installed in the Point System™ locally and a stand-alone device [SRMFE, pg 56] installed at the remote location.

- In-band management of stand alone Fast Ethernet NID
- Remote Loopback assists in diagnosing network problems [pg 24]
- Upstream and downstream Bandwidth Control allows service providers to offer an array of services

Features

- Auto-Negotiation [pg 22]
- AutoCross™ [pg 22]
- Far-End-Fault (FEF) [pg 22]
- Link Pass Through [pg 23]
- Pause [pg 23]
- Remote Management [pg 23]
- Loopback [pg 24]
- Automatic Link Restoration [pg 24]
- Bandwidth Allocation [pg 24]
- Field Upgradeable Firmware [pg 24]
- Can be used with any Point System™ Chassis [pg 38-39]

Remotely Managed Fast Ethernet



Specifications

Complete list of fiber optic connector specifications [pg 116-123]

Standards	IEEE Std. 802.3
3-position Jumpers	**Jumper (J2):** Enable/Disable AutoCross™ **Jumper (J6):** Hardware/Software **Hardware:** mode is determined by 4-position switch settings **Software:** mode is determined by most recently saved on-board microprocessor settings.
4 position Switch	**Pos 1: Auto-Neg:** ON = Advertises 100 Mbps full/half-duplex during auto-negotiation; (OFF) Used primarily when connecting to hub. Operates at 100 Mbps in duplex mode of attached device. **Pos 2: PAUSE:** Applies only if Switch 1 is UP AND device is connected to Auto-Negotiating device(s) capable of Pause Control Frame propagation. (UP) ALLOWS negotiation of Pause Control Frame. DOWN = Does NOT allow negotiation of Pause Control Frame. **Pos 3: Link Pass Through:** UP = enabled; DOWN = disabled **Pos 4: Far-End-Fault:** UP = enabled; DOWN = disabled
Status LEDs	Power **LKF** (Fiber Link) **RXF** (Fiber Receive) **RXC** (Copper Receive) **LKC** (Copper Link)
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
Shipping Weight	1 lb. [0.45 kg]
Regulatory Compliance	CISPR/EN55022 Class A & B + EN55024; FCC Class A & B; CE Mark
Warranty	Lifetime

Ordering Information

Complete list of fiber optic connector specifications [pg 116-123]

CRMFE1011-200
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1300nm MM (ST)
[2 km/1.2 mi.] Link Budget: 11.0 dB

CRMFE1013-200
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1300nm MM (SC)
[2 km/1.2 mi.] Link Budget: 11.0 dB

CRMFE1014-200
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1310nm SM (SC)
[20 km/12.4 mi.] Link Budget: 16.0 dB

CRMFE1015-200
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1310nm SM (SC)
[40 km/24.9 mi.] Link Budget: 26.0 dB

CRMFE1016-200
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1310nm SM (SC)
[60 km/37.3 mi.] Link Budget: 29.0 dB

CRMFE1017-200
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1550nm SM (SC)
[80 km/49.7 mi.] Link Budget: 29.0 dB

CRMFE1035-200
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1550nm SM (SC)
[120 km/74.6 mi.] Link Budget: 36.0 dB

Single Fiber Products

Recommended use in pairs [pg 25]

CRMFE1029-200
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1310nm TX/1550nm RX single fiber SM (SC)
[20 km/12.4 mi.] Link Budget: 19.0 dB

CRMFE1029-201
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1550nm TX/1310nm RX single fiber SM (SC)
[20 km/12.4 mi.] Link Budget: 19.0 dB

CRMFE1029-202
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1310nm TX/1550nm RX single fiber SM (SC)
[40 km/24.9 mi.] Link Budget: 25.0 dB

CRMFE1029-203
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1550nm TX/1310nm RX single fiber SM (SC)
[40 km/24.9 mi.] Link Budget: 25.0 dB

Fast Ethernet or ATM/OC-3/SDH/SONET

see also: Fast Ethernet ot ATM/OC-3/SDH/SONET Stand-Alone Optical Mode Converter [pg 57]

CFMFF1xxx-20x

Single Mode to Multimode Optical Mode Converter

- Connect single mode fiber cable to devices with multimode ports
- Protocol Transparency
- Can be used with any Point System™ Chassis [pg 38-39]

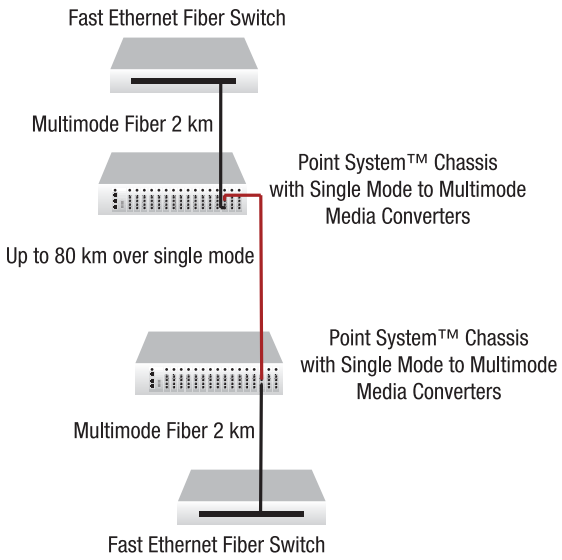
Features

- Link Pass Through [pg 23]
- Automatic Link Restoration [pg 24]
- Field Upgradeable Firmware [pg 24]
- Card Manageability:
  - MM/SM signal detect
  - Hardware/software mode
  - Fiber port enable/disable multimode or single mode

Extend Network Distance

Convert multimode 100-155 Mbps interfaces to single mode fiber on a port-by-port basis and extend ATM or Fast Ethernet over single mode fiber up to 80 km.

Extend Network Distance



Specifications

Complete list of fiber optic connector specifications [pg 116-123]

Standards	IEEE Std. 802.3™
3-position Jumper	**Hardware:** Software mode is disabled **Software:** Converter mode is determined by most recently saved on-board microprocessor settings
Status LEDs	**Power:** Steady green LED indicates connection to external AC power **LKS (Single mode Fiber Link):** Steady LED indicates single mode fiber link **LKM (Multimode Fiber Link):** Steady LED indicates multimode fiber link
Dimensions	**Width:** 0.86" [22 mm] **Depth:** 5.0" [127 mm] **Height:** 3.4" [86 mm]
Power Consumption	3.5 Watts
Environment	See chassis specifications
Shipping Weight	1 lb. [0.45 kg]
Regulatory Compliance	UL Listed; C-UL Listed (Canada); CISPR/EN55022 Class B; EN55024; EN61000; FCC Class B; CE Mark
Warranty	Lifetime

Ordering Info: Class B

CFMFF1313-200
1300nm multimode (SC) **[2 km/1.2 mi.] Link Budget: 11.0 dB**
to 1300nm multimode (SC) **[2 km/1.2 mi.] Link Budget: 11.0 dB**

CFMFF1314-200
1300nm multimode (SC) **[2 km/1.2 mi.] Link Budget: 11.0 dB**
to 1310nm single mode (SC) **[20 km/12.4 mi.] Link Budget: 16.0 dB**

CFMFF1315-200
1300nm multimode (SC) **[2 km/1.2 mi.] Link Budget: 11.0 dB**
to 1310nm single mode (SC) **[40 km/24.9 mi.] Link Budget: 26.0 dB**

CFMFF1316-200
1300nm multimode (SC) **[2 km/1.2 mi.] Link Budget: 11.0 dB**
to 1310nm single mode (SC) **[60 km/37.3 mi.] Link Budget: 29.0 dB**

CFMFF1317-200
1300nm multimode (SC) **[2 km/1.2 mi.] Link Budget: 11.0 dB**
to 1550nm single mode (SC) **[80 km/49.7 mi.] Link Budget: 29.0 dB**

CFMFF1414-200
1310nm single mode (SC) **[20 km/12.4 mi.] Link Budget: 16.0 dB**
to 1310nm single mode (SC) **[20 km/12.4 mi.] Link Budget: 16.0 dB**

CFMFF1415-200
1310nm single mode (SC) **[20 km/12.4 mi.] Link Budget: 16.0 dB**
to 1310nm single mode (SC) **[40 km/24.9 mi.] Link Budget: 26.0 dB**

Single Fiber Products [pg 25]

CFMFF1329-200
1300nm multimode (SC) **[2 km/1.2 mi.] Link Budget: 11.0 dB**
to 1310nm TX/1550nm RX single fiber SM (SC) **[20 km/12.4 mi.] Link Budget: 19.0 dB**

CFMFF1329-201
1300nm multimode (SC) **[2 km/1.2 mi.] Link Budget: 11.0 dB**
to 1550nm TX/1310nm RX single fiber single mode (SC) **[20 km/12.4 mi.] Link Budget: 19.0 dB**

CFMFF1329-202
1300nm multimode (SC) **[2 km/1.2 mi.] Link Budget: 11.0 dB**
to 1310nm TX/1550nm RX single fiber SM (SC) **[40 km/24.9 mi.] Link Budget: 25.0 dB**

CFMFF1329-203
1300nm multimode (SC) **[2 km/1.2 mi.] Link Budget: 11.0 dB**
to 1550nm TX/1310nm RX single fiber SM (SC) **[40 km/24.9 mi.] Link Budget: 25.0 dB**

CFMFF1429-200
1310nm single mode (SC) **[20 km/12.4 mi.] Link Budget: 16.0 dB**
to 1310nm TX/1550nm RX single fiber SM (SC) **[20 km/12.4 mi.] Link Budget: 19.0 dB**

CFMFF1429-201
1310nm single mode (SC) **[20 km/12.4 mi.] Link Budget: 16.0 dB**
to 1550nm TX/1310nm RX single fiber SM (SC) **[20 km/12.4 mi.] Link Budget: 19.0 dB**

CFMFF1429-202
1310nm single mode (SC) **[20 km/12.4 mi.] Link Budget: 16.0 dB**
to 1310nm TX/1550nm RX single fiber SM (SC) **[40 km/24.9 mi.] Link Budget: 25.0 dB**

CFMFF1429-203
1310nm single mode (SC) **[20 km/12.4 mi.] Link Budget: 16.0 dB**
to 1550nm TX/1310nm RX single fiber SM (SC) **[40 km/24.9 mi.] Link Budget: 25.0 dB**

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

CFBRM10xx-1xx

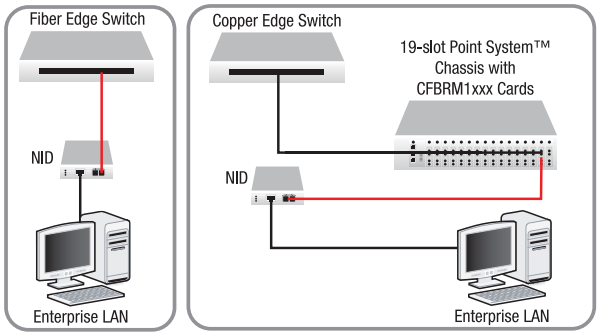
OAM/IP-Based Remotely Managed NID (Network Interface Device)

CARRIER ETHERNET MEF Certified Compliant™

Features

- MEF 9 & MEF 14 Carrier Ethernet Certification
- Two Remote Management modes:
  - IP-Based Remote Management [pg 23]
  - In-Band Link OAM 802.3ah (remote device managed by local peer)
- SNMP v1
- AutoCross™ [pg 22]
- Auto-Negotiation [pg 22]
- Pause [pg 23]
- Transparent Link Pass Through [pg 23]
- Far-End-Fault [pg 22]
- Remote Loopback [pg 24]
- 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)
- IEEE 802.1x Port based security
- RADIUS client
- RMON counters for each port
- Bandwidth Allocation per port [pg 24]
- DMI Optical Management
- USB port for basic setup
- Cable diagnostic function for TP ports
- 8K MAC addresses
- Field Upgradeable Firmware [pg 24]

Remotely Managed 10/100 NID IP or OAM Management



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 116-123]

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:** 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 116-123]

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)
[20 km/6.2 mi.] Link Budget: 16.0 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 25]

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 Budget: 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 96-104]

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

OAM/IP Remotely Managed 10/100/1000BASE-TX to 1000BASE-X

see also: 10/100/1000 OAM/IP-Based Remotely Managed Stand-Alone NIDs [pg 61]

CBFFG10xx-1xx

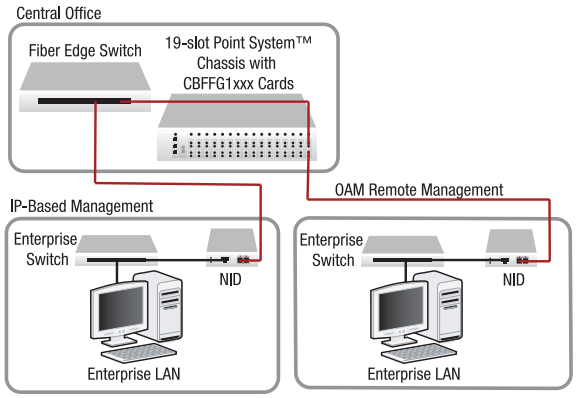
OAM/IP-Based Remotely Managed NID (Network Interface Device)

CARRIER ETHERNET MEF Certified Compliant™

Features

- 10K Jumbo Frame Support
- MEF 9 & MEF 14 Carrier Ethernet Certification
- Two selectable remote management modes:
  - IP-Based Remote Management [pg 23]
  - In-Band Link OAM 802.3ah (remote device managed by local peer)
- SNMP v1
- AutoCross™ [pg 22]
- Auto-Negotiation [pg 22]
- Pause [pg 23]
- Transparent Link Pass Through [pg 23]
- Far-End-Fault [pg 22]
- Remote Loopback [pg 24]
- IEEE 802.1p QoS packet classification with 4 egress queues
- Ipv4 IP TOS and DiffServ QoS classification, IPv6 Traffic class
- IEEE 802.1q VLAN, 4096 entries
- Static MAC, 64 entries
- Double VLAN tagging (C-tag/S-tag)
- VLAN Tunneling
- Selectable Ethertype for S-Tag when using Double VLAN Tagging 0x8100, 0x9100 or 0x88A8
- IEEE 802.1x Port based security
- RADIUS client
- RMON counters for each port
- Bandwidth Allocation per port [pg 24]
- DMI Optical Management
- USB port for basic setup
- Cable diagnostic function for TP ports
- 8K MAC addresses
- Field Upgradeable Firmware [pg 24]

Remotely Managed 10/100/1000 NID



- 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 116-123]

Standards	IEEE Std. 802.3, IEEE Std. 802.3ah, IEEE Std. 802.1P, IEEE Std. 802.1Q, IEEE Std. 802.1X
Data Rate	**Copper:** 10/100/1000 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 116-123]

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 25]

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 96-104]

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]

Gigabit Ethernet/Fiber Channel 1000BASE-SX to 1000BASE-LX

see also: Gigabit Ethernet Stand-Alone Optical Mode Converter [pg 62]

CFMFF1xxx-22x

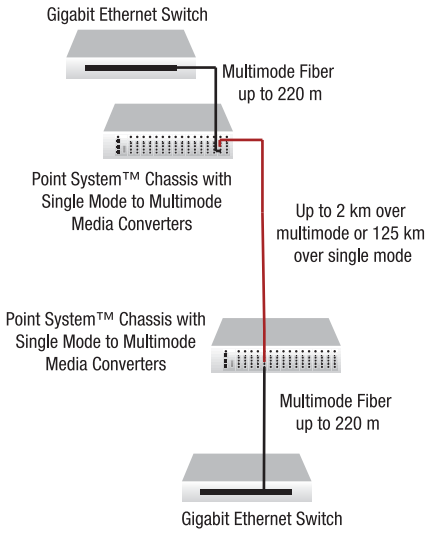
Gigabit Ethernet/Fiber Channel Optical Mode Converter

Used individually or in pairs, this media converter can extend Gigabit Ethernet over single mode fiber up to 125 km. Convert 1000BASE-SX ports on a Gigabit Ethernet switch to 1000BASE-LX on a port-by-port basis. Ideal for campus area networks or other applications requiring the distance advantages of single mode fiber.

Features

- Link Pass Through [pg 23]
- Protocol Transparency
- Extended Multimode SX capability (up to 2 km 62.5/125 µm fiber)
- Field Upgradeable Firmware [pg 24]
- Card manageability:
  - Multimode signal detect
  - Hardware/software mode
  - Fiber port enable/disable multimode
  - Fiber port enable/disable single mode
- Can be used with any Point System™ Chassis [pg 38-39]

Extend Network Distance



Specifications

Complete list of fiber optic connector specifications [pg 116-123]

Standards	IEEE Std. 802.3
3-position Jumper	**Hardware:** Software mode is disabled **Software:** Converter mode is determined by most recently saved on-board microprocessor settings
Status LEDs	**PWR (Power):** Steady green LED indicates connection to external AC power **LKS (Single mode fiber link):** Steady LED indicates single mode fiber link **LKM (Multimode fiber link):** Steady LED indicates multimode fiber link
Dimensions	**Width:** 0.86" [22 mm] **Depth:** 5.0" [127 mm] **Height:** 3.4" [86 mm]
Power Consumption	3.5 Watts
Environment	See chassis specifications
Shipping Weight	1 lb. [0.45 kg]
Regulatory Compliance	UL LIsted; C-UL Listed (Canada); CISPR/EN55022 Class A & B + EN55024; FCC Class A & B; CE Mark
Warranty	Lifetime

Ordering Information

Complete list of fiber optic connector specifications [pg 116-123]

CFMFF1313-220
1000BASE-SX 850nm multimode (SC)
[62.5/125 µm fiber: 220 m/722 ft.]
[50/125 µm fiber: 550 m/1804 ft.]
Link Budget 7.0 dB
to 1000BASE-SX 850nm multimode (SC)
[62.5/125 µm fiber: 220 m/722 ft.]
[50/125 µm fiber: 550 m/1804 ft.]
Link Budget 7.0 dB

CFMFF1324-220
1000BASE-SX 850nm multimode (SC)
[62.5/125 µm fiber: 220 m/722 ft.]
[50/125 µm fiber: 550 m/1804 ft.]
Link Budget 7.0 dB
to 1000BASE-LX 1310nm Extended MM (62.5/125 µm fiber only) (SC)
[up to 2 km] Link Budget: 7.0 dB

CFMFF1424-220
1000BASE-LX 1310nm SM (SC)
[10 km/6.2 mi.] Link Budget: 7.0 dB
to 1000BASE-LX 1310nm Extended MM (62.5/125 µm fiber only) (SC)
[up to 2 km] Link Budget: 7.0 dB

CFMFF1314-220
1000BASE-SX 850nm multimode (SC)
[62.5/125 µm fiber: 220 m/722 ft.]
[50/125 µm fiber: 550 m/1804 ft.]
Link Budget: 7.0 dB
to 1000BASE-LX 1310nm SM (SC)
[10 km/6.2 mi.] Link Budget: 7.0 dB

CFMFF1414-220
1000BASE-LX 1310nm SM (SC)
[10 km/6.2 mi.] Link Budget: 7.0 dB
to 1000BASE-LX 1310nm SM (SC)
[10 km/6.2 mi.] Link Budget: 7.0 dB

CFMFF1315-220
1000BASE-SX 850nm multimode (SC)
[62.5/125 µm fiber: 220 m/722 ft.]
[50/125 µm fiber: 550 m/1804 ft.]
Link Budget: 7.0 dB
to 1000BASE-LX 1310nm SM (SC)
[25 km/15.5 mi.] Link Budget: 15.0 dB

CFMFF1317-220
1000BASE-SX 850nm multimode (SC)
[62.5/125 µm fiber: 220 m/722 ft.]
[50/125 µm fiber: 550 m/1804 ft.]
Link Budget: 7.0 dB
to 1000BASE-LX 1550nm SM (SC)
[65 km/40.4 mi.] Link Budget: 20.0 dB

CFMFF1335-220
1000BASE-SX 850nm multimode (SC)
[62.5/125 µm fiber: 220 m/722 ft.]
[50/125 µm fiber: 550 m/1804 ft.]
Link Budget: 7.0 dB
to 1000BASE-LX 1550nm SM (SC)
[125 km/77.7 mi.] Link Budget: 27.0 dB

Single Fiber Products

Recommended use in pairs [pg 25]

CFMFF1329-220
1000BASE-SX 850nm multimode (SC)
[62.5/125 µm fiber: 220 m/722 ft.]
[50/125 µm fiber: 550 m/804 ft.]
Link Budget: 7.0 dB
to 1000BASE-LX 1310nm TX/1550nm RX single fiber single mode (SC)
[20 km/12.4 mi.] Link Budget: 13.0 dB

CFMFF1329-221
1000BASE-SX 850nm multimode (SC)
[62.5/125 µm fiber: 220 m/22 ft.]
[50/125 µm fiber: 550 m/1804 ft.]
Link Budget: 7.0 dB
to 1000BASE-LX 1550nm TX/1310nm RX single fiber single mode (SC)
[20 km/12.4 mi.] Link Budget: 13.0 dB

CFMFF1329-222
1000BASE-SX 850nm multimode (SC)
[62.5/125 µm fiber: 220 m/722 ft.]
[50/125 µm fiber: 550 m/1804 ft.]
Link Budget: 7.0 dB
to 1000BASE-LX 1310nm TX/1550nm RX single fiber single mode (SC)
[40 km/24.9 mi.] Link Budget: 20.0 dB

CFMFF1329-223
1000BASE-SX 850nm multimode (SC)
[62.5/125 µm fiber: 220 m/722 ft.]
[50/125 µm fiber: 550 m/804 ft.]
Link Budget: 7.0 dB
to 1000BASE-LX 1550nm TX/1310nm RX single fiber single mode (SC)
[40 km/24.9 mi.] Link Budget: 20.0 dB

AUTO NEG | LINK PASS THRU | AUTO LINK RESTORE | PAUSE | FIELD UPGRADEABLE FIRMWARE

Gigabit Ethernet 1000BASE-SX to 1000BASE-LX

see also: Gigabit Ethernet Optical Mode Stand-Alone Media Converters [pg 63]

CFMFF13xx-28x

Gigabit Optical Mode Converter with Signal Retiming & Regeneration

- Transition Networks Gigabit Ethernet optical mode converters now include signal retiming, regeneration and re-amplification to maintain signal integrity and allow for maximum network distance without signal degradation.
- Distances of hundreds of kilometers are possible when cascading two or more devices in the same link.
- Can be used with any Point System™ Chassis [pg 38-39]

Features

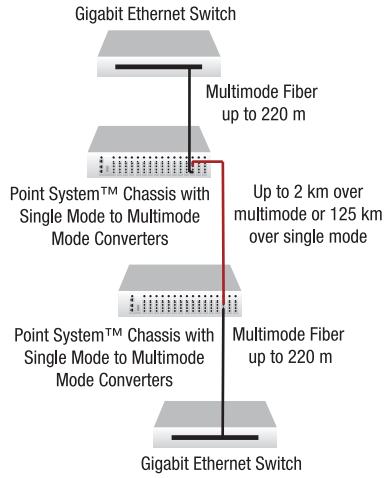
- Auto-Negotiation [pg 22]
- Link Pass Through [pg 23]
- Automatic Link Restoration [pg 24]
- Pause [pg 23]
- Field Upgradeable Firmware [pg 24]
- Extended multimode SX capability (up to 2 km 62.5/125 µm fiber)
- Supports 3R optical signal regeneration
  - Reamplify, Reshape & Retrieve

Management Features

- Report local converter status to chassis management software:
  - Converter power status
  - Hardware/Software mode status
  - Single Mode and Multimode link status
  - Auto-Negotiation, Link Pass Through and Pause setting
- Write operation includes:
  - Power on/off converter
  - Enable/disable Single Mode port
  - Enable/disable Multimode port
  - Enable/disable Auto-Negotiation [pg 22]
  - Enable/disable Link Pass Through [pg 23]
  - Select Pause Advertisement(s) [pg 23]

Extend Network Distance

Convert 1000BASE-SX ports over to 1000BASE-LX on a port-by-port basis. Used individually or in pairs, this media converter can extend Gigabit Ethernet over single mode fiber up to 125 km. Or cascade two or more converters in a link to achieve even greater distances.



Specifications

Complete list of fiber optic connector specifications [pg 116-123]

Standards	IEEE Std. 802.3
Status LEDs	**PWR (Power):** Lit for normal operation **LKS (Single Mode Fiber Link):** ON = Fiber Link **LKM (Multimode Fiber Link):** ON = Fiber Link **ACT (Activity):** Blinking = data reception on either fiber link
Switches	**Switch 1:** Fiber Auto-Negotiation on/off **Switch 2:** Link Pass Through on/off **Switch 3&4:** Pause configuration determined by combined setting
3-position Jumper	**Hardware:** Converter mode is determined by DIP switch settings **Software:** Converter mode is determined by most recently saved on-board microprocessor settings
Dimensions	**Width:** 0.86" [22 mm] **Depth:** 5.0" [127 mm] **Height:** 3.4" [86 mm]
Power Consumption	3.5 Watts
Environment	0 – 50°C operating; 5% – 95% humidity non-condensing; 0 – 10,000 ft. altitude
Shipping Weight	1 lb. [0.45 kg]
Regulatory Compliance	EN55024; CISPR22/EN55022 Class B; FCC Class B; CE Mark
Warranty	Lifetime

Ordering Info [Class B]

Complete list of fiber optic connector specifications [pg 116-123]

CFMFF1324-280
1000BASE-SX 850nm multimode (SC)
[220 m/722 ft.]* Link Budget: 7.0 dB
[550 m/1804 ft.]* Link Budget: 7.0 dB
to 1000BASE-LX 1310nm Extended MM (SC) (62.5/125 µm fiber only)
[up to 2 km] Link Budget: 7.0 dB

CFMFF1314-280
1000BASE-SX 850nm multimode (SC)
[220 m/722 ft.]* Link Budget: 7.0 dB
[550 m/1804 ft.]* Link Budget: 7.0 dB
to 1000BASE-LX 1310nm SM (SC)
[10 km/6.2 mi.] Link Budget: 33.0 dB

CFMFF1414-280
1000BASE-LX 1310nm SM (SC)
[10 km/6.2 mi.] Link Budget: 7.0 dB
to 1000BASE-LX 1310nm SM (SC)
[10 km/6.2 mi.] Link Budget: 7.0 dB

CFMFF1315-280
1000BASE-SX 850nm multimode (SC)
[220 m/722 ft.]* Link Budget: 7.0 dB
[550 m/1804 ft.]* Link Budget: 7.0 dB
to 1000BASE-LX 1310nm SM (SC)
[25 km/15.5 mi.] Link Budget: 15.0 dB

CFMFF1317-280
1000BASE-SX 850nm multimode (SC)
[220 m/722 ft.]* Link Budget: 7.0 dB
[550 m/1804 ft.]* Link Budget: 7.0 dB
to 1000BASE-LX 1550nm SM (SC)
[65 km/40.4 mi.] Link Budget: 21.0 dB

CFMFF1335-280
1000BASE-SX 850nm multimode (SC)
[220 m/722 ft.]* Link Budget: 7.0 dB
[550 m/1804 ft.]* Link Budget: 7.0 dB
to 1000BASE-LX 1550nm SM (SC)
[125 km/77.7 mi.] Link Budget: 27.0 dB

Single Fiber Products

Recommended use in pairs [pg 25]

CFMFF1329-280
1000BASE-SX 850nm multimode (SC)
[220 m/722 ft.]* Link Budget: 7.0 dB
[550 m/1804 ft.]* Link Budget: 7.0 dB
to 1000BASE-LX 1310nm TX/1550nm RX single fiber single mode (SC)
[20 km/12.4 mi.] Link Budget: 13.0 dB

CFMFF1329-281
1000BASE-SX 850nm multimode (SC)
[220 m/722 ft.]* Link Budget: 7.0 dB
[550 m/1804 ft.]* Link Budget: 7.0 dB
to 1000BASE-LX 1550nm TX/1310nm RX single fiber SM (SC)
[20 km/12.4 mi.] Link Budget: 13.0 dB

CFMFF1329-282
1000BASE-SX 850nm multimode (SC)
[220 m/722 ft.]* Link Budget: 7.0 dB
[550 m/1804 ft.]* Link Budget: 7.0 dB
to 1000BASE-LX 1310nm TX/1550nm RX single fiber single mode (SC)
[40 km/24.9 mi.] Link Budget: 20.0 dB

CFMFF1329-283
1000BASE-SX 850nm multimode (SC)
[220 m/722 ft.]* Link Budget: 7.0 dB
[550 m/1804 ft.]* Link Budget: 7.0 dB
to 1000BASE-LX 1550nm TX/1310nm RX single fiber single mode (SC)
[40 km/24.9 mi.] Link Budget: 20.0 dB

CFMFF1329-286
1000BASE-SX 850nm multimode (SC)
[220 m/722 ft.]* Link Budget: 7.0 dB
[550 m/1804 ft.]* Link Budget: 7.0 dB
to 1000BASE-LX 1510nm TX/1590nm RX single fiber single mode (SC)
[80 km/49.6 mi.] Link Budget: 24.0 dB

CFMFF1329-287
1000BASE-SX 850nm multimode (SC)
[220 m/722 ft.]* Link Budget: 7.0 dB
[550 m/1804 ft.]* Link Budget: 7.0 dB
to 1000BASE-LX 1590nm TX/1510nm RX single fiber single mode (SC)
[80 km/49.6 mi.] Link Budget: 24.0 dB

**[62.5/125 µm fiber: 220 m/722 ft.];*
**[50/125 µm fiber: 550 m/1804 ft.]*

CFMFF4040-100

Small Form Factor Pluggable Converter

These converters 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 converter 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.

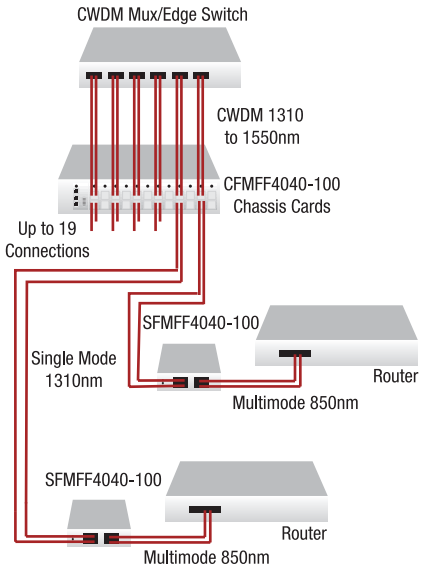
Features

- CWDM and DWDM SFP-ready platform allowing for cost-effective transponder functionality
- Link Pass Through [pg 23]
- DMI, Digital diagnostics per SFF-8472
- Automatic Link Restoration [pg 24]
- Field Upgradeable Firmware [pg 24]
- Can be used with any Point System™ Chassis [pg 38-39]
- 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.

- 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

Service Provider Application



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; CISPRB; CE Mark
Warranty	Lifetime

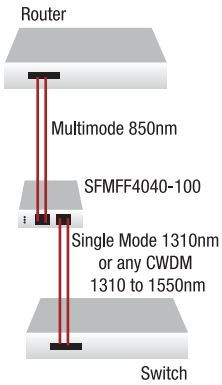
Ordering Information

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

Optional Accessories *(sold separately)*

SFP Modules [pg 96-104]

Enterprise Application

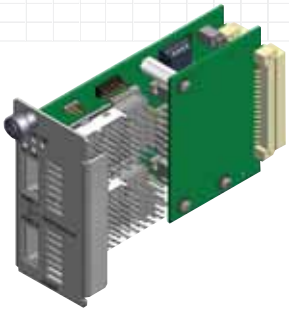


10GBase-SR/LR/ER/ZR to10GBase-SR/LR/ER/ZR Optical Line Converter with XFP Slots

see also: 10GBase Optical Line Stand-Alone Media Converter [pg 65]

CTGFFxxxx-100

10 Gigabit Ethernet Fiber to Fiber Converter Module



The Transition Networks' 10 Gigabit Ethernet fiber to fiber converter is a two-port 10G pluggable media converter, supporting a variety of XFP and SFP+ modules allowing network designers to utilize the module to meet their network requirements.

The media converter 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.

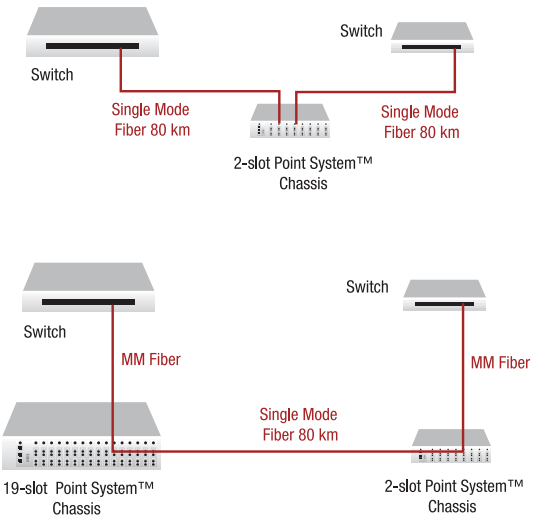
Copper to fiber conversion is also supported with the use of a 10GBase-CX4 XFP module in one of the ports.

This converter 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 23]
- Auto Link Restore [pg 24]
- Loopback [pg 24]
- 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

10 Gigabit Ethernet Fiber to Fiber Converter Application



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+

CTGFF4748-100
(2) Port 10GBase-xx open XFP 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

DS3-T3/E3 & STS-1 Coax to Fiber

see also: DS3-T3/E3 Point System™ Stand-Alone NID [pg 67]

CCSCF30xx-11x

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

The DS3 – T3/E3 & STS-1 copper to fiber network interface device (NID) provides a solution for those users that need to extend DS3 connections over fiber.

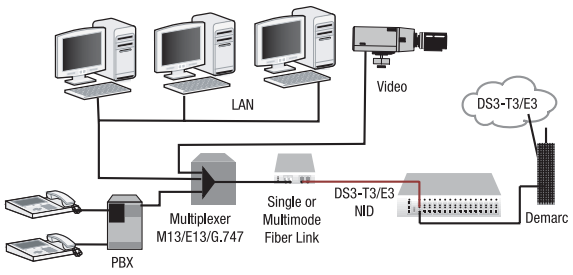
The DS3 – T3/Es & STS-1 supports Small Form Pluggable (SFP) transceivers to support a variety of fiber types, distances and wavelengths to provide maximum flexibility across a variety of network topologies. The use of Coarse Wave Division Multiplexing (CWDM) SFPs can be utilized to further increase the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

The DS3 – T3/E3 & STS-1 NID 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 67] 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 24]
- 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 24] when used with Point System™ Chassis and management module

Integrate Voice & Data on Fiber Network



Specifications

Complete list of fiber optic connector specifications [pg 116-123]

Standards	ANSI, ITU-TS, ETSI, AT&T, G.703, G.921 & G.955
Coax Conectors	75 ohm coax **TX output** min: +2.5 dBm max: +9.1 dBm **RX input** min: -9.7dBm 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 116-123]

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 25]

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 SCSCF30xx-110. The product does not work with a -10x model.*

REMOTE MGMT | LOOP BACK | FIELD UPGRADEABLE FIRMWARE

T1/E1 Copper to Fiber
With Remote Management

see also: T1/E1 Stand-Alone NID [pg 68, 69]

T1/E1

CSDTFx0xx-12x

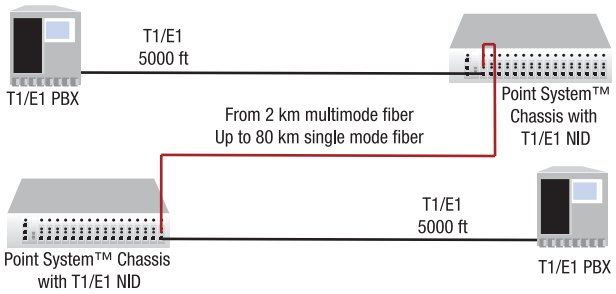
Remotely Managed T1/E1 NID (Network Interface Device)

Features

- Remote in-band management [pg 23]
- Local or Remote Loopbacks on copper or fiber in software mode
- Loopback switch facilitates local installation [pg 24]
- 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 24]
- LED provides Alarm Indication Signal (AIS)
- Can be used with fractional T1/E1 circuits

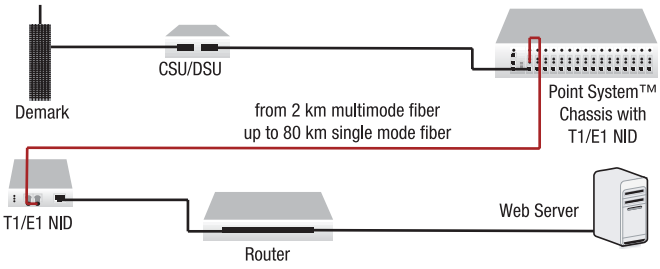
Provide Campus Interconnects

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.



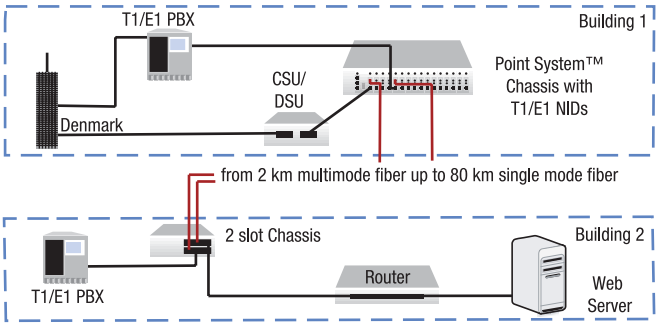
Remote Management

Stand-alone can be managed remotely when used with a managed chassis.



Extend T1 Networks

Extend T1 to other buildings in a campus or MAN from 2 km to 80km for voice or data applications.



Point System™ Management Features

- Report local or remote NID status:
  - Copper & Fiber Link status
  - Hardware switch settings: LBO, AIS Copper, AIS Fiber, HW/SW
  - AIS detected Copper & Fiber
  - Model Number
  - Copper & Fiber Connector
- Local or remote command operations include:
  - Loopback Copper & Fiber [pg 24]
  - AIS transmitted on Fiber on loss of Copper link
  - AIS Transmitted on Copper on loss of Fiber link
  - Boot-load firmware

- The Remotely Managed T1/E1 copper to fiber NID 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.

T1/E1 NID (Network Interface Device) with Remote 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 [SSDTF, pg 68-69] installed at the remote location.

Specifications

Complete list of fiber optic connector specifications [pg 116-123]

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:** 5.0v [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

Ordering Information

Complete list of fiber optic connector specifications [pg 116-123]

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 25]

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

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

see also: 4xT1 Transport Mux Stand-Alone NIDs [pg 70-71]

T1/E1

C4TEF10xx-10x

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

Features

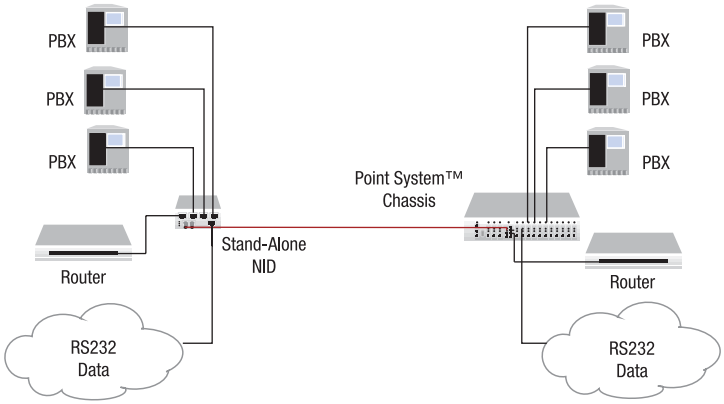
- Automatic Link Restoration [pg 24]
- Remote Management [pg 23]
- Local & Remote Loopback [pg 24]
- AIS/TAOS
- LEDs for each data port
- DIP switches for line code, line length, local loopback or remote loopback [pg 24]
- T1/E1/J1 mode settings
- Dry Relay Contacts on each TDM port
- Mirror Port (SNMP selectable)
- Local (AUX) Management Interface (RS232 connector)
- Switch selection for Data or Management mode on RS232
- Access to complete status information on local and remote device
- Access to local and remote configuration
- Switch or SNMP selected Baud rate operation
- Field Upgradeable Firmware [pg 24]

Management Features

- Report local device status:
  - Fiber Link Status
  - Copper Link Status for each T1/E1
  - Hardware switch settings: LBO, AIS on C/F, HW/SW, speed
  - AIS detected Fiber & Copper
  - Model Number
  - Copper & Fiber Connectors
- 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 24]
  - Serial connection speed and parity (Software Mode)
  - T1/E1 Mirror Port Modes (Port Trapping)
  - Boot-load firmware upgrades
- Remote device status:
  - Fiber Link status
  - Copper Link Status for each T1/E1
  - Hardware switch settings: LBO, AIS on C/F, HW/SW, speed
  - AIS detected Fiber & Copper
  - Model Number
  - Copper & Fiber Connectors
- Remote Commands:
  - Loopback Fiber & T1/E1 per channel
  - Serial connection speed and parity (Software Mode)
  - AIS TX on fiber on loss of copper link & AIS TX on copper on loss of fiber link

- Low cost transport capability: (4) T1/E1/J1 and (1) RS232 data channel line
- 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



Specifications

Complete list of fiber optic connector specifications [pg 116-123]

Standards	AMI/B8ZS/HDB3; G.703 Telecordia TR-NWT-001089: FCC Part 68, UL1459; ITU-T, ANSI, AT&T, ETSI; TBR 12; PD 7024: 1994 (NTR 4)
Switches	Numerous switch settings for line coding, line buildout, loopback (per port), AIS setting, data/mgmt RS-232 and RS-232 port speed and parity
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	6.0 Watts
Environment	See chassis specifications
Shipping Weight	1 lb. [0.45 kg]
Regulatory Compliance	FCC Class A; VCCI Class A; EN 55022 (CISPR 22) Class A; ICES-003
Warranty	Lifetime

*Note: C4TEF cards cannot be used with the 1-Slot Point System™ Chassis [pg 38].

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, pg 70-71] installed at the remote location.

Ordering Information

Complete list of fiber optic connector specifications [pg 116-123]

C4TEF1011-100
1300nm multimode (ST)
[2 km/1.2 mi.] Link Budget: 11.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**
plus 6-pin DIN **[3 m/10 ft.]**

C4TEF1013-100
1300nm multimode (SC)
[2 km/1.2 mi.] Link Budget: 11.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**
plus 6-pin DIN **[3 m/10 ft.]**

C4TEF1014-100
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 6-pin DIN **[3 m/10 ft.]**

C4TEF1015-100
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 6-pin DIN **[3 m/10 ft.]**

C4TEF1016-100
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 6-pin DIN **[3 m/10 ft.]**

C4TEF1017-100
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 6-pin DIN **[3 m/10 ft.]**

C4TEF1035-100
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 6-pin DIN **[3 m/10 ft.]**

Single Fiber Products

Recommended use in pairs [pg 25]

C4TEF1029-100
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.]**
plus6-pin DIN **[3 m/10 ft.]**

C4TEF1029-101
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.]**
plus 6-pin DIN **[3 m/10 ft.]**

C4TEF1029-102
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.]**
plus 6-pin DIN **[3 m/10 ft.]**

C4TEF1029-103
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.]**
plus 6-pin DIN **[3 m/10 ft.]**

*Note: RS-232 cable included with each card (6-pin DIN to DB-9)

AUTO NEG | AUTO CROSS | TRANSPARENT LINK PASS THRU | AUTO LINK RESTORE | PAUSE | REMOTE MGMT | LOOP BACK | FIELD UPGRADEABLE FIRMWARE | SINGLE FIBER

4x T1/E1/J1 + 10/100 Ethernet Copper to Fiber Transport Mux

see also: Stand-Alone NID [pg 72, 73]

C4TEF10xx-11x

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

Features

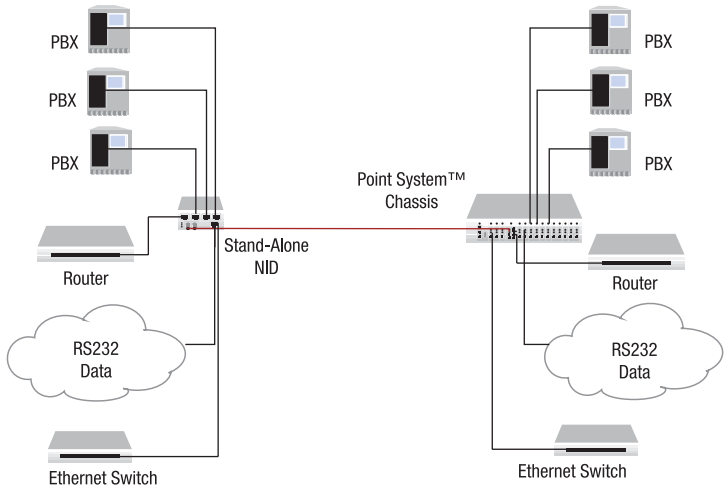
- Auto-Negotiation for 10/100BASE-TX [pg 22]
- AutoCross™ (auto MDI/MDI-X) [pg 22]
- Transparent Link Pass Through for Ethernet [pg 23]
- Automatic Link Restoration [pg 24]
- Pause (Flow Control) [pg 23]
- Remote Management [pg 23]
- Local and Remote Loopback [pg 24]
- Remote Fiber Loss Signaling
- AIS/TAOS
- LEDs for each data port
- DIP switches for line code, line length, local loopback or remote loopback [pg 24]
- T1/E1/J1 mode settings
- Dry Relay Contacts on each TDM port
- Local (AUX) Management Interface (RS232 connector)
- Switch selection for Data or Management mode on RS232 interface
- Access to complete status information on local and remote device
- Access to local and remote configuration
- Switch or SNMP selected Baud rate operation
- Field Upgradeable Firmware [pg 24]

Management Features

- Report local device status:
  - Fiber Link Status
  - Copper Link Status for each T1/E1
  - Hardware switch settings: LBO, AIS on C/F, HW/SW, speed
  - AIS detected Fiber & Copper
  - Model Number
  - Copper & Fiber Connectors
- 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
  - Serial connection speed and parity (Software Mode)
  - T1/E1 Mirror Port Modes
  - Boot-load firmware upgrades
  - Ethernet settings:
    - Auto-Negotiation Enable/Disable
    - Force speeds and modes on 10/100TX
- Remote device status:
  - Fiber Link status
  - Copper Link status for each T1/E1
  - Hardware switch settings: LBO, AIS on C/F, HW/SW, speed
  - AIS detected Fiber & Copper
  - Model Number
  - Copper & Fiber Connectors
- Remote Commands:
  - Loopback Fiber & T1/E1 per channel
  - Serial connection speed and parity (Software Mode)
  - AIS TX on fiber on loss of copper link & AIS TX on copper on loss of fiber link
  - T1/E1 Monitor Modes
  - Ethernet settings (Software Mode)
  - Force speeds and modes on 10/100TX
  - Enable/Disable: Auto-Negotiation; Link Pass Through; Flow Control; & AutoCross™

- Low cost transport capability: (4) T1/E1/J1; (1) Ethernet and (1) RS232 data channel line.
- 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



Specifications

Complete list of fiber optic connector specifications [pg 116-123]

Standards	IEEE Std. 802.3 2003; Telecordia TR-NWT-001089: FCC Part 68, UL1459; ITU-T, ANSI, AT&T, ETSI; TBR 12; PD 7024: 1994 (NTR 4); AMI/B8ZS/HD83; G.703
Switches	Numerous switch settings for line coding, line buildout, loopback (per port), AIS setting, data/mgmt RS-232 RS-232 port speed and parity 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	6.0 Watts
Environment	See chassis specifications
Shipping Weight	1 lb. [0.45 kg]
Regulatory Compliance	FCC Class A; VCCI Class A; EN 55022 (CISPR 22) Class A; ICES-003
Warranty	Lifetime

*Note: C4TEF cards cannot be used with the 1-Slot Point System™ Chassis [pg 38]. 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, pg 72-73] installed at the remote location.

Ordering Information

Complete list of fiber optic connector specifications [pg 116-123]

C4TEF1011-110
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) **[100 m]**
plus 6-pin DIN [3 m/10 ft.]

C4TEF1013-110
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) **[100 m]**
plus 6-pin DIN [3 m/10 ft.]

C4TEF1014-110
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]**
plus 6-pin DIN [3 m/10 ft.]

C4TEF1015-110
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]**
plus 6-pin DIN [3 m/10 ft.]

C4TEF1016-110
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]**
plus 6-pin DIN [3 m/10 ft.]

C4TEF1017-110
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]**
plus 6-pin DIN [3 m/10 ft.]

C4TEF1035-110
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]**
plus 6-pin DIN [3 m/10 ft.]

Single Fiber Products

Recommended use in pairs [pg 25]

C4TEF1029-110
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]**
plus 6-pin DIN [3 m/10 ft.]

C4TEF1029-111
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]**
plus 6-pin DIN [3 m/10 ft.]

C4TEF1029-112
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]**
plus 6-pin DIN [3 m/10 ft.]

C4TEF1029-113
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]**
plus 6-pin DIN [3 m/10 ft.]

*Note: RS-232 cable included with each card (6-pin DIN to DB-9)

E-MCR-05

12-Slot Media Converter Rack

Flexible Design for Growing Networks

Simplify your installation of Transition Networks' stand-alone media converters with the Media Converter Rack. This 19" rack-mountable unit supports up to twelve media converters 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 converter installations. The unit saves space in the wiring closet by providing a means for mounting (12) converters in (3) units of rack space while reducing the number of wall outlet power connections required.

Convenience

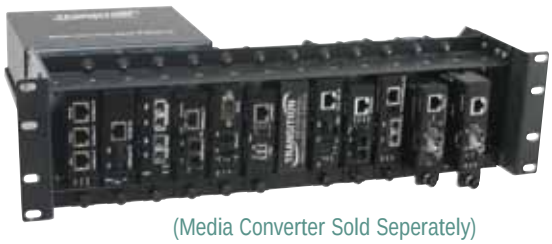
The media converters are hot-swappable. They can also be removed from the rack, powered externally, and used as stand-alone units in new applications as your network needs change in the future.

Cost Effective

Easily rack mount the single-wide, 12 volt powered, Transition Networks' media converters that you already own, or buy stand-alone units today and rack mount them in the future.

Includes

(12) univeral rack mount media converter brackets.



(Media Converter 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 Media Converter Rack

Optional Accessories *(sold separately)*

Mounting Options

RMBU
Universal Rack Mount Bracket for Stand-Alone Converters

RMBM
Rack Mount Bracket for Mini Media Converters

- 19" Rack-Mountable Chassis
- Securely houses up to (12) stand-alone media converters with the use of universal converter mounting brackets
- One AC power source will independently power up to (12) hot-swappable converters
- Supports any combination of single wide, 12 VDC powered, Transition Networks' media converters

RMS19-SA4-01

4-Slot Media Converter 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 media converters (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 media converter.

Power Cord Tie-Downs

Eliminates the accidental disconnection of power supplies from the media converters.

Converter Mounting Brackets

Securely mounts the converters to the shelf.

Includes

(4) univeral rack mount media converter brackets.

(Media Converter 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 Media Converter Shelf

Optional Accessories *(sold separately)*

Mounting Options

RMBU
Universal Rack Mount Bracket for Stand-Alone Converters

RMBM
Rack Mount Bracket for Mini Media Converters

Mounting Brackets

Stand-Alone Media Converters

Wall Mount Brackets are small simple "L-shaped" tabs that allow a single Transition Networks' media converter to be mounted anywhere needed. The brackets are sold in pairs and are available in several sizes and types to match the different sized media converters and space requirements.

Din Rail Brackets allow stand-alone media converters 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 converter mounts on its edge.

Mini wall mount brackets allow a mini media converter to be securely mounted to a wall or any other flat surface.

WMBL; WMBP; WMBS

WMBV; WMBD

WMBM

Specifications

Shipping Weight	1 lb. [0.45 kg]
Warranty	Lifetime

Ordering Information

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

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

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

WMBD-FS
3.1" [79 mm] DIN Rail Mount Bracket (flat, small) Fits Stand-Alone Converters 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 Converters size 4.7" [119 mm]

WMBM
3.3" [84 mm]
Fits all "Mini" Media Converters

WMBP
5.0" [127 mm]
Fits Single or Dual Slot Point System™ Chassis

WMBS
3.2" [81 mm]
Fits Stand-Alone Converters size 3.9" [99 mm]

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

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

NEW PRODUCT

SPS-2460-xx

Extended Temperature Power Supply

SPS-2460-CC
Piggy-Back Power Supply

SPS-2460-PS
Piggy-Back Power Supply

SPS-2460-SA
Stand-Alone Power Supply

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

Ordering Information

SPS-2460-CC
Piggy-Back
For use with: Non-Point System™ stand-alone media converters 3.0" wide (E-TBT-FRL-05; E-100BTX-FX-05; etc.)

SPS-2460-PS
Piggy-Back
For use with: Point System™ stand-alone media converters 3.25" wide (SBFTF1011-100; SGETF1013-100, etc.)

SPS-2460-SA
Stand-Alone
For use with: All stand-alone media converters; Single-Slot Point System™ Chassis; Dual-Slot Point System™ Chassis

Transition Networks' wide input external power supplies allow you to provide a wide range of input voltages to power your stand-alone converters and chassis. Input voltages of 24 – 60 VDC and 24 – 42VRMS allow for installation of any of Transition's stand-alone media converters 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 media converters 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 converter and eliminate the power cable commonly found between the power supply and the converter. Once the piggy back supply is attached to the converter, the combined assembly is much easier to wall mount or attach to Din Rail environments than using a separate supply.

SRMFE10xx-20x

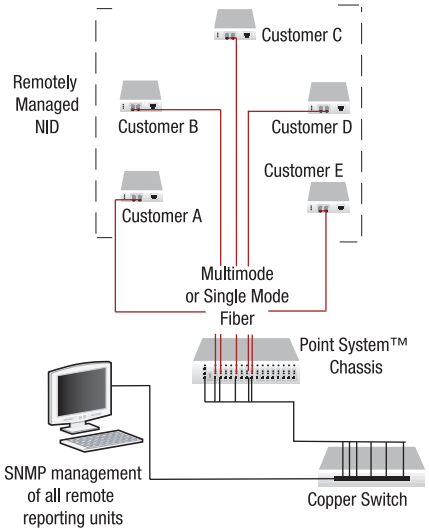
Remotely Managed Fast Ethernet NID (Network Interface Device)

- In-band management of stand-alone Fast Ethernet NID
- Remote Loopback assists in diagnosing network problems [pg 24]
- Upstream and downstream Bandwidth Control allows service providers to offer an array of services

Features

- Auto-Negotiation [pg 22]
- AutoCross™ [pg 22]
- Link Pass Through [pg 23]
- Far-End-Fault (FEF) [pg 22]
- Automatic Link Restoration [pg 24]
- Pause [pg 23]
- Loopback [pg 24]
- Remote Management [pg 23]

Remotely Managed Fast Ethernet



With the Remotely Managed Fast Ethernet NID, service providers can now monitor and manage the entire optical link from the Central Office (CO) to the Customer Premise Equipment (CPE).

When used in conjunction with a managed Point System™ Chassis card, [CRMFE pg 40], this stand-alone unit can be managed remotely. This Fast Ethernet NID provides a fully-managed conversion between 100BASE-TX and 100BASE-FX signals at Customer Premises.

Devices should be used in pairs. Typical installation will include a chassis card installed in the Point System locally and a stand-alone device (SRMFE) installed at the remote location.

Specifications

Complete list of fiber optic connector specifications [pg 116-123]

Standards	IEEE Std. 802.3
3-position Jumper	**Jumper J2:** Enable/disable AutoCross™ **Jumper J6:** **Hardware:** Device mode determined by 4-position switch settings **Software:** Device mode determined by most recently saved on-board microprocessor settings
4 position Switch	**Pos 1** Enable/disable twisted pair auto-negotiation **Pos 2** Enable/disable twisted pair pause **Pos 3** (UP) Enables Link Pass Through (DOWN) Disables Link Pass Through **Pos 4** (UP) Enables Far-End-Fault (DOWN) Disables Far-End-Fault
Status LEDs	**Power** **LKF (Fiber Link)** **RXF (Fiber Receive)** **RXC (Copper Receive)** **LKC (Copper Link)**
Dimensions	**Width:** 3.25" [83 mm] **Depth:** 4.8" [122 mm] **Height:** 1.0" [25 mm]
Power Consumption	4 Watts
Power	External AC/DC required; 12 VDC 0.5A; unregulated; standard
Environment	0 – 50°C; 5% – 95% humidity non-condensing; 0 – 10,000 ft. altitude
Shipping Weight	2 lbs. [0.90 kg]
Safety Compliance	**Wall Mount Power Supply:** UL Listed and CSA certified
Regulatory Compliance	CISPR/EN55022 Class A & B + EN55024; FCC Class A & B; CE Mark
Warranty	Lifetime

Ordering Information

Complete list of fiber optic connector specifications [pg 116-123]

SRMFE1011-200
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1300nm multimode (ST)
[2 km/1.2 mi.] Link Budget: 11.0 dB

SRMFE1013-200
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1300nm multimode (SC)
[2 km/1.2 mi.] Link Budget: 11.0 dB

SRMFE1014-200
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1310nm SM (SC)
[20 km/12.4 mi.] Link Budget: 16.0 dB

SRMFE1015-200
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1310nm SM (SC)
[40 km/24.9 mi.] Link Budget: 26.0 dB

SRMFE1016-200
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1310nm SM (SC)
[60 km/37.3 mi.] Link Budget: 29.0 dB

SRMFE1017-200
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1550nm SM (SC)
[80 km/49.7 mi.] Link Budget: 29.0 dB

Single Fiber Products

Recommended use in pairs [pg 25]

SRMFE1029-200
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1310nm TX/1550nm RX
single fiber single mode (SC)
[20 km/12.4 mi.] Link Budget: 19.0 dB

SRMFE1029-201
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1550nm TX/1310nm RX
single fiber single mode (SC)
[20 km/12.4 mi.] Link Budget: 19.0 dB

SRMFE1029-202
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1310nm TX/1550nm RX
single fiber single mode (SC)
[40 km/24.9 mi.] Link Budget: 25.0 dB

SRMFE1029-203
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1550nm TX/1310nm RX
single fiber single mode (SC)
[40 km/24.9 mi.] Link Budget: 25.0 dB

Optional Accessories *(sold separately)*

Wide Input (24 - 60 VDC) Power Supplies
SPS-2460-PS or SPS-2460-SA [pg 55]

Mounting Options
E-MCR-05 [pg 53]
12-Slot Media Converter Rack

WMBD or WMBL [pg 54]
Wall Mount Brackets

RMS19-SA4-01 [pg 53]
4-Slot Media Converter Shelf

F-SM-MM-02 & SFMFF1xxx-20x

Single Mode to Multimode Optical Mode Converter

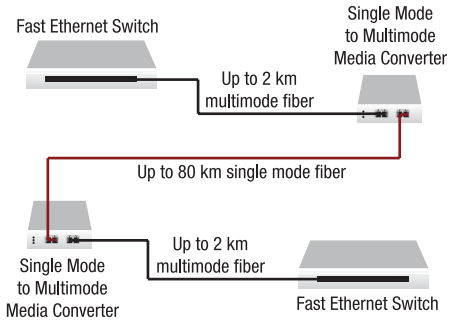
Features

- Link Pass Through [pg 23]
- Automatic Link Restoration [pg 24]

Extend Network Distance

Extend distances up to 80 km with network protocols that use 1300nm wavelength for fiber optic transmission. In fact, distances can be extended in any networking protocol between 100 Mbps and 155 Mbps.

Save money by purchasing Fast Ethernet devices with lower cost multimode fiber interfaces and use converters to introduce single mode fiber only where you need it.



Specifications

Complete list of fiber optic connector specifications [pg 116-123]

Standards	IEEE Std. 802.3
Status LEDs	**PWR (Power):** Steady green LED indicates connection to external AC power **LKM or Link (Left):** Lit for MM Link **LKS or Link (Right):** Lit for SM Link
Dimensions	**Width:** 3.0" [76 mm] **Depth:** 4.7" [119 mm] **Height:** 1.0" [25 mm]
Power	External AC/DC required; 12 VDC. 0.5A; unregulated; standard
Environment	0 – 50°C; 5% – 90% humidity non-condensing; 0 – 10,000 ft. altitude
Shipping Weight	2 lbs. [0.90 kg]
Safety Compliance	**Wall Mount Power Supply:** UL Listed and CSA certified
Regulatory Compliance	CISPR/EN55022 Class A; EN55024; EN61000; FCC Class A; CE Mark
Warranty	Lifetime

Ordering Information

Complete list of fiber optic connector specifications [pg 116-123]

SFMFF1313-200
1300nm multimode (SC)
[2 km/1.2 mi.] Link Budget: 11.0 dB
to 1300nm multimode (SC)
[2 km/1.2 mi.] Link Budget: 11.0 dB

F-SM-MM-02
1300nm multimode (SC)
[2 km/1.2 mi.] Link Budget: 11.0 dB
to 1310nm single mode (SC)
[20 km/12.4 mi.] Link Budget: 16.0 dB

F-SM-MM-02(LH)
1300nm multimode (SC)
[2 km/1.2 mi.] Link Budget: 11.0 dB
to 1310nm single mode (SC)
[40 km/24.9 mi.] Link Budget: 26.0 dB

F-SM-MM-02(XL)
1300nm multimode (SC)
[2 km/1.2 mi.] Link Budget: 11.0 dB
to 1310nm single mode (SC)
[60 km/37.3 mi.] Link Budget: 29.0 dB

F-SM-MM-02(LW)
1300nm multimode (SC)
[2 km/1.2 mi.] Link Budget: 11.0 dB
to 1550nm single mode (SC)
[80 km/49.7 mi.] Link Budget: 29.0 dB

SFMFF1414-200
1310nm single mode (SC)
[20 km/12.4 mi.] Link Budget: 16.0 dB
to 1310nm single mode (SC)
[20 km/12.4 mi.] Link Budget: 26.0 dB

SFMFF1415-200
1310nm single mode (SC)
[20 km/12.4 mi.] Link Budget: 16.0 dB
to 1310nm single mode (SC)
[40 km/24.9 mi.] Link Budget: 26.0 dB

SFMFF1417-200
1310nm single mode (SC)
[20 km/12.4 mi.] Link Budget: 16.0 dB
to 1550nm single mode (SC)
[80 km/49.7 mi.] Link Budget: 29.0 dB

Single Fiber Products

Recommended use in pairs [pg 25]

SFMFF1329-200
1300nm multimode (SC)
[2 km/1.2 mi.] Link Budget: 11.0 dB
to 1310nm TX/1550nm RX single fiber single mode (SC)
[20 km/12.4 mi.] Link Budget: 19.0 dB

SFMFF1329-201
1300nm multimode (SC)
[2 km/1.2 mi.] Link Budget: 11.0 dB
1550nm TX/1310nm RX single fiber single mode (SC)
[20 km/12.4 mi.] Link Budget: 19.0 dB

SFMFF1329-202
1300nm multimode (SC)
[2 km/1.2 mi.] Link Budget: 11.0 dB
1310nm TX/1550nm RX single fiber single mode (SC)
[40 km/24.9 mi.] Link Budget: 25.0 dB

SFMFF1329-203
1300nm multimode (SC)
[2 km/1.2 mi.] Link Budget: 11.0 dB
1550nm TX/1310nm RX single fiber single mode (SC)
[40 km/24.9 mi.] Link Budget: 25.0 dB

Ordering Information

Complete list of fiber optic connector specifications [pg 116-123]

SFMFF1329-204
1300nm multimode (SC)
[2 km/1.2 mi.] Link Budget: 11.0 dB
1310nm TX/1550nm RX single fiber single mode (SC)
[60 km/37.3 mi.] Link Budget: 28.0 dB

SFMFF1329-205
1300nm multimode (SC)
[2 km/1.2 mi.] Link Budget: 11.0 dB
1550nm TX/1310nm RX single fiber single mode (SC)
[60 km/37.3 mi.] Link Budget: 27.0 dB

SFMFF1429-200
1310nm single mode (SC)
[20 km/12.4 mi.] Link Budget: 16.0 dB
1310nm TX/1550nm RX single fiber single mode (SC)
[20 km/12.4 mi.] Link Budget: 19.0 dB

SFMFF1429-201
1310nm single mode (SC)
[20 km/12.4 mi.] Link Budget: 16.0 dB
to 1550nm TX/1310nm RX single fiber single mode (SC)
[20 km/12.4 mi.] Link Budget: 19.0 dB

SFMFF1429-202
1310nm single mode (SC)
[20 km/12.4 mi.] Link Budget: 16.0 dB
to 1310nm TX/1550nm RX single fiber single mode (SC)
[40 km/24.9 mi.] Link Budget: 25.0 dB

SFMFF1429-203
1310nm single mode (SC)
[20 km/12.4 mi.] Link Budget: 16.0 dB
to 1550nm TX/1310nm RX single fiber single mode (SC)
[40 km/24.9 mi.] Link Budget: 25.0 dB

Optional Accessories *(sold separately)*

F-SM-MM-02

SPS-2460-CC [pg 55]
Wide Input (24 - 60 VDC) Piggy Back Power Supply for the F-SM-MM-02

WMBD-FS [pg 54]
DIN Rail Bracket (flat, small) 3.1" [79 mm]

SFMFF1x29-20x

SPS-2460-PS [pg 55]
Wide Input (24 - 60 VDC) Piggy Back Power Supply for the SFMSS1xxx-20x

WMBD-F [pg 54]
DIN Rail Bracket (flat) 3.3" [84 mm]

F-SM-MM-02 or SFMFF1x29-20x

SPS-2460-SA [pg 55]
Wide Input (24 - 60 VDC) Stand-Alone Power Supply

E-MCR-05 [pg 53]
12-Slot Media Converter Rack

RMS19-SA4-01 [pg 53]
4-Slot Media Converter Shelf

WMBD [pg 54]
DIN Rail Bracket 5.0" [127 mm]

WMBL [pg 54]
Wall Mount Bracket 4.0" [102 mm]

WMBV [pg 54]
Vertical Wall Mount Bracket 5.0" [127 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

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

SFBRM10xx-1xx

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

see also: 10/100 OAM/IP-Based Point System™ Slide-In-Modules [pg 42]

10/100 Bridging

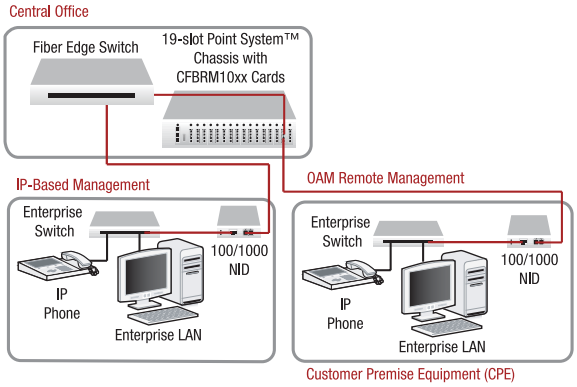
CARRIER ETHERNET MEF Certified Compliant™

Features

- MEF 9 & MEF 14 Carrier Ethernet Certification
- Two remote management modes:
  - IP-Based Remote Management [pg 23]
  - In-Band Link OAM 802.3ah (remote device managed by local peer)
- SNMP v1
- AutoCross™ [pg 22]
- Auto-Negotiation [pg 22]
- Pause [pg 23]
- Transparent Link Pass Through [pg 23]
- Far-End-Fault [pg 22]
- Remote Loopback [pg 24]
- 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)
- IEEE 802.1x Port based security
- RADIUS client
- RMON counters for each port
- Bandwidth Allocation per port [pg 24]
- DMI Optical Management on select models
- USB port for basic setup
- Cable diagnostic function for TP ports
- 8K MAC addresses
- Field Upgradeable Firmware [pg 24]

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

Remotely Managed 10/100 NID



Specifications

Complete list of fiber optic connector specifications [pg 116-123]

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	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

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)
[20 km/6.2 mi.] Link Budget: 16.0 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 25]

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 55]
Piggy Back Power Supply

SPS-2460-SA [pg 55]
Stand-Alone Power Supply

Mounting Options

E-MCR-05 [pg 53]
12-Slot Media Converter Rack

RMS19-SA4-01 [pg 53]
4-Slot Media Converter Shelf

WMBD [pg 54]
DIN Rail Bracket 5.0" [127 mm]

WMBL [pg 54]
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]

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

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

see also: 10/100 OAM/IP-Based System™ Slide-In-Modules [pg 42]

SFBRM10xx-18x

10/100 Bridging

OAM/IP-Based NID (Network Interface Device) For Indoor and Protected Outdoor Applications

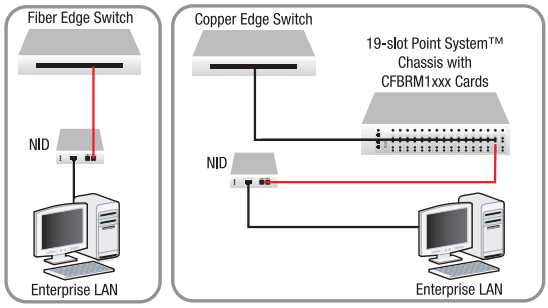
CARRIER ETHERNET MEF Certified Compliant

- 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

Features

- MEF 9 & MEF 14 Carrier Ethernet Certification
- Two Remote Management modes:
  - IP-Based Remote Management [pg 23]
  - In-Band Link OAM 802.3ah (remote device managed by local peer)
- SNMP v1
- AutoCross™ [pg 22]
- Auto-Negotiation [pg 22]
- Pause [pg 23]
- Transparent Link Pass Through [pg 23]
- Far-End-Fault [pg 22]
- Remote Loopback [pg 24]
- IEEE 802.1p QoS packet classification with 4 egress queues
- Ipv4 IP TOS and DiffServ QoS classification, IPv6 Traffic class
- IEEE 802.1q VLAN, 4096 entries
- Static MAC, 64 entries
- Double VLAN tagging (C-tag/S-tag)(Q-in-Q)
- IEEE 802.1x Port based security
- RADIUS client
- RMON counters for each port
- Bandwidth Allocation per port [pg 24]
- DMI Optical Management
- USB port for basic setup
- Cable diagnostic function for TP ports
- 8K MAC addresses
- Field Upgradeable Firmware [pg 24]

Remotely Managed 10/100 NID IP or OAM Management



Specifications

Complete list of fiber optic connector specifications [pg 116-123]

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

Ordering Information

Complete list of fiber optic connector specifications [pg 116-123]

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)
[20 km/12.4 mi.] Link Budget: 19.0 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 25]

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 55]
Piggy Back Power Supply

SPS-2460-SA [pg 55]
Stand-Alone Power Supply

Mounting Options

E-MCR-05 [pg 53]
12-Slot Media Converter Rack

RMS19-SA4-01 [pg 53]
4-Slot Media Converter Shelf

WMBD [pg 54]
DIN Rail Bracket 5.0" [127 mm]

WMBL [pg 54]
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]

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

OAM/IP-Based Remotely Managed 10/100BASE-TX to (2) 100BASE-X 10/100 Bridging

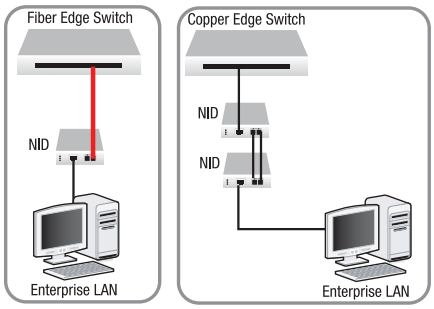
SFBRM1040-140

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 23]
  - In-Band Link OAM 802.3ah (remote device managed by local peer)
- SNMP v1
- AutoCross™ [pg 22]
- Auto-Negotiation [pg 22]
- Pause [pg 23]
- Transparent Link Pass Through [pg 23]
- Far-End-Fault [pg 22]
- Remote Loopback [pg 24]
- IEEE 802.1p QoS packet classification with 4 egress queues
- Ipv4 IP TOS and DiffServ QoS classification, IPv6 Traffic class
- IEEE 802.1q VLAN, 4096 entries
- Static MAC, 64 entries
- Double VLAN tagging (C-tag/S-tag)(Q-in-Q)
- IEEE 802.1x Port based security
- RADIUS client
- RMON counters for each port
- Bandwidth Allocation per port [pg 24]
- DMI Optical Management
- USB port for basic setup
- Cable diagnostic function for TP ports
- 8K MAC addresses
- Field Upgradeable Firmware [pg 24]

Specifications

Complete list of fiber optic connector specifications [pg 116-123]

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:** 3.4" [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 116-123]

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 96-104]

Wide Input (24 - 60 VDC) Power Supplies

SPS-2460-PS [pg 55]
Piggy Back Power Supply

SPS-2460-SA [pg 55]
Stand-Alone Power Supply

Mounting Options

E-MCR-05 [pg 53]
12-Slot Media Converter Rack

RMS19-SA4-01 [pg 53]
4-Slot Media Converter Shelf

WMBD [pg 54]
DIN Rail Bracket 5.0" [127 mm]

WMBL [pg 54]
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]

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

OAM/IP Remotely Managed 10/100/1000BASE-T to 1000BASE-X

SBFFG10xx-1xx

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

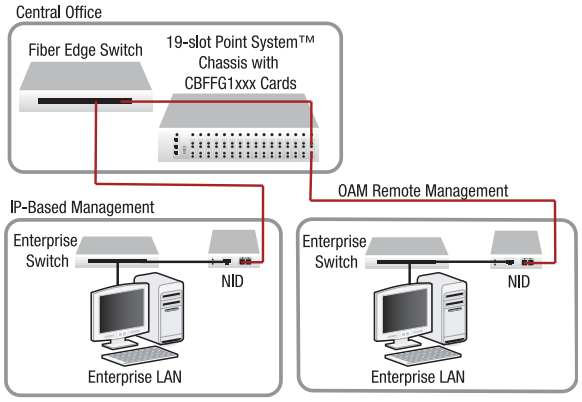
see also: OAM/IP-Based Remotley Managed Point System™ Slide-In-Modules [pg 43]

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 23]
  - In-Band Link OAM 802.3ah (remote device managed by local peer)
- SNMP V1
- AutoCross™ [pg 22]
- Auto-Negotiation [pg 22]
- Pause [pg 23]
- Transparent Link Pass Through [pg 23]
- Far-End-Fault [pg 22]
- Remote Loopback [pg 24]
- 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)
- VLAN Tunneling
- Selectable Ethertype for S-TAG when using Double VLAN Tagging: 0x8100, 0x9100 or 0x88A8
- IEEE 802.1x Port based security
- RADIUS client
- RMON counters for each port
- Bandwidth Allocation per port [pg 24]
- DMI Optical Management
- USB port for basic setup
- Cable diagnostic function for TP ports
- 8K MAC addresses
- Field Upgradeable Firmware [pg 24]

Remotely Managed 10/100/1000 NID or OAM Management



- 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 116-123]

Standards	IEEE Std. 802.3, IEEE Std. 802.3ah, IEEE Std. 802.1P, IEEE Std. 802.1Q, IEEE Std. 802.1X
Data Rate	**Copper:** 10/100/1000 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.*

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 25]

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 55]
Piggy Back Power Supply

SPS-2460-SA [pg 55]
Stand-Alone Power Supply

Mounting Options

E-MCR-05 [pg 53]
12-Slot Media Converter Rack

RMS19-SA4-01 [pg 53]
4-Slot Media Converter Shelf

WMBD [pg 54]
DIN Rail Bracket 5.0" [127 mm]

WMBL [pg 54]
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]

Gigabit Ethernet/Fiber Channel Optical Mode Conversion 1000BASE-SX to 1000BASE-LX

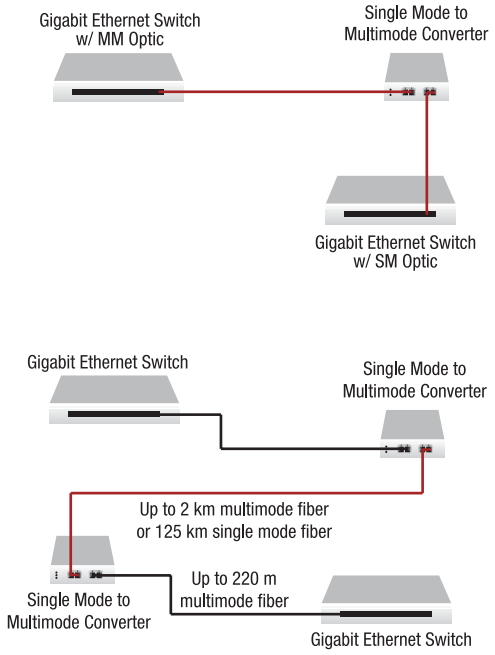
see also: Point System™ Slide-In-Module Gigabit Ethernet/Fiber Channel Optical Mode Converters [pg 44]

SFMFF1xxx-22x

Gigabit Ethernet/Fiber Channel Optical Mode Converter

Features

- Auto-Negotiation (1000Base-X ports) [pg 22]
- Link Pass Through [pg 23]
- Far-End-Fault (100Base-FX ports) [pg 22]
- Pause [pg 23]
- Automatic Link Restoration [pg 24]
- Protocol Transparency
- Convert 1000BASE-SX ports on a Gigabit Ethernet switch to 1000BASE-LX on a port-by-port basis
- Ideal for campus area networks or other applications requiring the distance advantages of single mode fiber



Used individually or in pairs, this mode converter can extend 1000 Mbps Gigabit Ethernet or Fiber Channel signals over single mode fiber up to 125 km.

Ordering Information

Complete list of fiber optic connector specifications [pg 116-123]

SFMFF1313-220
1000BASE-SX 850nm multimode (SC)
[62.5/125 µm fiber: 220 m/722 ft.]
[50/125 µm fiber: 550 m/1804 ft.]
Link Budget 7.5 dB
to 1000BASE-SX 850nm multimode (SC)
[62.5/125 µm fiber: 220 m/722 ft.]
[50/125 µm fiber: 550 m/1804 ft.]
Link Budget 7.5 dB

SFMFF1324-220
1000BASE-SX 850nm multimode (SC)
[62.5/125 µm fiber: 220 m/722 ft.]
[50/125 µm fiber: 550 m/1804 ft.]
Link Budget 7.0 dB
to 1000BASE-LX 1310nm Extended MM (62.5/125 µm fiber only) (SC)
[up to 2 km] Link Budget: 7.0 dB

SFMFF1424-220
1000BASE-LX 1310nm SM (SC)
[10km/6.2 mi.] Link Budget: 7.0 dB
to 1000BASE-LX 1310nm Extended MM (62.5/125 µm fiber only) (SC)
[up to 2 km] Link Budget: 7.0 dB

SFMFF1314-220
1000BASE-SX 850nm multimode (SC)
[62.5/125 µm fiber: 220 m/722 ft.]
[50/125 µm fiber: 550 m/1804 ft.]
Link Budget: 7.0 dB
to 1000BASE-LX 1310nm SM (SC)
[10 km/6.2 mi.] Link Budget: 7.0 dB

SFMFF1414-220
1000BASE-LX 1310nm SM (SC)
[10 km/6.2 mi.] Link Budget: 7.0 dB
to 1000BASE-LX 1310nm SM (SC)
[10 km/6.2 mi.] Link Budget: 7.0 dB

SFMFF1315-220
1000BASE-SX 850nm multimode (SC)
[62.5/125 µm fiber: 220 m/722 ft.]
[50/125 µm fiber: 550 m/1804 ft.]
Link Budget: 7.0 dB
to 1000BASE-LX 1310nm SM (SC)
[25 km/15.5 mi.] Link Budget: 15.0 dB

SFMFF1317-220
1000BASE-SX 850nm multimode (SC)
[62.5/125 µm fiber: 220 m/722 ft.]
[50/125 µm fiber: 550 m/1804 ft.]
Link Budget: 7.0 dB
to 1000BASE-LX 1550nm SM (SC)
[65 km/40.4 mi.] Link Budget: 20.0 d

SFMFF1335-220
1000BASE-SX 850nm multimode (SC)
[62.5/125 µm fiber: 220 m/722 ft.]
[50/125 µm fiber: 550 m/1804 ft.]
Link Budget: 7.0 dB
to 1000BASE-LX 1550nm SM (SC)
[125 km/77.7 mi.] Link Budget: 27.0 dB

Single Fiber Products

Recommended use in pairs [pg 25]

SFMFF1329-220
1000BASE-SX 850nm multimode (SC)
[62.5/125 µm fiber: 220 m/722 ft.]
[50/125 µm fiber: 550 m/1804 ft.]
Link Budget: 7.0 dB
to 1000BASE-LX 1310nm TX/1550nm RX single fiber single mode (SC)
[20 km/12.4 mi.] Link Budget: 13.0 dB

SFMFF1329-221
1000BASE-SX 850nm multimode (SC)
[62.5/125 µm fiber: 220 m/722 ft.]
[50/125 µm fiber: 550 m/1804 ft.]
Link Budget: 7.0 dB
to 1000BASE-LX 1550nm TX/1310nm RX single fiber single mode (SC)
[20 km/12.4 mi.] Link Budget: 13.0 dB

SFMFF1329-222
1000BASE-SX 850nm multimode (SC)
[62.5/125 µm fiber: 220 m/722 ft.]
[50/125 µm fiber: 550 m/1804 ft.]
Link Budget: 7.0 dB
to 1000BASE-LX 1310nm TX/1550nm RX single fiber single mode (SC)
[40 km/24.9 mi.] Link Budget: 20.0 dB

SFMFF1329-223
1000BASE-SX 850nm multimode (SC)
[62.5/125 µm fiber: 220 m/722 ft.]
[50/125 µm fiber: 550 m/1804 ft.]
Link Budget: 7.0 dB
to 1000BASE-LX 1550nm TX/1310nm RX single fiber single mode (SC)
[40 km/24.9 mi.] Link Budget: 20.0 dB

SFMFF1429-220
1000BASE-LX 1310nm single mode (SC)
[10km/6.2 mi.] Link Budget: 10.5.0 dB
to 1000BASE-LX 1310nm TX/1550nm RX single fiber single mode (SC)
[20 km/12.4 mi.] Link Budget: 13.0 dB

SFMFF1429-221
1000BASE-LX 1310nm single mode (SC)
[10km/6.2 mi.] Link Budget: 10.5.0 dB
to 1000BASE-LX 1550nm TX/1310nm RX single fiber single mode (SC)
[20 km/12.4 mi.] Link Budget: 13.0 dB

*62.5/125 µm fiber: 220 m/722 ft.
50/125 µm fiber: 550 m/1804 ft.

Optional Accessories *(sold separately)*

Wide Input (24 - 60 VDC) Power Supplies

SPS-2460-PS [pg 55]
Piggy Back Power Supply

SPS-2460-SA [pg 55]
Stand-Alone Power Supply

Mounting Options

E-MCR-05 [pg 53]
12-Slot Media Converter Rack

RMS19-SA4-01 [pg 53]
4-Slot Media Converter Shelf

WMBD [pg 54]
DIN Rail Bracket 5.0" [127 mm]

WMBD-F [pg 54]
DIN Rail Bracket (flat) 3.3" [84 mm]

WMBL [pg 54]
Wall Mount Bracket 4.0" [102 mm]

WMBV [pg 54]
Vertical Wall Mount Bracket 5.0" [127 mm]

stand-alone media converter

Gigabit Ethernet Optical Mode Conversion 1000BASE-SX to 1000BASE-LX

see also: Point System™ Slide-In-Module Gigabit Ethernet Optical Mode Converters [pg 45]

SFMFF13xx-28x

Gigabit Optical Mode Converter with Signal Retiming & Regeneration

Convert 1000BASE-SX ports over to 1000BASE-LX on a port-by-port basis. Used individually or in pairs, this media converter can extend Gigabit Ethernet over single mode fiber up to 125 km. Or cascade two or more converters in a link to achieve even greater distances.

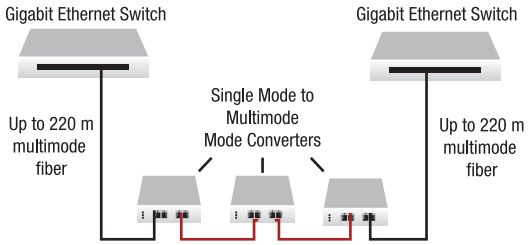
Transition Networks' Gigabit Ethernet optical mode converters now include signal retiming, regeneration & re-amplification to maintain signal integrity and allow for maximum network distance without signal degradation. Distances of hundreds of kilometers are possible when cascading two or more devices in the same link.

- Transition Networks' Gigabit Ethernet optical mode converters now include signal retiming, regeneration and re-amplification to maintain signal integrity and allow for maximum network distance without signal degradation
- Distances of hundreds of kilometers are possible when cascading two or more devices in the same link
- Supports 3R optical signal regeneration
  - Reamplify, Reshape & Retrieve

Features

- Auto-Negotiation [pg 22]
- Link Pass Through [pg 23]
- Pause [pg 23]
- Automatic Link Restoration [pg 24]

Extend Network Distance



Specifications

Complete list of fiber optic connector specifications [pg 116-123]

Standards	IEEE Std. 802.3
Status LEDs	**PWR (Power)**: Lit for normal operation **LKS (Single Mode Fiber Link)**: ON = Fiber Link **LKM (Multimode Fiber Link)**: ON = Fiber Link **ACT (Activity)**: Blinking = data reception on either fiber link
Switches	**Switch 1**: Fiber Auto-Negotiation on/off **Switch 2**: Link Pass Through on/off **Switch 3&4**: Pause configuration determined by combined setting
Dimensions	**Width**: 3.25" [82 mm] **Depth**: 4.8" [120 mm] **Height**: 1.0" [25 mm]
Power	External AC/DC included; 12 VDC, 0.5A; unregulated
Power Consumption	3.5 Watts
Environment	0 – 50°C operating; 5% – 95% humidity non-condensing; 0 – 10,000 ft. altitude
Shipping Weight	2 lbs. [0.90 kg]
Safety Compliance	**Wall Mount Power Supply**: UL Listed and CSA certified
Regulatory Compliance	EN55024; CISPR22/EN55022 Class A; FCC Class A; CE Mark
Warranty	Lifetime

Ordering Information

Complete list of fiber optic connector specifications [pg 116-123]

SFMFF1324-280
1000BASE-SX 850nm multimode (SC)
[220 m/722 ft.]* Link Budget: 7.0 dB
[550 m/1804 ft.]* Link Budget: 7.0 dB
to 1000BASE-LX 1310nm Extended MM (SC) (62.5/125 µm fiber only)
[up to 2 km] Link Budget: 7.0 dB

SFMFF1314-280
1000BASE-SX 850nm multimode (SC)
[220 m/722 ft.]* Link Budget: 7.0 dB
[550 m/1804 ft.]* Link Budget: 7.0 dB
to 1000BASE-LX 1310nm SM (SC)
[10 km/6.2 mi.] Link Budget: 7.0 dB

SFMFF1414-280
1000BASE-LX 1310nm SM (SC)
[10 km/6.2 mi.] Link Budget: 7.0 dB
to 1000BASE-LX 1310nm SM (SC)
[10 km/6.2 mi.] Link Budget: 7.0 dB

SFMFF1315-280
1000BASE-SX 850nm multimode (SC)
[220 m/722 ft.]* Link Budget: 7.0 dB
[550 m/1804 ft.]* Link Budget: 7.0 dB
to 1000BASE-LX 1310nm SM (SC)
[25 km/15.5 mi.] Link Budget: 15.0 dB

SFMFF1317-280
1000BASE-SX 850nm multimode (SC)
[220 m/722 ft.]* Link Budget: 7.0 dB
[550 m/1804 ft.]* Link Budget: 7.0 dB
to 1000BASE-LX 1550nm SM (SC)
[65 km/40.4 mi.] Link Budget: 21.0 dB

SFMFF1335-280
1000BASE-SX 850nm multimode (SC)
[220 m/722 ft.]* Link Budget: 7.0 dB
[550 m/1804 ft.]* Link Budget: 7.0 dB
to 1000BASE-LX 1550nm SM (SC)
[125 km/77.7 mi.] Link Budget: 27.0 dB

Single Fiber Products

Recommended use in pairs [pg 25]

SFMFF1329-280
1000BASE-SX 850nm multimode (SC)
[220 m/722 ft.]* Link Budget: 7.0 dB
[550 m/1804 ft.]* Link Budget: 7.5 dB
to 1000BASE-LX 1310nm TX/1550nm RX single fiber single mode (SC)
[20 km/12.4 mi.] Link Budget: 13.0 dB

SFMFF1329-281
1000BASE-SX 850nm multimode (SC)
[220 m/722 ft.]* Link Budget: 7.0 dB
[550 m/1804 ft.]* Link Budget: 7.0 dB
to 1000BASE-LX 1550nm TX/1310nm RX single fiber SM (SC)
[20 km/12.4 mi.] Link Budget: 13.0 dB

SFMFF1329-282
1000BASE-SX 850nm multimode (SC)
[220 m/722 ft.]* Link Budget: 7.0 dB
[550 m/1804 ft.]* Link Budget: 7.0 dB
to 1000BASE-LX 1310nm TX/1550nm RX single fiber single mode (SC)
[40 km/24.9 mi.] Link Budget: 20.0 dB

SFMFF1329-283
1000BASE-SX 850nm multimode (SC)
[220 m/722 ft.]* Link Budget: 7.0 dB
[550 m/1804 ft.]* Link Budget: 7.0 dB
to 1000BASE-LX 1550nm TX/1310nm RX single fiber single mode (SC)
[40 km/24.9 mi.] Link Budget: 20.0 dB

SFMFF1329-286
1000BASE-SX 850nm multimode (SC)
[220 m/722 ft.]* Link Budget: 7.0 dB
[550 m/1804 ft.]* Link Budget: 7.0 dB
to 1000BASE-LX 1510nm TX/1590nm RX single fiber single mode (SC)
[80 km/49.6 mi.] Link Budget: 24.0 dB

SFMFF1329-287
1000BASE-SX 850nm multimode (SC)
[220 m/722 ft.]* Link Budget: 7.0 dB
[550 m/1804 ft.]* Link Budget: 7.0 dB
to 1000BASE-LX 1590nm TX/1510nm RX single fiber single mode (SC)
[80 km/49.6 mi.] Link Budget: 24.0 dB

*62.5/125 µm fiber: 220 m/722 ft.
50/125 µm fiber: 550 m/1804 ft.

SFMFF4040-100

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

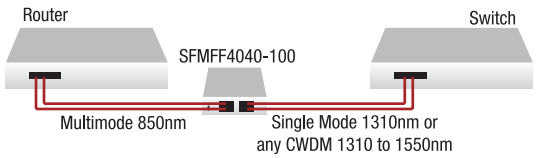
These converters offer an excellent upgrade path for networks. Today's Fast Ethernet applications can be upgraded to Gigabit speeds tomorrow with a simple SFP swap. The converter remains installed, managed and fully operational at any of these speeds.

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.

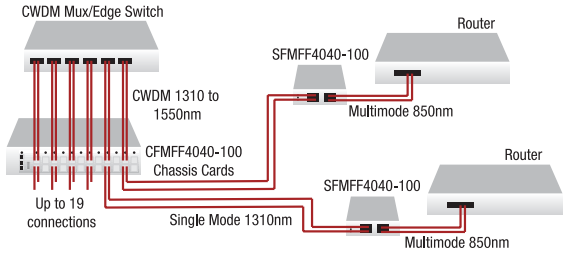
Features

- CWDM and DWDM SFP-ready platform
- Link Pass Through [pg 23]
- Automatic Link Restoration [pg 24]

Enterprise Application



Service Provider Application



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

Ordering Information

SFMFF4040-100
SFP Slot (empty) to SFP Slot (empty)

Optional Accessories *(sold separately)*

SFP Modules [pg 96-104]

Wide Input (24 - 60 VDC) Power Supplies
SPS-2460-PS or SPS-2460-SA [pg 55]

Mounting Options

RMS19-SA4-01 [pg 53]
4-Slot Media Converter Shelf

E-MCR-05 [pg 53]
12-Slot Media Converter Rack

WMBD [pg 54]
DIN Rail Mount Bracket 5.0" [127 mm]

WMBL [pg 54]
Wall Mount Bracket 4.0" [102 mm]

10GBase to 10GBase Optical Line Converter with XFP Slots

see also: Point System™ 10G Slide-In-Module Optical Line Converters [pg 47]

STGFFxxxx-100

10 Gigabit Ethernet Fiber to Fiber Converter

The Transition Networks' 10 Gigabit Ethernet fiber to fiber converter is a two-port 10G pluggable media converter, supporting a variety of XFP and SFP+ modules allowing network designers to utilize the module to meet their network requirements.

The media converter 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.

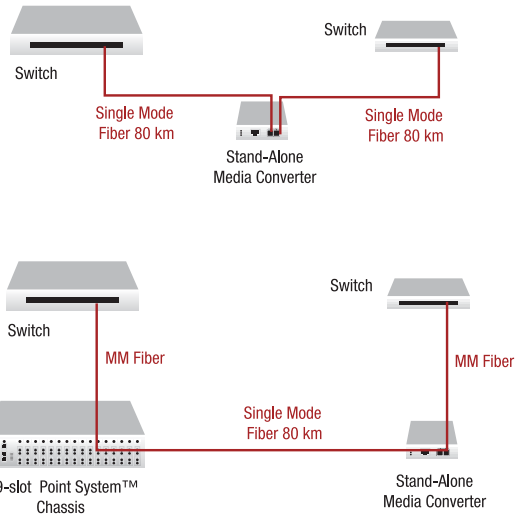
Copper to fiber conversion is also supported with the use of a 10GBase-CX4 XFP module in one of the ports.

This converter 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 23]
- Full-Duplex
- Automatic Link Restoration [pg 24]
- Loopback [pg 24]
- Supports +5V, +3.3V, and +1.8V MSA compliant XFP modules
- Supports 3R (Reamplify, Reshape, and Retime) optical signal regeneration

10 Gigabit Ethernet Fiber to Fiber Converter Application



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+

STGFF4748-100
(2) Port 10GBase-xx open XFP 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 54]
DIN Rail Bracket 5.0" [127 mm]

WMBD-F [pg 54]
DIN Rail Bracket (flat) 3.3" [84 mm]

WMBL [pg 54]
Wall Mount Bracket 4.0" [102 mm]

WMBV [pg 54]
Vertical Wall Mount Bracket 5.0" [127 mm]

Wide Input (24 - 60 VDC) Power Supplies

SPS-2460-SA [pg 55]
Stand-Alone Power Supply

OC12 ATM/SONET/SDH Single Mode to Multimode Fiber

F-SM-MM-06(xx) & SFMFF131x-21x

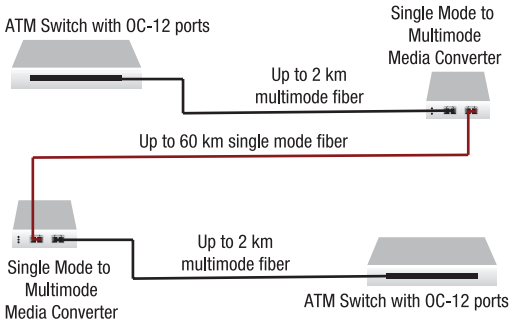
Single Mode to Multimode Optical Mode Converter

- Link Pass Through [pg 23]
- Automatic Link Restoration [pg 24]
- Protocol Transparency
- Extend Network Distance

  Convert multimode 622 Mbps interfaces to single mode fiber on a port-by-port basis and extendATM or SONET over single mode fiber.

Reduce the cost of an ATM/SONET deployment by purchasing ATM/SONET devices with lower cost multimode fiber interfaces and using a media converter to introduce single mode fiber ports only where you need them.

Extend Network Distance



Specifications

Complete list of fiber optic connector specifications [pg 116-123]

Standards	ANSI T1.646, ITU G.957
Status LEDs	**PWR(Power)**: Lit for normal operation **MMF**: Lit for active **SMF**: Lit for active
Dimensions	**Width**: 3.0" [76 mm] **Depth**: 4.7" [119 mm] **Height**: 1.0" [25 mm]
Power	External AC/DC required; 12 VDC. .5A; unregulated; standard
Power Consumption	3.1 Watts
Environment	0 – 50°C, 5% – 90% humidity (non-condensing), 0 – 10,000 ft.
Shipping Weight	2 lbs. [0.90 kg]
Safety Compliance	**Wall Mount Power Supply**: UL Listed and CSA certified
Regulatory Compliance **F-SM-MM-06:**	CE Mark CISPR/EN55022 Class A; FCC Class A
SFMFF131x-21x:	CISPR/EN55022 Class A&B; FCC Class A&B
Warranty	Lifetime

Ordering Information

Complete list of fiber optic connector specifications [pg 116-123]

F-SM-MM-06
622 Mbps fiber optic 1300nm MM (SC)
[2 km/1.2 mi.] Link Budget: 7.0 dB
to 622 Mbps fiber optic 1310nm SM (SC)
[15 km/9.3 mi.] Link Budget: 13.0 dB

F-SM-MM-06(XL)
622 Mbps fiber optic 1300nm MM (SC)
[2 km/1.2 mi.] Link Budget: 7.0 dB
to 622 Mbps fiber optic 1310nm SM (SC)
[40 km/24.9 mi.] Link Budget: 26.0 dB

SFMFF1314-210
622 Mbps fiber optic 1300nm MM (SC)
[2 km/1.2 mi.] Link Budget: 7.0 dB
to 622 Mbps fiber optic 1310nm SM (SC)
[20 km/12.4 mi.] Link Budget: 11.0 dB

SFMFF1316-210
622 Mbps fiber optic 1300nm MM (SC)
[2 km/1.2 mi.] Link Budget: 7.0 dB
to 622 Mbps fiber optic 1310nm SM (SC)
[40 km/24.9 mi.] Link Budget: 25.0 dB

SFMFF1317-210
622 Mbps fiber optic 1300nm MM (SC)
[2 km/1.2 mi.] Link Budget: 7.0 dB
to 622 Mbps 1550nm SM (SC)
[60 km/37.3 mi.] Link Budget: 25.0 dB

SFMFF1329-210
622 Mbps fiber optic 1300nm MM (SC)
[2 km/1.2 mi.] Link Budget: 7.0 dB
to 622 Mbps 1310nm TX/1550nm RX single fiber SM (SC)
[20 km/12.4 mi.] Link Budget: 14.0 dB

SFMFF1329-211
622 Mbps fiber optic 1300nm MM (SC)
[2 km/1.2 mi.] Link Budget: 7.0 dB
to 622 Mbps 1550nm TX/1310nm RX single fiber SM (SC)
[20 km/12.4 mi.] Link Budget: 14.0 dB

Optional Accessories *(sold separately)*

F-SM-MM-06(xx) or SFMFF131x-21x

SPS-2460-SA [pg 55]
Wide Input (24 - 60 VDC) Stand-Alone Power Supply

E-MCR-05 [pg 53]
12-Slot Media Converter Rack

RMS19-SA4-01 [pg 53]
4-Slot Media Converter Shelf

WMBD [pg 54]
DIN Rail Bracket 5.0" [127 mm]

WMBL [pg 54]
Wall Mount Bracket 4.0" [102 mm]

WMBV [pg 54]
Vertical Wall Mount Bracket 5.0" [127 mm]

F-SM-MM-06(xx)

SPS-2460-CC [pg 55]
Wide Input (24 - 60 VDC) Piggy Back Power Supply

WMBD-FS [pg 54]
DIN Rail Bracket (flat, small) 3.1" [79 mm]

SFMFF131x-21x

SPS-2460-PS [pg 55]
Wide Input (24 - 60 VDC) Piggy Back Power Supply

WMBD-F [pg 54]
DIN Rail Bracket (flat) 3.3" [109 mm]

SCSCF30xx-11x

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

The DS3 – T3/E3 & STS-1 copper to fiber network interface device (NID) 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 NID must be used in pairs*. A typical installation will include a chassis card [CCSCF, pg 48] 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 24]
- 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 55]
Piggy Back Power Supply

SPS-2460-SA [pg 55]
Stand-Alone Power Supply

Mounting Options

E-MCR-05 [pg 53]
12-Slot Media Converter Rack

WMBD [pg 54]
DIN Rail Bracket 5.0" [127 mm]

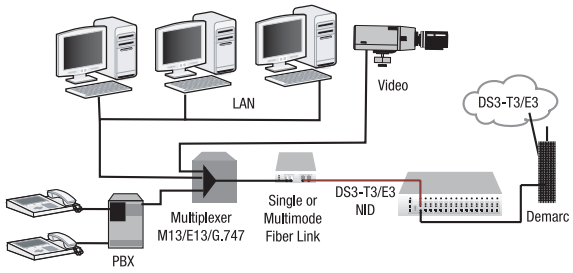
WMBD-F [pg 54]
DIN Rail Bracket (flat) 3.3" [84 mm]

WMBL [pg 54]
Wall Mount Bracket 4.0" [102 mm]

WMBV [pg 54]
Vertical Wall Mount Bracket 5.0" [127 mm]

RMS19-SA4-01 [pg 53]
4-Slot Media Converter Shelf

Integrate Voice & Data on Fiber Network



Specifications

Complete list of fiber optic connector specifications [pg 116-123]

Standards	ANSI, ITU-TS, ETSI, AT&T, G.703, G.921 & G.955
Coax Connectors	75 ohm coax **TX output** min: +2.5 dBm max: +9.1 dBm **RX input** min: -9.7dBm 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

Ordering Information

Complete list of fiber optic connector specifications [pg 116-123]

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 25]

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

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.*

REMOTE MGMT LOOP BACK

T1/E1 Copper to Fiber with Remote In-Band Management

see also: T1/E1 Point System™ Slide-In-Module NID [pg 49, 50]

T1/E1

SSDTFx0xx-12x

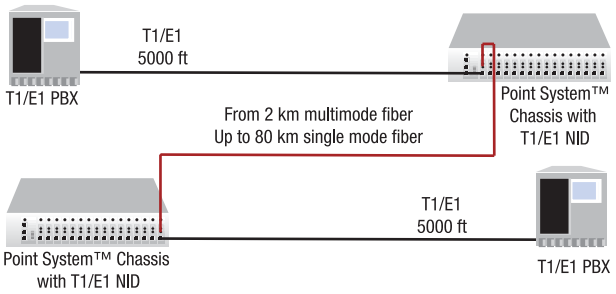
Remotely Managed T1/E1 NID (Network Interface Device)

Features

- Remote unit in-band management [pg 23]
- Local or Remote Loopbacks on copper or fiber in software mode [pg 24]
- Loopback switch facilitates local installation [pg 24]
- 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 converter 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

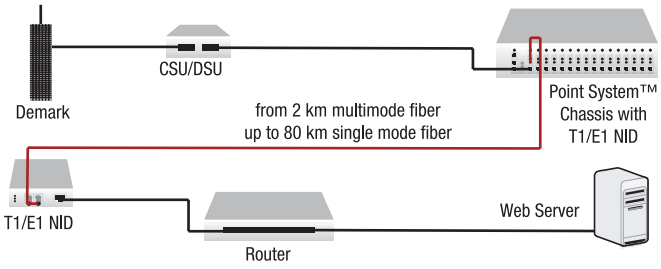
- Remote management in a stand-alone device When used in conjunction with a managed Point System™ chassis, this stand-alone unit can be managed remotely.
- The Remotely Managed T1/E1 copper to fiber media converter will provide a solution for users who desire to extend their T1 or E1 circuits over fiber and remotely manage them “in-band” from admin locations.

Provide Campus Interconnects



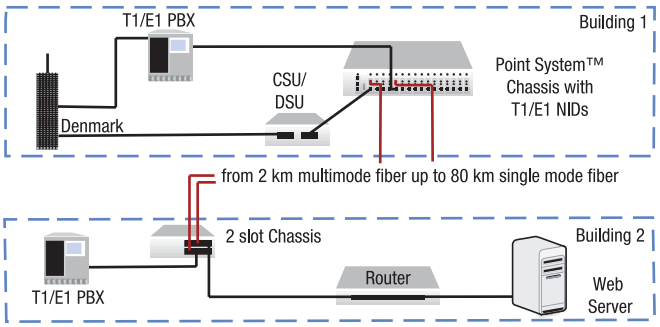
With the exception of Ethernet, T1/E1 is one of the most common campus/ metropolitan area networking interconnects. A copper to fiber conversion on the premise side of the T1/E1 makes it easier to integrate voice traffic, frame relay or IP type traffic on your fiber network.

Remote Management



Stand-alone can be managed remotely when used with a managed chassis.

Extend T1/E1 Networks



Extend T1/E1 to other buildings in a campus or MAN from 2 km to 80 km for voice or data applications.

See next page for Ordering Information

T1/E1 Copper to Fiber with Remote In-Band Management

see also: T1/E1 Point System™ Slide-In-Module NID [pg 49, 50]

Ordering Information

Complete list of fiber optic connector specifications [pg 116-123]

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 25]

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

Specifications

Complete list of fiber optic connector specifications [pg 116-123]

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 49-50] installed in the Point System™ locally and a stand-alone device installed at the remote location.

Optional Accessories *(sold separately)*

Wide Input (18 – 72 VDC) Power Supplies

SPS-24602-PS [pg 55]
Piggy Back Power Supply

SPS-2460-SA [pg 55]
Stand-Alone Power Supply

Mounting Options

E-MCR-05 [pg 53]
12-Slot Media Converter Rack

RMS19-SA4-01 [pg 53]
4-Slot Media Converter Shelf

WMBD [pg 54]
DIN Rail Bracket 5.0" [127 mm]

WMBD-F [pg 54]
DIN Rail Bracket (flat) 3.3" [84 mm]

WMBL [pg 54]
Wall Mount Bracket 4.0" [102 mm]

WMBV [pg 54]
Vertical Wall Mount Bracket 5.0" [127 mm]

stand-alone network interface device

4x T1/E1/J1 to Fiber Transport Mux

see also: 4x T1 Transport Mux Point System™ Slide-In-Module NID [pg 51]

S4TEF10xx-10x

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

- Low cost transport capability: (4) T1/E1/J1 and (1) RS232 data channel line
- Target applications of the device include: FTTx, such as Fiber-to-the-Busi ness, Fiber-to-the-Building, Fiber-to-the-MDU and Fiber-to-the-Home; Cell Tower Backhaul
- Automatic Link Restoration [pg 24]
- Remote Management [pg 23]

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.

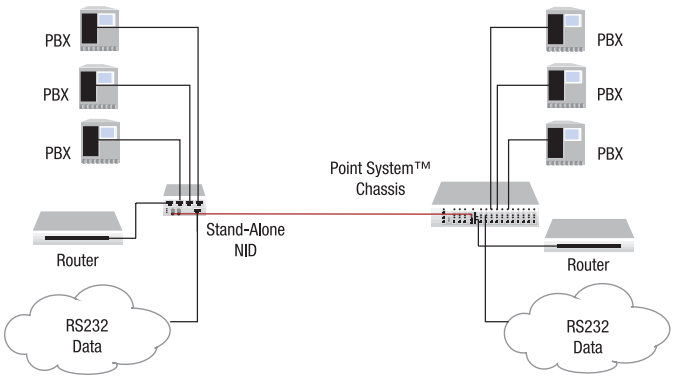
Copper connections are compatible with G.703 and AMI/B8ZS/HDB3; while the optical connection will run at 155 Mbps. A hardware-based solution guarantees the constant bit rate of TDM transport without requiring traffic management.

Features

- Local and Remote Loopback [pg 24]
- AIS/TAOS
- LEDs for each data port
- DIP switches for line code, line length, local loopback or remote loopback [pg 24]
- T1/E1/J1 mode settings
- Dry Relay Contacts on each TDM port
- Local (AUX) Management Interface (RS232 connector)
- Switch selection for Data or Management mode on RS232 interface
- Access to complete status information on local and remote device
- Access to local and remote configuration
- Switch or SNMP selected Baud rate operation
- Field Upgradeable Firmware [pg 24]

Devices must be used in pairs. Typically installation will include a chassis card [C4TEF, pg 51] installed in the Point System™ locally and a stand-alone device installed at the remote location.

Application



Specifications

Complete list of fiber optic connector specifications [pg 116-123]

Standards	AMI/B8ZS/HDB3; G.703; Telecordia TR-NWT-001089: FCC Part 68, UL1459; ITU-T, ANSI, AT&T, ETSI; TBR 12; PD 7024: 1994 (NTR 4)
Switches buildout,	Numerous switch settings for line coding, line loopback (per port), AIS setting, data/mgmt RS-232 and RS-232 port speed and parity
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	6.0 Watts
Operating Temperature	0 – 50°C
Storage Temperature	-40°C – 85°C
Altitude	0 – 10,000 ft.
Operating Humidity	5% – 95% (non-condensing)
Shipping Weight	2 lbs. [0.90 kg]
Safety Compliance	**Wall Mount Power Supply**: UL listed and CSA certified
Regulatory Compliance	FCC Class A, VCCI Class A, CISPR/EN55022 Class A, ICES-003, CE Mark
Warranty	Lifetime

Ordering Information

Complete list of fiber optic connector specifications [pg 116-123]

S4TEF1011-100
1300nm multimode (ST)
[2 km/1.2 mi.] Link Budget: 11.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**
plus 6-pin DIN **[3 m/10 ft.]**

S4TEF1013-100
1300nm multimode (SC)
[2 km/1.2 mi.] Link Budget: 11.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**
plus 6-pin DIN **[3 m/10 ft.]**

S4TEF1014-100
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 6-pin DIN **[3 m/10 ft.]**

S4TEF1015-100
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 6-pin DIN **[3 m/10 ft.]**

S4TEF1016-100
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 6-pin DIN **[3 m/10 ft.]**

S4TEF1017-100
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 6-pin DIN **[3 m/10 ft.]**

S4TEF1035-100
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 6-pin DIN **[3 m/10 ft.]**

Single Fiber Products

Recommended use in pairs [pg 25]

S4TEF1029-100
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.]**
plus 6-pin DIN **[3 m/10 ft.]**

S4TEF1029-101
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.]**
plus 6-pin DIN **[3 m/10 ft.]**

S4TEF1029-102
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.]**
plus 6-pin DIN **[3 m/10 ft.]**

S4TEF1029-103
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.]**
plus 6-pin DIN **[3 m/10 ft.]**

Optional Accessories *(sold separately)*

Wide Input (24 - 60 VDC) Power Supplies

SPS-2460-SA [pg 55]
Stand-Alone Power Supply

Mounting Options

WMBD [pg 54]
DIN Rail Bracket 5.0" [127 mm]

WMBD-F [pg 54]
DIN Rail Bracket (flat) 3.3" [84 mm]

WMBL [pg 54]
Wall Mount Bracket 4.0" [102 mm]

WMBV [pg 54]
Vertical Wall Mount Bracket 5.0" [127 mm]

*Note: RS-232 cable included with each unit (6-pin DIN to dB-9)

4x T1/E1/J1 to Fiber Transport Mux

see also: 4x T1 Transport Mux Point System™ Slide-In-Module NID [pg 51]

S4TEF10xx-10x

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

Features

- Local and Remote Loopback [pg 24]
- AIS/TAOS
- LEDs for each data port
- DIP switches for line code, line length, local loopback or remote loopback [pg 24]
- T1/E1/J1 mode settings
- Dry Relay Contacts on each TDM port
- Local (AUX) Management Interface (RS232 connector)
- Switch selection for Data or Management mode on RS232 interface
- Access to complete status information on local and remote device
- Access to local and remote configuration
- Switch or SNMP selected Baud rate operation
- Field Upgradeable Firmware [pg 24]

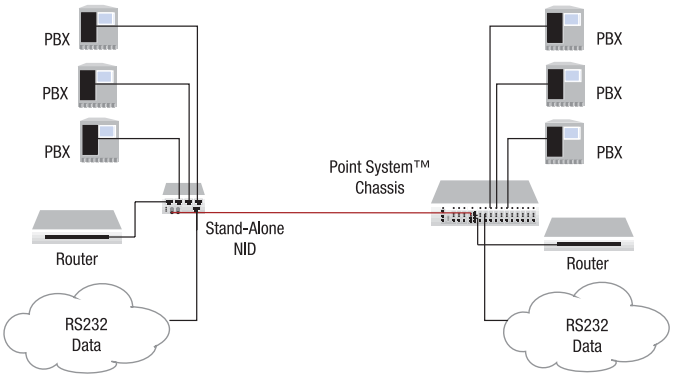
Devices must be used in pairs. Typically installation will include a chassis card [C4TEF, pg 51] installed in the Point System™ locally and a stand-alone device installed at the remote location.

- Low cost transport capability: (4) T1/E1/J1 and (1) RS232 data channel line
- Target applications of the device include: FTTx, such as Fiber-to-the-Busi ness, Fiber-to-the-Building, Fiber-to-the-MDU and Fiber-to-the-Home; Cell Tower Backhaul
- Automatic Link Restoration [pg 24]
- Remote Management [pg 23]

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.

Application



Specifications

Complete list of fiber optic connector specifications [pg 116-123]

Standards	AMI/B8ZS/HDB3; G.703; Telecordia TR-NWT-001089: FCC Part 68, UL1459; ITU-T, ANSI, AT&T, ETSI; TBR 12; PD 7024: 1994 (NTR 4)
Switches buildout,	Numerous switch settings for line coding, line loopback (per port), AIS setting, data/mgmt RS-232 and RS-232 port speed and parity
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	6.0 Watts
Operating Temperature	-20°C – 65°C
Storage Temperature	-40°C – 85°C
Altitude	0 – 10,000 ft.
Operating Humidity	5% – 95% (non-condensing)
Shipping Weight	2 lbs. [0.90 kg]
Safety Compliance	**Wall Mount Power Supply**: UL listed and CSA certified
Regulatory Compliance	FCC Class A, VCCI Class A, CISPR/EN55022 Class A, ICES-003, CE Mark
Warranty	Lifetime

Ordering Information

Complete list of fiber optic connector specifications [pg 116-123]

S4TEF1011-105
1300nm multimode (ST)
[2 km/1.2 mi.] Link Budget: 11.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**
plus 6-pin DIN **[3 m/10 ft.]**

S4TEF1013-105
1300nm multimode (SC)
[2 km/1.2 mi.] Link Budget: 11.0 dB
to (4) RJ-48 **[1.5 km/0.9 mi.]**
plus 6-pin DIN **[3 m/10 ft.]**

S4TEF1014-105
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 6-pin DIN **[3 m/10 ft.]**

S4TEF1015-105
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 6-pin DIN **[3 m/10 ft.]**

S4TEF1016-105
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 6-pin DIN **[3 m/10 ft.]**

S4TEF1017-105
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 6-pin DIN **[3 m/10 ft.]**

Single Fiber Products

Recommended use in pairs [pg 25]

S4TEF1029-105
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.]**
plus 6-pin DIN **[3 m/10 ft.]**

S4TEF1029-106
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.]**
plus 6-pin DIN **[3 m/10 ft.]**

Optional Accessories *(sold separately)*

Wide Input (24 - 60 VDC) Power Supplies

SPS-2460-SA [pg 55]
Stand-Alone Power Supply

Mounting Options

WMBD [pg 54]
DIN Rail Bracket 5.0" [127 mm]

WMBD-F [pg 54]
DIN Rail Bracket (flat) 3.3" [84 mm]

WMBL [pg 54]
Wall Mount Bracket 4.0" [102 mm]

WMBV [pg 54]
Vertical Wall Mount Bracket 5.0" [127 mm]

*Note: RS-232 cable included with each unit (6-pin DIN to dB-9)

AUTO NEG | AUTO CROSS | TRANSPARENT LINK PASS THRU | AUTO LINK RESTORE | PAUSE | REMOTE MGMT | LOOP BACK | FIELD UPGRADEABLE FIRMWARE | SINGLE FIBER

4x T1/E1/J1 + 10/100 Ethernet to Fiber

see also: 4x T1 Transport Mux Point System™ Slide-In-Module NID [pg 52]

S4TEF10xx-11x

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

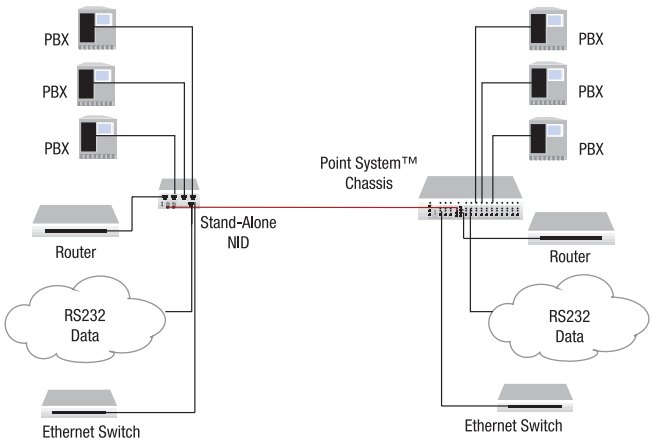
- Low cost transport capability: (4) T1/E1/J1; (1) Ethernet and (1) RS232 data channel line
- Target applications include: FTTx, such as Fiber-to-the-Business, Fiber-to-the-Building, Fiber-to-the-MDU and Fiber-to-the-Home.

Features

- Auto-Negotiation for 10/100BASE-TX [pg 22]
- AutoCross™ (auto MDI/MDI-X) [pg 22]
- Transparent Link Pass Through for Ethernet [pg 23]
- Automatic Link Restoration [pg 24]
- Pause (Flow Control) [pg 23]
- Remote Management [pg 23]
- Local and Remote Loopback [pg 24]
- Remote Fiber Loss Signaling
- AIS/TAOS
- LEDs for each data port
- DIP switches for line code, line length, local loopback or remote loopback [pg 24]
- T1/E1/J1 mode settings
- Dry Relay Contacts on each TDM port
- Local (AUX) Management Interface (RS232 connector)
- Switch selection for Data or Management mode on RS232 interface
- Access to complete status information on local and remote device
- Access to local and remote configuration
- Switch or SNMP selected Baud rate operation
- Field Upgradeable Firmware [pg 24]

These products offer a low cost transport capability for four T1/E1/J1, one Ethernet and one data channel line (x4TEF10XX-11X). The offering will provide copper connections compatible with G.703, AMI/B8ZS/HDB3, 10/100BASE-TX, as well as RS232 channel; 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.

Application



Specifications

Complete list of fiber optic connector specifications [pg 116-123]

Standards	IEEE Std. 802.3 2003; Telecordia TR-NWT-001089: FCC Part 68, UL1459; ITU-T, ANSI, AT&T, ETSI; TBR 12; PD 7024: 1994 (NTR 4); AMI/B8ZS/HDB3; G.703
Switches	Numerous switch settings for line coding, line buildout, loopback (per port), AIS setting, data/mgmt RS-232 and RS-232 port speed and parity
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	6.0 Watts
Operating Temperature	0 – 50°C
Storage Temperature	-40°C – 85°C
Altitude	0 – 10,000 ft.
Operating Humidity	5% – 95% (non-condensing)
Shipping Weight	2 lbs. [0.90 kg]
Safety Compliance	**Wall Mount Power Supply**: UL listed, and CSA certified
Regulatory Compliance	FCC Class A, VCCI Class A, CISPR/EN55022 Class A, ICES-003, CE Mark
Warranty	Lifetime

Devices must be used in pairs. Typically installation will include a chassis card [C4TEF, pg 52] installed in the Point System™ locally and a stand-alone device installed at the remote location.

Ordering Information

S4TEF1011-110
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) **[100 m]**
plus 6-pin DIN **[3 m/10 ft.]**

S4TEF1013-110
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) **[100 m]**
plus 6-pin DIN **[3 m/10 ft.]**

S4TEF1014-110
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]**
plus 6-pin DIN **[3 m/10 ft.]**

S4TEF1015-110
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]**
plus 6-pin DIN **[3 m/10 ft.]**

S4TEF1016-110
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]**
plus 6-pin DIN **[3 m/10 ft.]**

S4TEF1017-110
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]**
plus 6-pin DIN **[3 m/10 ft.]**

S4TEF1035-110
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]**
plus 6-pin DIN **[3 m/10 ft.]**

Single Fiber Products [pg 25]

S4TEF1029-110
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]**
plus 6-pin DIN **[3 m/10 ft.]**

S4TEF1029-111
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]**
plus 6-pin DIN **[3 m/10 ft.]**

S4TEF1029-112
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]**
plus 6-pin DIN **[3 m/10 ft.]**

S4TEF1029-113
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]**
plus 6-pin DIN **[3 m/10 ft.]**

Optional Accessories *(sold separately)*

Wide Input (24 - 60 VDC) Power Supplies

SPS-2460-SA [pg 55]
Stand-Alone Power Supply

Mounting Options

WMBD [pg 54]
DIN Rail Bracket 5.0" [127 mm]

WMBD-F [pg 54]
DIN Rail Bracket (flat) 3.3" [84 mm]

WMBL [pg 54]
Wall Mount Bracket 4.0" [102 mm]

WMBV [pg 54]
Vertical Wall Mount Bracket 5.0" [127 mm]

*Note: RS-232 cable included with each unit (6-pin DIN to dB-9)

AUTO NEG | AUTO CROSS | TRANSPARENT LINK PASS THRU | AUTO LINK RESTORE | PAUSE | REMOTE MGMT | LOOP BACK | FIELD UPGRADEABLE FIRMWARE | SINGLE FIBER

4x T1/E1/J1 + 10/100 Ethernet to Fiber

see also: 4x T1 Transport Mux Point System™ Slide-In-Module NID [pg 52]

S4TEF10xx-11x

Extended Temperature
4x T1/E1/J1 + 10/100 Ethernet Transport Mux

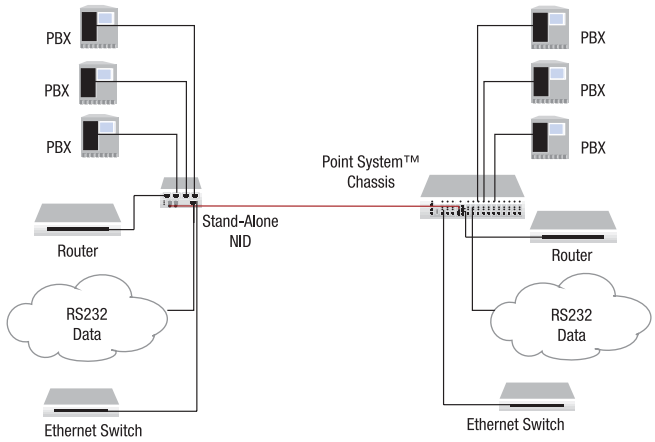
- Low cost transport capability: (4) T1/E1/J1; (1) Ethernet and (1) RS232 data channel line
- Target applications include: FTTx, such as Fiber-to-the-Business, Fiber-to-the-Building, Fiber-to-the-MDU and Fiber-to-the-Home.

Features

- Auto-Negotiation for 10/100BASE-TX [pg 22]
- AutoCross™ (auto MDI/MDI-X) [pg 22]
- Transparent Link Pass Through for Ethernet [pg 23]
- Automatic Link Restoration [pg 24]
- Pause (Flow Control) [pg 23]
- Remote Management [pg 23]
- Local and Remote Loopback [pg 24]
- Remote Fiber Loss Signaling
- AIS/TAOS
- LEDs for each data port
- DIP switches for line code, line length, local loopback or remote loopback [pg 24]
- T1/E1/J1 mode settings
- Dry Relay Contacts on each TDM port
- Local (AUX) Management Interface (RS232 connector)
- Switch selection for Data or Management mode on RS232 interface
- Access to complete status information on local and remote device
- Access to local and remote configuration
- Switch or SNMP selected Baud rate operation
- Field Upgradeable Firmware [pg 24]

These products offer a low cost transport capability for four T1/E1/J1, one Ethernet and one data channel line (x4TEF10XX-11X). The offering will provide copper connections compatible with G.703, AMI/B8ZS/HDB3, 10/100BASE-TX, as well as RS232 channel; 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.

Application



Specifications

Standards	IEEE Std. 802.3 2003; Telecordia TR-NWT-001089: FCC Part 68, UL1459; ITU-T, ANSI, AT&T, ETSI; TBR 12; PD 7024: 1994 (NTR 4); AMI/B8ZS/HDB3; G.703
Switches	Numerous switch settings for line coding, line buildout, loopback (per port), AIS setting, data/mgmt RS-232 and RS-232 port speed and parity
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	6.0 Watts
Operating Temperature	0 – 50°C
Storage Temperature	-20°C – 65°C
Altitude	0 – 10,000 ft.
Operating Humidity	5% – 95% (non-condensing)
Shipping Weight	2 lbs. [0.90 kg]
Safety Compliance	**Wall Mount Power Supply**: UL listed, and CSA certified
Regulatory Compliance	FCC Class A, VCCI Class A, CISPR/EN55022 Class A, ICES-003, CE Mark
Warranty	Lifetime

Devices must be used in pairs. Typically installation will include a chassis card [C4TEF, pg 52] 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 116-123]

S4TEF1011-115
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]**
plus 6-pin DIN **[3 m/10 ft.]**

S4TEF1013-115
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]**
plus 6-pin DIN **[3 m/10 ft.]**

S4TEF1014-115
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]**
plus 6-pin DIN **[3 m/10 ft.]**

S4TEF1015-115
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]**
plus 6-pin DIN **[3 m/10 ft.]**

S4TEF1016-115
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]**
plus 6-pin DIN **[3 m/10 ft.]**

S4TEF1017-115
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]**
plus 6-pin DIN **[3 m/10 ft.]**

Single Fiber Products [pg 25]

S4TEF1029-115
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]**
plus 6-pin DIN **[3 m/10 ft.]**

S4TEF1029-116
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]**
plus 6-pin DIN **[3 m/10 ft.]**

Optional Accessories *(sold separately)*

Wide Input (24 - 60 VDC) Power Supplies
SPS-2460-SA [pg 55]
Stand-Alone Power Supply

Mounting Options
WMBD [pg 54]
DIN Rail Bracket 5.0" [127 mm]
WMBD-F [pg 54]
DIN Rail Bracket (flat) 3.3" [84 mm]
WMBL [pg 54]
Wall Mount Bracket 4.0" [102 mm]
WMBV [pg 54]
Vertical Wall Mount Bracket 5.0" [127 mm]

*Note: RS-232 cable included with each unit (6-pin DIN to dB-9)

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.

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

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 138]
ION Power Supply Module, Universal Input 100 – 240 VAC

IONPS-D[pg 139]
-48 VDC Power Supply Module

IONMM [pg 139]
ION Management Module

IONFP
ION Face Plate (required for all empty slots)

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 & v2

(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

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.

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:** 10.0" [254 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

Ordering Information

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

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

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 faceplate, 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)*

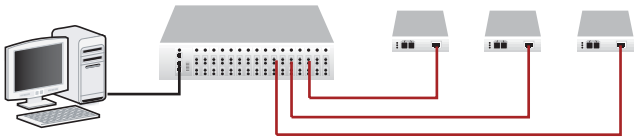
IONDCR
Dry contact relay module

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 23] allows for faster mean-time-to-repair (MTTR) by proactively receiving traps and alerts on potential issues. With les downtime you are able to focus on revenue generating aspects of your business.



Network Management Station

Complete Visibility and Control
Remote Configuration
Remote Monitoring
Remote Fault Detection & Resolution

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& v2
  (v3 via future firmware upgrade)
- ☑ 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

Part Number Key Chassis Cards

1 2 3 4 5 — 6 7 8 9 — 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: Fast Ethernet 100BASE-TX to 100BASE-FX Stand-Alone Media Converters [pg 85]

C2110 Series

Fast Ethernet Media Converter 100BASE-TX to 100BASE-FX

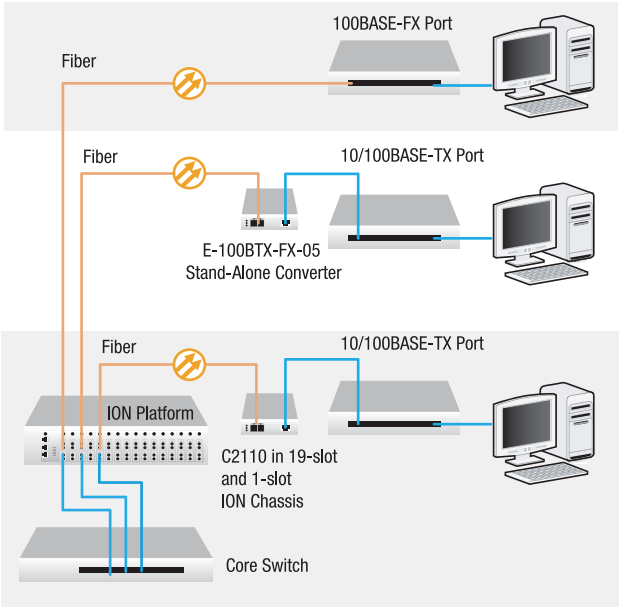
Features

- Auto-Negotiation of speed and duplex on TP port [pg 22]
- AutoCross™ on TP port [pg 22]
- Link Pass Through (LPT) fault monitoring [pg 23]
- Far-End-Fault (FEF) detection [pg 22]
- Automatic Link Restoration [pg 24]
- Pause advertisement [pg 23]
- Field Upgradeable Firmware [pg18]
- Can be used in any ION Platform Chassis
- Standards based, will link with any standard 100Base-TX and any standard 100Base-FX ports

The following manageable features are available when used in an ION chassis along with an ION Management Module

- Report converter status to chassis management software:
  - TP and Fiber Link Status
  - Hardware switch settings
  - Fault condition
  - TP cable length
- Write operation includes:
  - Power on/off device
  - Auto-Negotiation enable/disable [pg 22]
  - Pause enable/disable [pg 23]
  - LPT enable/disable [pg 23]
  - FEF enable/disable [pg 22]
  - AutoCross enable/disable [pg 22]

Fiber Integration in 10/100 Copper Environments



The ION C2110 device provides an interface between 100Base-TX ports and 100Base-FX ports allowing users to integrated fiber optic cabling into 100Base-TX copper environments.

Specifications

Complete list of fiber optic connector specifications [pg 116-123]

Standards	IEEE Std. 802.3
Data Rate	100 Mbps, Layer-1
Switches	**SW1**: Auto-Negotiation (UP = enabled) **SW2:** Pause (UP=enabled) **SW3:** Link Pass Through (UP = enabled) **SW4:** Far-End-Fault (UP = enabled)
Internal Jumpers	AutoCross™: Enable/Disable
Hardware/Software Jumpers	**Hardware:** Mode of operation is determined by the settings on the 4-position switch **Software:** Mode of operation is determined by the most recently saved on-board microprocessor settings
Status LEDs	**PWR (Power)**: ON = Connection to powered backplane **LKC (Copper Link)**: ON = Copper Link **RXC (Receive Copper)**: Blinking = Data recieved on Copper link **LKF (Fiber Link)**: ON = Fiber Link **RXF (Receive Fiber)**: Blinking = Data received on Fiber Link
Dimensions	**Width:** 0.86" [22 mm] **Depth:** 6.5" [165 mm] **Height:** 3.4" [86 mm]
Power Consumption	2.5 Watts, 200 mA @ 13.9 VDC
Environment	See chassis specifications
Shipping Weight	1 lb. [.45 kg]
Regulatory Compliance	CISPR/EN55022 Class A, FCC Class A, CE Mark
Warranty	Lifetime

Ordering Information

Complete list of fiber optic connector specifications [pg 116-123]

C2110-1011
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1300nm MM (ST)
[2 km/1.2 mi.] Link Budget: 11.0 dB

C2110-1013
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1300nm MM (SC)
[2 km/1.2 mi.] Link Budget: 11.0 dB

C2110-1039
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1300nm MM (LC)
[2 km/1.2 mi.] Link Budget: 11.0 dB

C2110-1014
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1300nm SM (SC)
[20 km/12.4 mi.] Link Budget: 16.0 dB

C2110-1019
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1300nm SM (LC)
[20 km/12.4 mi.] Link Budget: 17.3 dB

C2110-1015
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1300nm SM (SC)
[40 km/24.9 mi.] Link Budget: 29.0 dB

C2110-1016
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1300nm SM (SC)
[60 km/32.3 mi.] Link Budget: 29.0 dB

C2110-1017
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1550nm SM (SC)
[80 km/49.7 mi.] Link Budget: 29.0 dB

C2110-1035
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1550nm SM (SC)
[120 km/77.5 mi.] Link Budget: 36.0 dB

C2110-1040
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100Base-X SFP Slot (empty)

Single Fiber Products

Recommended use in pairs [pg 25]

C2110-1029-A1
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1310nm TX/1550nm RX single fiber single mode (SC)
[20 km/12.4 mi.] Link Budget: 19.0 dB

C2110-1029-A2
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1550nm TX/1310nm RX single fiber single mode (SC)
[20 km/12.4 mi.] Link Budget: 19.0 dB

C2110-1029-B1
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1310nm TX/1550nm RX single fiber single mode (SC)
[40 km/24.9 mi.] Link Budget: 25.0 dB

C2110-1029-B2
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1550nm TX/1310nm RX single fiber single mode (SC)
[40 km/24.9 mi.] Link Budget: 25.0 dB

see also: 10/100Base-TX to 100Base-FX Stand-Alone Media Converters [pg 86]

Fast Ethernet

C2210 Series

Fast Ethernet Media Converter 10/100BASE-TX to 100BASE-FX

The ION C2210 device provides an interface between 10/100Base-TX ports and 100Base-FX ports allowing users to integrated fiber optic cabling into 10/100Base-TX copper environments.

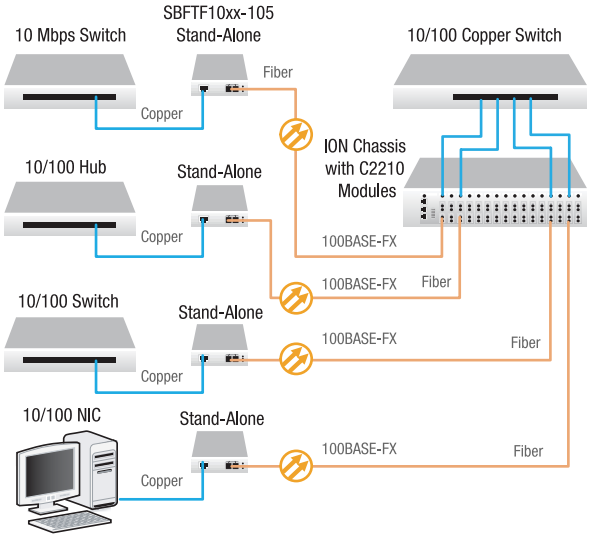
Features

- Auto-Negotiation of speed and duplex on TP port [pg 22]
- AutoCross™ on TP port [pg 22]
- Link Pass Through (LPT) fault monitoring [pg 23]
- Far-End-Fault (FEF) detection [pg 22]
- Pause (Software Controlled) [pg 23]
- Automatic Link Restoration [pg 24]
- Field Upgradeable Firmware [pg 24]
- Can be used in any ION Platform Chassis
- Standards based, will link with any standard 10/100Base-TX and any standard 100Base-FX ports

The following manageable features are available when used in an ION Platform chassis along with an ION Management Module.

- Report converter status to chassis management software:
  - TP and Fiber Link Status
  - Hardware switch settings
  - Copper Port Speed
  - TP and Fiber Port Duplex
  - Fault condition
- Write operation includes:
  - Power on/off device
  - Auto-Negotiation enable/disable [pg 22]
  - Force 10 Mbps or 100 Mbps
  - Force half or full duplex
  - Select advertising modes when Auto-Negotiation is enabled
  - LPT enable/disable
  - FEF enable/disable
  - Pause enable/disable [pg 23]
  - AutoCross™ enable/disable [pg 22]

Fiber Integration



Specifications

Complete list of fiber optic connector specifications [pg 116-123]

Standards	IEEE Std. 802.3
Data Rate	10 Mbps; 100 Mbps Layer-2
Max Frame Size	2048 bytes
Frame Buffer Memory	512 Kbits
MAC Address Table	1K
Switches	**SW1:** Auto-Negotiation (UP = enabled) **SW2:** Forced 100 Mbps/10 Mbps with Auto-Neg. off (UP = 100 Mbps) **SW3:** Forced Full/Half Duplex with Auto-Neg. off (UP = Full) **SW4:** Full/Half Duplex on fiber port (UP = Full) **SW5:** AutoCross™ on UTP (UP = enabled) **SW6:** Link Pass Through (UP = enabled)
Internal Jumpers	AutoCross™: Enable/Disable
Hardware/Software Jumpers	**Hardware:** Mode of operation is determined by the settings on the 4-position switch **Software:** Mode of operation is determined by the most recently saved on-board microprocessor settings
Status LEDs	**FD (Fiber Duplex):** ON= Full-duplex on fiber **LACT (Fiber Link/Activity):** ON = Fiber Link **PWR (Power):** ON = Connection to powered backplane **(TP. Duplex/Link):** Yellow = Half duplex, Green = Full Duplex (TP. Speed): Yellow = 10 Mbps, Green = 100 Mbps
Dimensions	**W:** 0.86" [22 mm]; **D:** 6.5" [165 mm]; **H:** 3.4" [8 6 mm]
Power Consumption	2.5 Watts, 200 mA @ 13.9 VDC
Environment	See chassis specifications
Shipping Weight	1 lb. [.45 kg]
Regulatory Compliance	CISPR/EN55022 Class A, FCC Class A, CE Mark, EN55024
Warranty	Lifetime

Ordering Information

Complete list of fiber optic connector specifications [pg 116-123]

C2210-1011
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**

C2210-1013
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**

C2210-1039
10/100BASE-TX (RJ-45) **[100 m/328 ft.]** to 100BASE-FX 1300nm MM (LC) **[2 km/1.2 mi.] Link Budget: 11.0 dB**

C2210-1014
10/100BASE-TX (RJ-45) **[100 m/328 ft.]** to 100BASE-FX 1300nm SM (SC) **[20 km/12.4 mi.] Link Budget: 16.0 dB**

C2210-1019
10/100BASE-TX (RJ-45) **[100 m/328 ft.]** to 100BASE-FX 1300nm SM (LC) **[20 km/12.4 mi.] Link Budget: 17.3 dB**

C2210-1015
10/100BASE-TX (RJ-45) **[100 m/328 ft.]** to 100BASE-FX 1300nm SM (SC) **[40 km/24.9 mi.] Link Budget: 29.0 dB**

C2210-1016
10/100BASE-TX (RJ-45) **[100 m/328 ft.]** to 100BASE-FX 1300nm SM (SC) **[60 km/32.3 mi.] Link Budget: 32.0 dB**

C2210-1017
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**

C2210-1035
10/100BASE-TX (RJ-45) **[100 m/328 ft.]** to 100BASE-FX 1550nm SM (SC) **[120 km/77.5 mi.] Link Budget: 36.0 dB**

C2210-1040
10/100BASE-TX (RJ-45) **[100 m/328 ft.]** to 100Base-X SFP Slot (empty)

Single Fiber Products

Recommended use in pairs [pg 25]

C2210-1029-A1
10/100BASE-TX (RJ-45) **[100 m/328 ft.]** to 100BASE-FX 1310nm TX/1550nm RX single fiber single mode (SC) **[20 km/12.4 mi.] Link Budget: 19.0 dB**

C2210-1029-A2
10/100BASE-TX (RJ-45) **[100 m/328 ft.]** to 100BASE-FX 1550nm TX/1310nm RX single fiber single mode (SC) **[20 km/12.4 mi.] Link Budget: 19.0 dB**

C2210-1029-B1
10/100BASE-TX (RJ-45) **[100 m/328 ft.]** to 100BASE-FX 1310nm TX/1550nm RX single fiber single mode (SC) **[40 km/24.9 mi.] Link Budget: 25.0 dB**

C2210-1029-B2
10/100BASE-TX (RJ-45) **[100 m/328 ft.]** to 100BASE-FX 1550nm TX/1310nm RX single fiber single mode (SC) **[40 km/24.9 mi.] Link Budget: 25.0 dB**

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

C2220 Series

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

10/100BASE-TX to 100BASE-FX Fast Ethernet

see also: 10/100Base-TX to 100Base-FX Stand-Alone NIDs [pg 87]

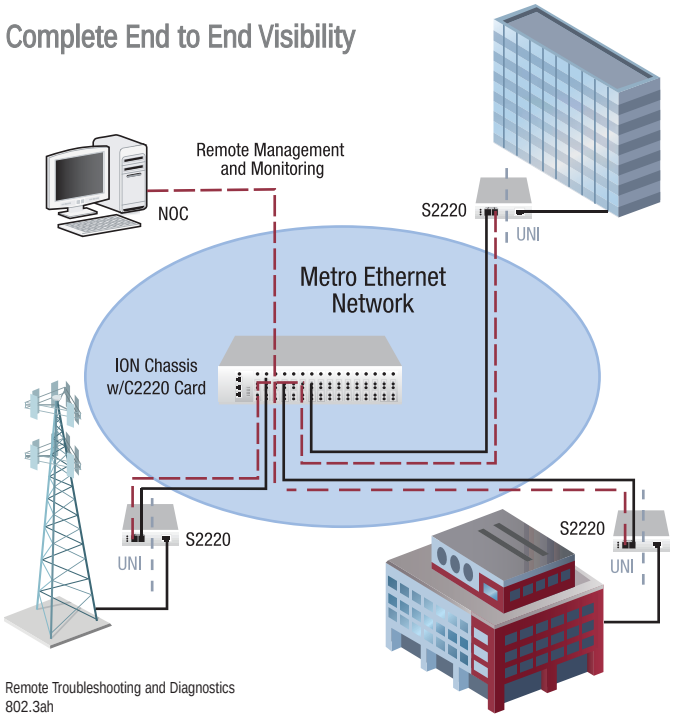
Features

- 802.3ah Link OAM
- 10K Jumbo Frame Support
- Two selectable Remote Management modes [pg 23]
  - IP-Based Remote Management
  - In-Band (remote device managed by local peer)
- AutoCross™ [pg 22]
- Auto-Negotiation [pg 22]
- Pause [pg 23]
- Transparent Link Pass Through [pg 23]
- Far-End-Fault [pg 22]
- Remote Loopback [pg 24]
- Field Upgradeable Firmware [pg 24]
- IEEE 802.1p q VLAN and double VLAN tagging with 4096 VIDs
- DHCP client
- SNTP
- TFTP
- IEEE 802.1x
- RADIUS client
- RMON counters for each port
- Bandwidth profiling [pg 24]
- DMI Optical Management
- Cable diagnostic function for copper ports
- SSH
- Telnet
- Command Line Interface (CLI)
- Web management
- Focal Point management
- SNMP v1 & v2c
- 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

Complete End to End Visibility



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

Specifications

Complete list of fiber optic connector specifications [pg 116-123]

Standards	IEEE Std. 802.3, IEE std. 802.3ah, IEE Std. 802.1P, IEEE std. 802.1Q, IEEE Std. 802.1X
Data Rate	**Copper:** 10/100/1000 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 25]

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 96-104]

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]

see also: 1000Base-T to 1000Base-SX/LX Stand-Alone Media Converters [pg 89]

Gigabit Ethernet

C3110 Series

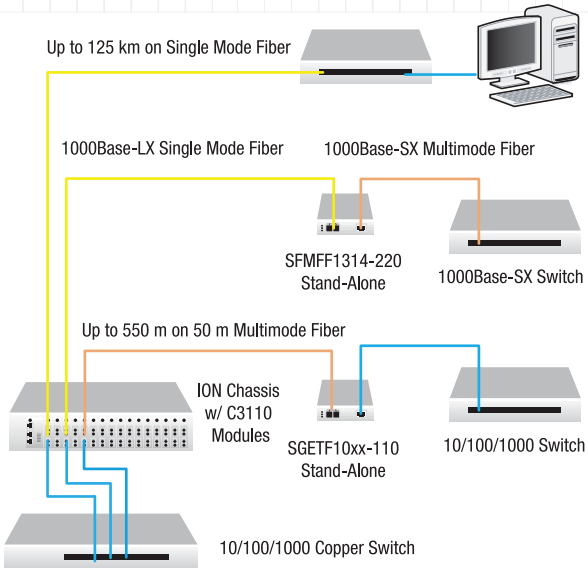
1000BASE-T to 1000BASE-SX/LX Slide-in-Module

Features

- Copper and Fiber Auto-Negotiation [pg 22]
- AutoCross™ on TP port [pg 22]
- Link Pass Through [pg 23]
- Remote Fault Detect [pg 25]
- Loopback [pg 24]
- Pause [pg 23]
- Automatic Link Restoration [pg 24]
- Field Upgradeable Firmware [pg 24]

The following manageable features are available when used in an ION Platform chassis along with an ION Management Module.

- Report converter status to chassis management software:
  - Copper and Fiber link/receive status
  - Hardware switch settings
  - Receive error count
- Write operation includes:
  - Power on/off device
  - Auto-Negotiation enable/disable
  - Remote Fiber Fault Detect enable/disable
  - Link Pass Through enable/disable [pg 23]
  - Pause enable/disable [pg 23]
  - Symetric Pause
  - Asymmetric TX Pause
  - Asymetric RX Pause



The ION C3110 device provides an interface between 1000Base-T ports and 1000Base-SX/LX ports allowing users to integrated fiber optic cabling into 1000Base-T copper environments.

Specifications

Complete list of fiber optic connector specifications [pg 116-123]

Standards	IEEE Std. 802.3ab, IEEE 802.3z, IEEE 802.3 2000
Data Rate	1000 Mbps, Layer-1
Switches	**SW1:** Remote Fiber Fault Detect **SW2:** Pause (symmetric) **SW3:** Pause (asymmetric) **SW4:** Transparent **SW5:** Fiber **SW6:** Loopback
Hardware/Software Jumpers	**Hardware:** Mode of operation is determined by the settings on the 4-position switch **Software:** Mode of operation is determined by the most recently saved on-board microprocessor settings
Status LEDs	**LKF (fiber link)**: On = Fiber Link, blinking activity **PWR (Power):** On = Connection to powered backplane **TP LED 1 (Copper Link):** On = Link, bliking activity **TP LED2 (Copper Duplex):** On = Full Duplex
Dimensions	**Width:** 0.86" [22 mm] **Depth:** 6.5" [165 mm] **Height:** 3.4" [86 mm]
Power Consumption	3.6 Watts, 300mA @ 112 VDC
Environment	See chassis specifications
Shipping Weight	1 lb [.45 kg]
Regulatory Compliance	CISPR/EN55022 Class A, FCC Class A, CE Mark, EN55024
Warranty	Lifetime

Ordering Information

Complete list of fiber optic connector specifications [pg 116-123]

C3110-1013
1000BASE-T (RJ-45) **[100 m/328 ft.]**
to 1000BASE-SX 850nm MM (SC)
[220m/721 ft. and 550 m/1804 ft.]
Link Budget: 8.5 dB

C3110-1024
1000BASE-T (RJ-45) **[100 m/328 ft.]**
to 1000BASE-SX 1310nm extended MM (SC)
[2 km/1.2 mi.] Link Budget: 7.0 dB

C3110-1014
1000BASE-T (RJ-45) **[100 m/328 ft.]**
to 1000BASE-LX 1310nm SM (SC)
[10 km/6.2 mi.] Link Budget: 10.5 dB

C3110-1015
1000BASE-T (RJ-45) **[100 m/328 ft.]**
to 1000BASE-LX 1310nm SM (SC)
[25 km/15.5 mi.] Link Budget: 15.0 dB

C3110-1017
1000BASE-T (RJ-45) **[100 m/328 ft.]**
to 1000BASE-LX 1550nm SM (SC)
[65 km/40.4 mi.] Link Budget: 21.0 dB

C3110-1035
1000BASE-T (RJ-45) **[100 m/328 ft.]**
to 1000BASE-LX 1550nm SM (SC)
[125 km/77.5 mi.] Link Budget: 27.0 dB

C3110-1040
1000BASE-T (RJ-45) **[100 m/328 ft.]**
to 1000Base-X SFP Slot (empty)

Single Fiber Products

Recommended use in pairs [pg 25]

C3110-1029-A1
1000BASE-T (RJ-45) **[100 m/328 ft.]**
to 1000BASE-LX 1310nm TX/1550nm RX single fiber single mode (SC)
[20 km/12.4 mi.] Link Budget: 13.0 dB

C3110-1029-A2
1000BASE-T (RJ-45) **[100 m/328 ft.]**
to 1000BASE-LX 1550nm TX/1310nm RX single fiber single mode (SC)
[20 km/12.4 mi.] Link Budget: 13.0 dB

C3110-1029-B1
1000BASE-T (RJ-45) **[100 m/328 ft.]**
to 1000BASE-LX 1310nm TX/1550nm RX single fiber single mode (SC)
[40 km/24.9 mi.] Link Budget: 20.0 dB

C3110-1029-B2
1000BASE-T (RJ-45) **[100 m/328 ft.]**
to 1000BASE-LX 1550nm TX/1310nm RX single fiber single mode (SC)
[40 km/24.9 mi.] Link Budget: 20.0 dB

- Can be used in any ION Platform Chassis
- Cost effective fiber deployment by pairing C3110 with lower cost 1000Base-T switches, offering the benefits of fiber without the high costs
- Standards based, will link with any standard 1000Base-T and any standard 1000Base-SX or LX ports

see also: 10/100/1000Base-T to 1000Base-SX/LX Stand-Alone Media Converters [pg 90]

Gigabit Ethernet

C3210 Series

10/100/1000BASE-T to 1000BASE-SX/LX Slide-in-Module

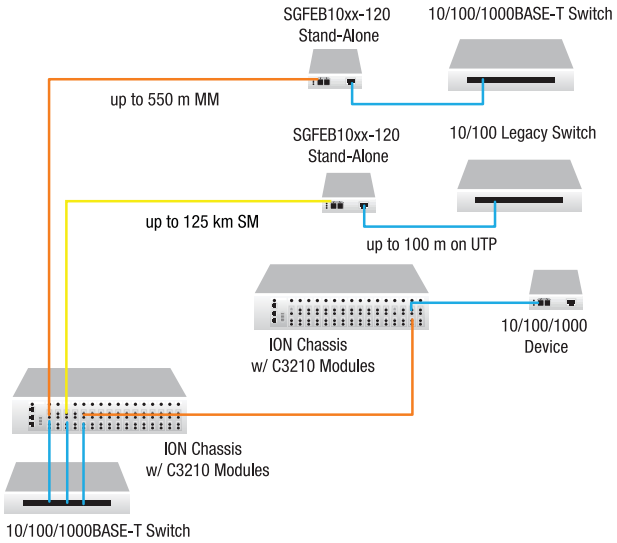
The ION C3210 device provides an interface between 10/100/1000Base-T ports and 1000Base-SX/LX ports allowing users to integrated fiber optic cabling into 10/100/1000Base-T copper environments.

- Intergrate fiber into copper based networking environments
- Can be used in any ION Platform Chassis
- Bridging legacy 10/100 devices into a Gigabit Backbone
- Secure Uni-directional transmission
- Standards based, will link with any standard 10/100/1000Base-T and any standard 1000Base-SX or LX ports

The following manageable features are available when used in an ION Platform chassis along with an ION Management Module:

Features

- Copper and Fiber Auto-Negotiation [pg 22]
- Switch Selectable Speeds
- AutoCross™ [pg 22]
- Link Pass Through [pg 23]
- Remote Fault Detect [pg 25]
- Pause [pg 23]
- Automatic Link Restoration [pg 24]
- IEEE 802.1P QoS, IPv4 TOS/Diffserv, IPv6 traffic class
- IEEE 802.1q Port VLAN, tagging and doubling tagging (Q in Q)
- Field Upgradeable Firmware [pg 24]
- Virtual Cable Test on UTP port
- Uni-directional data transmission
- Bandwidth Allocation [pg 24]
- DMI, digital diagnostics per SFF-8472
- RMON counters for each port



Report devices status to chassis management software:
- Copper and Fiber link status
- Copper and Fiber Port Duplex
- Copper Port Speed
- Hardware switch settings

Write operation includes:
- Set copper full/half duplex
- Set copper connection speed
- Enable/Disable: Link pass Through, Auto-Negotiation, Port VLAN
- Set Administrative State
- Set Egress and Ingress rate limits
- Reset Factory Defaults, Counters
- Reset Switch
- Set Speed
- Set Duplex
- Set MDI/MDI-X/Auto
- Set Pause Operations
- Set VLAN Tagging
- Set Default Priority
- Set IEEE priority remapping
- Initiate Virtual Cable Test
- Set Fiber RX Power Intrusion Threshold

Specifications

Complete list of fiber optic connector specifications [pg 212-224]

Standards	IEEE 802.3, IEEE Std. 802.3ab, IEEE 802.3u, IEEE 802.3z, IEEE 802.3p, IEEE 802.3q
Data Rate	10/100/1000 Mbps; Layer-2
Max Frame Size	10,240 Bytes (jumbo frame support)
Switches	**SW1:** TP Auto-Negotiation **SW2:** TP Speed **SW3:** TP Duplex **SW4:** Link Pass Through **SW5:** Fiber Duplex **SW6:** Unused
Hardware/SoftwareJumpers	Hardware/Software mode, AutoCross™
Status LEDs	**PWR (Power):** ON = Connection to powered backplane **LACT (Fiber Link):** ON = Fiber link, Blinking = activity **UTP Duplex/Link**: Orange = half duplex link, Blinking = half duplex activity, Green = Full duplex link, Blinking =Full duplex activity, Off = 10 Mbps operation (or no link), Orange = 100 Mbps operation, Green = 1000 Mbps operation
Dimensions	**W:** 0.86" [22 mm]; **D:** 6.5" [165 mm]; **Ht:** 3.4" [8 6 mm]
Power Consumption	3.6 Watts, 300mA @ 12 VDC
Environment	See chassis specifications
Shipping Weight	1 lb [.45 kg]
Regulatory Compliance	CISPR/EN55022 Class A, EN55024, EN61000, FCC Class A, CE Mark
Warranty	Lifetime

Ordering Information

Complete list of fiber optic connector specifications [pg 116-123]

C3210-1013
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

C3210-1024
10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-SX 1310nm extended MM (SC)
[2 km/1.2 mi.] Link Budget: 7.0 dB

C3210-1014
10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-LX 1310nm SM (SC)
[10 km/6.2 mi.] Link Budget: 10.5 dB

C3210-1015
10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-LX 1310nm SM (SC)
[25 km/15.5 mi.] Link Budget: 15.0 dB

C3210-1017
10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-LX 1550nm SM (SC)
[65 km/40.4 mi.] Link Budget: 21.0 dB

C3210-1035
10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-LX 1550nm SM (SC)
[125 km/77.5 mi.] Link Budget: 27.0 dB

C3210-1040
10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000Base-X SFP Slot (empty)

Single Fiber Products

Recommended use in pairs [pg 25]

C3210-1029-A1
10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-LX 1310nm TX/1550nm RX single fiber single mode (SC)
[20 km/12.4 mi.] Link Budget: 13.0 dB

C3210-1029-A2
10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-LX 1550nm TX/1310nm RX single fiber single mode (SC)
[20 km/12.4 mi.] Link Budget: 13.0 dB

C3210-1029-B1
10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-LX 1310nm TX/1550nm RX single fiber single mode (SC)
[40 km/24.9 mi.] Link Budget: 20.0 dB

C3210-1029-B2
10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-LX 1550nm TX/1310nm RX single fiber single mode (SC)
[40 km/24.9 mi.] Link Budget: 20.0 dB

C3210-1029-D1
10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-LX 1510nm TX/1590nm RX single fiber single mode (SC)
[80 km/49.7 mi.] Link Budget: 24.0 dB

C3210-1029-D2
10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-LX 1590nm TX/1510nm RX single fiber single mode (SC)
[80 km/49.7 mi.] Link Budget: 24.0 dB

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

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

see also: 10/100/1000BASE-T to 1000BASE-SX/LX Stand-Alone NIDs [pg 91]

Gigabit Ethernet

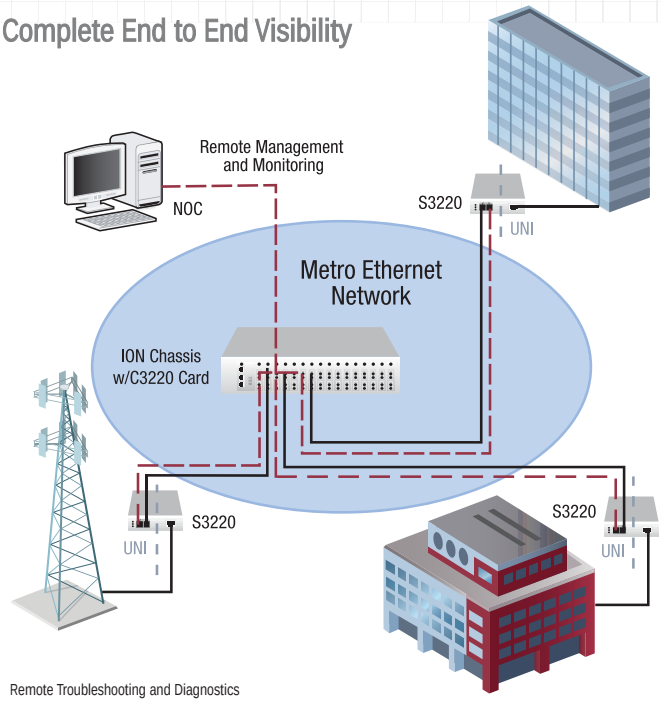
C322x Series

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

Features

- 802.3ah Link OAM
- 10K Jumbo Frame Support
- Two selectable Remote Management modes: [pg 23]
  - IP-Based Remote Management
  - In-Band (remote device managed by local peer)
- AutoCross™ [pg 22]
- Auto-Negotiation [pg 22]
- Pause [pg 23]
- Transparent Link Pass Through [pg 23]
- Far-End-Fault [pg 22]
- Remote Loopback [pg 24]
- Field Upgradeable Firmware [pg 24]
- 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
- IEEE 802.1x
- RADIUS client
- RMON counters for each port
- Bandwidth profiling [pg 24]
- DMI Optical Management
- Cable diagnostic function forcopper 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



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 116-123]

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.*

Ordering Information

Complete list of fiber optic connector specifications [pg 116-123]

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 Slot (empty)

Single Fiber Products [pg 25]

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 96-104]

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

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

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

see also: 10/100/1000BASE-T to 1000BASE-SX/LX Stand-Alone NIDs [pg 92]

C323x Series

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

Gigabit Ethernet

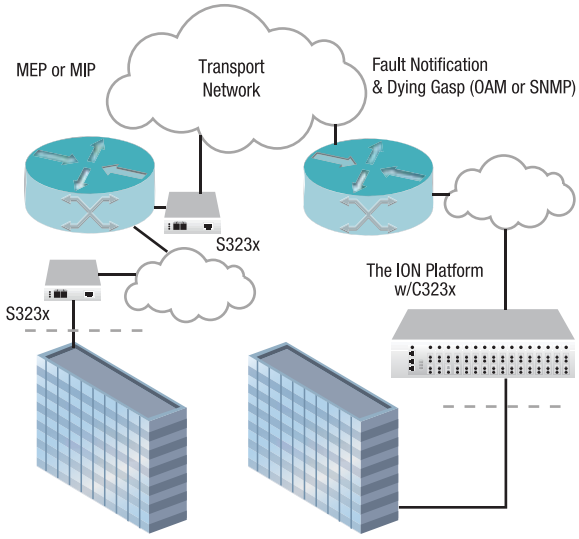
Features

- 802.3ah Link OAM
- ITU Y.1731
- 10K Jumbo Frame Support
- Two selectable Remote Management modes:
  - IP-Based Remote Management
  - In-Band (remote device managed by local peer) [pg 23]
- AutoCross [pg 22]
- Auto-Negotiation [pg 22]
- Pause [pg 23]
- Transparent Link Pass Through [pg 23]
- Far-End-Fault [pg 22]
- Remote Loopback [pg 24]
- Field Upgradeable Firmware [pg 24]
- 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
- IEEE 802.1x
- RADIUS client
- RMON counters for each port
- Bandwidth profiling [pg 24]
- DMI Optical Management
- Cable diagnostic function for copper ports
- SSH
- Telnet
- Command Line Interface (CLI)
- Web management
- Focal Point Management
- SNMP v1 & v2c
- 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

Complete End to End Visibility



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

Specifications

Complete list of fiber optic connector specifications [pg 116-123]

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:** 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 116-123]

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 Open SFP Slot

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

Single Fiber Products [pg 25]

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 96-104]

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 NEG | AUTO CROSS | LINK PASS THRU | FAULT DETECT | LINK RESTORE | PAUSE

100BASE-TX to 100BASE-FX

see also: ION Slide-in-Card 100BASE-TX to 100BASE-FX [pg 78]

E-100BTX-FX-05 Series

Fast Ethernet Media Converter

single fiber model

- Extend Network Distance
  Used in pairs, this media converter can extend distances between two twisted pair switches or a switch and a server up to 2 km over multimode fiber or up to 120 km over single mode fiber.
- Connect Remote Devices Using one media converter, a switch with a copper port can be connected to a switch with an existing fiber interface.

Features

- Operates under heavy traffic loads without excess heat, so there is no need for a failure-prone internal fan.
- Round trip delay of only 40 bit times-far below the Class II rating of 92 bit times
- Auto-Negotiation [pg 22]
- AutoCross™ [pg 22]
- Link Pass Through [pg 23]
- Far-End-Fault (FEF) [pg 22]
- Pause [pg 23]
- Automatic Link Restoration [pg 24]

Optional Accessories *(sold separately)*

Wide Input (24 - 60 VDC) Power Supplies

SPS-2460-CC [pg 95]
Piggy Back Power Supply

SPS-2460-SA [pg 95]
Stand-Alone Power Supply

Mounting Options

E-MCR-05 [pg 95]
12-slot Media Converter Rack

RMS19-SA4-01 [pg 95]
4-slot Media Converter Shelf

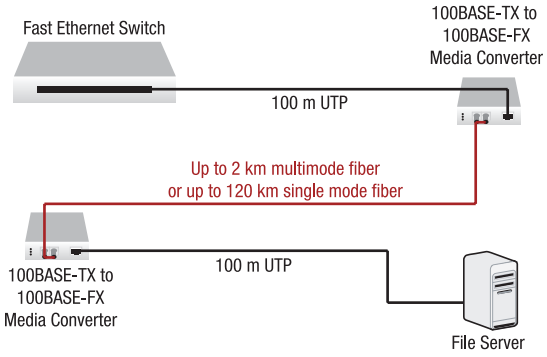
WMBD [pg 95]
DIN Rail Bracket 5.0" [127 mm]

WMBD-FS [pg 95]
DIN Rail Bracket (flat, small) 3.1" [7 9mm]

WMBL [pg 95]
Wall Mount Bracket 4.0" [102 mm]

WMBV [pg 95]
Vertical Wall Mount Bracket 5.0" [127 mm]

Extend Network Distance



The converters will automatically re-establish link when connected to two 10/100 auto-negotiating switches after the fault condition has been corrected. With other manufacturers' converters the user must intervene to re-establish link.

Specifications

Complete list of fiber optic connector specifications [pg 116-123]

Standards	IEEE Std. 802.3, 100BASE-FX, 100BASE-TX
Data Rate	100 Mbps; Layer-1
Switches	**SW1:** Auto-Negotiation On/Off **SW2:** Pause TX On/Off **SW3:** Link Pass Through On/Off **SW4:** Far-End-Fault On/Off
Jumpers	**Jumper Block 1:** AutoCross™ enable
Status LEDs	**PWR(Power)** **SDF or LKF (Link Fiber)** **SDC or LKC (Link Copper)** **RXF (Receive Fiber)** **RXC (Receive Copper)**
Dimensions	**Width:** 3.0" [76mm] **Depth:** 4.7" [119mm] **Height:** 1.0" [25mm]
Power	External AC/DC required: 12 VDC, 0.5 A, unregulated, standard
Environment	0 – 50°C, 5% – 95% humidity non-condensing, 0 – 10,000 ft. altitude
Shipping Weight	2 lbs. [0.90 kg]
Safety Compliance	**Wall Mount Power Supply:** UL Listed and CSA certified
Regulatory Compliance	FCC Class A, EN55024, EN55022 Class A, EN61000, CE Mark
Warranty	Lifetime

Ordering Information

Complete list of fiber optic connector specifications [pg 116-123]

E-100BTX-FX-05
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1300nm MM (ST)
[2 km/1.2 mi.] Link Budget: 11.0 dB

E-100BTX-FX-05(SC)
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1300nm multimode (SC)
[2 km/1.2 mi.] Link Budget: 11.0 dB

E-100BTX-FX-05(LC)
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1300nm multimode (LC)
[2 km/1.2 mi.] Link Budget: 11.0 dB

E-100BTX-FX-05(MT)
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1300nm MM (MT-RJ)
[2 km/1.2 mi.] Link Budget: 14.5 dB

E-100BTX-FX-05(SM)
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1310nm SM (SC)
[20 km/12.4 mi.] Link Budget: 16.0 dB

E-100BTX-FX-05(SMLC)
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1310nm SM (LC)
[20 km/12.4 mi.] Link Budget: 17.3 dB

E-100BTX-FX-05(LH)
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1310nm SM (SC)
[40 km/24.9 mi.] Link Budget: 26.0 dB

E-100BTX-FX-05(XL)
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1310nm SM (SC)
[60 km/37.3 mi.] Link Budget: 29.0 dB

E-100BTX-FX-05(LW)
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1550nm SM (SC)
[80 km/49.7 mi.] Link Budget: 29.0 dB

E-100BTX-FX-05(XLW)
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1550nm SM (SC)
[120 km/74.6 mi.] Link Budget: 36.0 dB

Single Fiber Products

Recommended use in pairs [pg 25]

E-100BTX-FX-05(100)
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1310nm TX/1550nm RX
single fiber single mode (SC)
[20 km/12.4 mi.] Link Budget: 19.0 dB

E-100BTX-FX-05(101)
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1550nm TX/1310nm RX
single fiber single mode (SC)
[20 km/12.4 mi.] Link Budget: 19.0 dB

E-100BTX-FX-05(102)
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1310nm TX/1550nm RX
single fiber single mode (SC)
[40 km/24.9 mi.] Link Budget: 25.0 dB

E-100BTX-FX-05(103)
100BASE-TX (RJ-45) **[100 m/328 ft.]**
to 100BASE-FX 1550nm TX/1310nm RX
single fiber single mode (SC)
[40 km/24.9 mi.] Link Budget: 25.0 dB

*Note: 60 km & 80 km versions of the single strand fiber products are available. Ask your Transition Networks' representative.

see also: ION Slide-In-Card 10/100Base-TX to 100Base-FX [pg 79]

SBFTF Series

10/100BASE-TX to 100BASE-FX Bridging Media Converter

- Extend network distance up to 120 km
- Bridging devices will provide conversion and integration solutions for half and full-duplex environments
- 10 Mbps or 100 Mbps on TP port
- Half or full-duplex on all ports including fiber

Features

- Auto-Negotiation [pg 22]
- AutoCross™ [pg 22]
- Link Pass Through [pg 23]
- Far-End-Fault (FEF) Detection [pg 22]
- Automatic Link Restoration [pg 24]

Optional Accessories *(sold separately)*

SFP Modules [pg 96-104]

Wide Input (24 - 60 VDC) Power Supplies

SPS-2460-PS [pg 95]
Piggy Back Power Supply

SPS-2460-SA [pg 95]
Stand-Alone Power Supply

Mounting Options

E-MCR-05 [pg 95]
12-slot Media Converter Rack

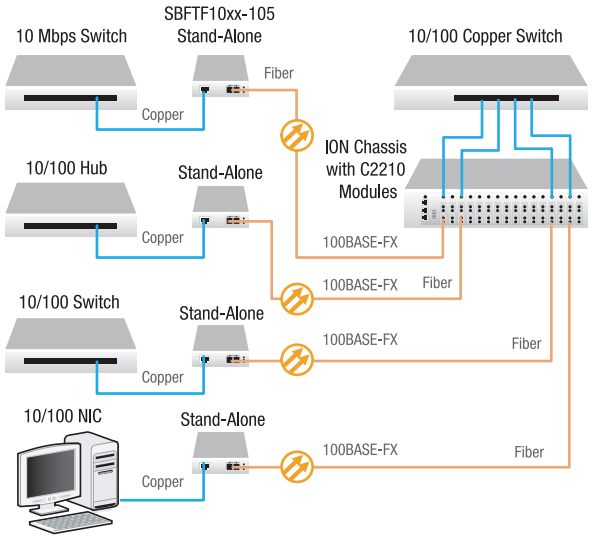
RMS19-SA4-01 [pg 95]
4-slot Media Converter Shelf

WMBD [pg 95]
DIN Rail Bracket 5.0" [127 mm]

WMBD-F [pg 95]
DIN Rail Bracket (flat) 3.3" [84 mm]

WMBL [pg 95]
Wall Mount Bracket 4.0" [102 mm]

WMBV [pg 95]
Vertical Wall Mount Bracket 5.0" [127 mm]



Specifications

Complete list of fiber optic connector specifications [pg 116-123]

Standards	IEEE Std. 802.3
Data Rate	10 Mbps; 100 Mbps, Layer-2
Filtering Addresses	1K MAC addresses
Filtering & Forwarding Rate	14,880 pps for Ethernet; 148,800 pps for Fast Ethernet
RAM Buffers	512 KB
Max Packet Size	2044 bytes untagged; 2048 bytes tagged
Switches	**SW1 (TP):** Auto-Negotiation On/Off **SW2 (TP):** Half or Full-duplex with Auto-Negotiation Off **SW3 (TP):** 10Mbps or 100 Mbps with Auto-Negotiation Off **SW4 (Fiber):** Half or Full-duplex **SW5:** Link Pass Through On/Off **SW6:** Far-End-Fault On/Off
Status LEDs	**PWR (Power):** ON = connection to external power **FD (Fiber Duplex):** ON = Full-duplex; Off = Half-duplex **LNK/ACT (Fiber Link/Activity):** ON = Link; Blinking = Activity **CD (Copper Duplex):** ON = Full-duplex; Off = Half-duplex **LNK/ACT (Copper Link/Activity):** ON = Link; Blinking = Activity **100 (Copper):** Off = 10 Mbps; ON = 100 Mbps
Dimensions	**W:** 3.25" [82 mm] **D:** 4.8" [122 mm] **H:** 1.0" [25 mm]
Power	External AC/DC; 12 VDC, 0.8A min
Environment	0 – 50°C; 5% – 90% humidity non-condensing; 0 – 10,000 ft. altitude
Shipping Weight	2 lbs. [0.90 kg]
Safety Compliance	**Wall Mount Power Supply:** UL Listed
Regulatory Compliance	FCC Class A, VCCI Class 1, CISPR22/EN55022 Class A, EN55024, EN61000, CE Mark
Warranty	Lifetime

Ordering Information

Complete list of fiber optic connector specifications [pg 116-123]

SBFTF1014-105
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

SBFTF1019-105
10/100BASE-TX (RJ-45)
[100 m/328 ft.]
to 100BASE-FX 1310nm SM (LC)
[20 km/12.4 mi.] Link Budget: 17.3 dB

SBFTF1011-105
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

SBFTF1013-105
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

SBFTF1039-105
10/100BASE-TX (RJ-45)
[100 m/328 ft.]
to 100BASE-FX 1300nm MM (LC)
[2 km/1.2 mi.] Link Budget: 11.0 dB

SBFTF1015-105
10/100BASE-TX (RJ-45)
[100 m/328 ft.]
to 100BASE-FX 1310nm SM (SC)
[40 km/24.9 mi.] Link Budget: 29.0 dB

SBFTF1016-105
10/100BASE-TX (RJ-45)
[100 m/328 ft.]
to 100BASE-FX 1310nm SM (SC)
[60 km/37.3 mi.] Link Budget: 32.0 dB

SBFTF1017-105
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

SBFTF1035-105
10/100BASE-TX (RJ-45)
[100 m/328 ft.]
to 100BASE-FX 1550nm SM (SC)
[120 km/74.6 mi.] Link Budget: 33.0 dB

SBFTF1040-105
10/100BASE-TX (RJ-45)
[100 m/328 ft.]
to 100BASE-X SFP Slot (empty)

Single Fiber Products [pg 25]

SBFTF1029-105
10/100BASE-TX (RJ-45)
[100 m/328 ft.]
to 100BASE-FX 1310nm TX/1550nm RX single fiber SM (SC)
[20 km/12.4 mi.] Link Budget: 19.0 dB

SBFTF1029-106
10/100BASE-TX (RJ-45)
[100 m/328 ft.]
to 100BASE-FX 1550nm TX/1310nm RX single fiber SM (SC)
[20 km/12.4 mi.] Link Budget: 19.0 dB

SBFTF1029-107
10/100BASE-TX (RJ-45)
[100 m/328 ft.]
to 100BASE-FX 1310nm TX/1550nm RX single fiber SM (SC)
[40 km/24.9 mi.] Link Budget: 25.0 dB

SBFTF1029-108
10/100BASE-TX (RJ-45)
[100 m/328 ft.]
to 100BASE-FX 1550nm TX/1310nm RX single fiber SM (SC)
[40 km/24.9 mi.] Link Budget: 25.0 dB

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

10/100BASE-TX to 100BASE-FX

see also: ION Slide-In-Card 10/100Base-TX to 100Base-FX [pg 80]

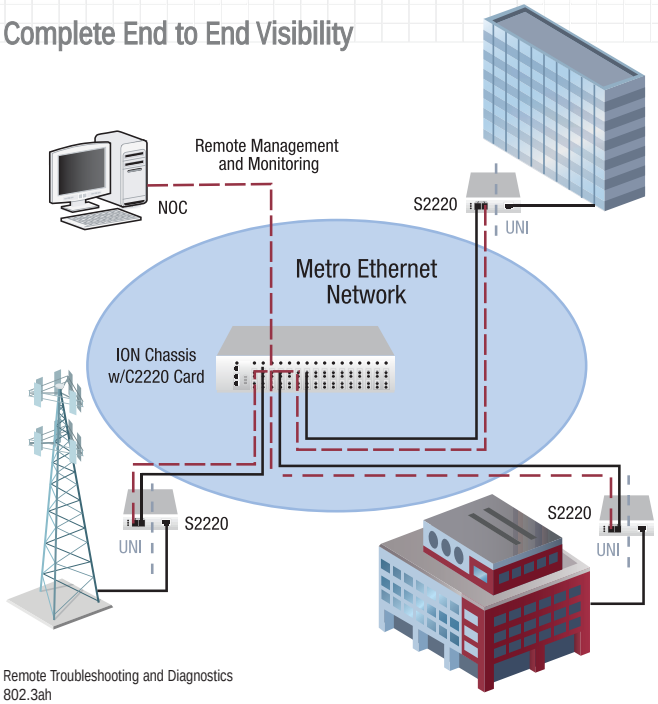
S2220 Series

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

Features

- 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 23]
- AutoCross™ [pg 22]
- Auto-Negotiation [pg 22]
- Pause [pg 23]
- Transparent Link Pass Through [pg 23]
- Far-End-Fault [pg 22]
- Remote Loopback [pg 24]
- Field Upgradeable Firmware [pg 24]
- 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
- IEEE 802.1x Port based security
- RADIUS client
- RMON counters for each port
- Bandwidth profiling [pg 24]
- DMI Optical Management
- Cable diagnostic function for copper 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



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 116-123]

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 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 25]

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 96-104]

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 | BANDWIDTH ALLOCATION | REMOTE MGMT

10/100BASE-TX
Fast Ethernet

S2250

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

CARRIER ETHERNET MEF Certified Compliant

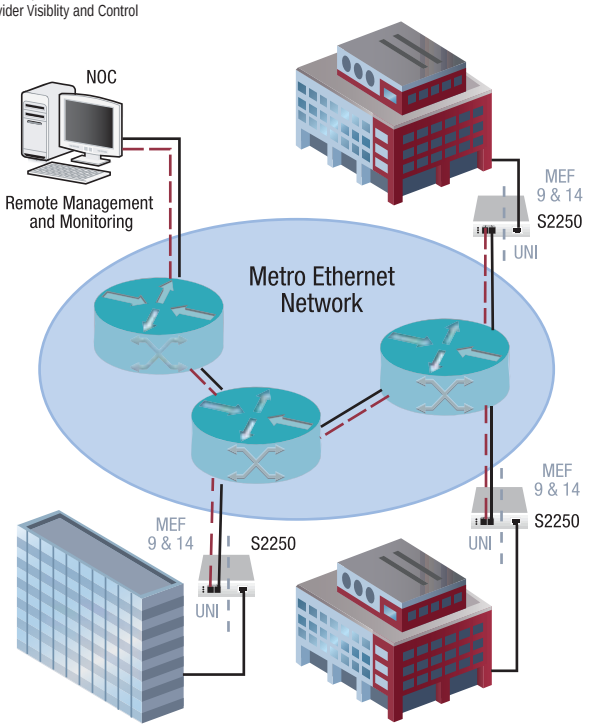
Designed to demarc the edges of your network, the S2250 device offers advanced packet performance metering and service creation directly from customer premises and cell-sites.

Features

- IEEE 802.3ah Linkt OAM
- IEEE 802.1ag Service OAM
- ITU-T Recommendation Y.1731
- Performance Monitoring
- Intelligent Loopbacks [pg 24]
- Per-Flow Statistics
- Tapping & Monitoring
- Thru-Traffic Per-flow Statistics
- Dual Monitoring Access Ports
- Fast Fault Propogation, <50 ms on all interfaces, client & network ports
- Dying Gasp (via 802.3ah or SNMP traps)
- VLAN Tagging/De-tagging and VLAN Stacking (.1Q in .1Q)
- Intergrated Copper TDR cable integrity testing
- Jumbo Frames support for all features (up to 10,240 bytes)
- Continuous in-service monitoring of Layer 2 & 3 SLA parameters
- User settable SLA threshold crossing alerts using SNMP traps
- Bandwidth policing [pg 24]
- Integrated Management
  - SNMP v1, v2c, Sets & Gets
  - Radius Authentication
  - SSL and SSH
  - Management VLAN
  - Configuration import/export
  - NTP Client (or source)
  - Syslog
  - DNS Client
  - DHCP Client

Complete End to End Visibility

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



Specifications

Standards	IEEE Std. 802.3ah, IEEE Std 802.1ag
Data Rate	100 Mbps
Dimensions	**Width:** 1.60” **Depth:** 5.80” **Height:** 5.34”
Power	External AC/DC adapter (120-240 VAC auto-sensing, 50-60 Hz), 5 VDC input to unit Dual (A/B) -48 VDC Central Office Supply inputs Cooling: convection cooled (no fans)
Power Consumption	5-8 Watts
Operating Temperature	-5°C to 65°C
Storage Temperature	-40°C to 70°C
Operating Humidity	5-95% (non-condensing)
Shipping Weight	1.37 lb. [.62kg]
Regulatory Compliance	IEC 60950, MTBF >53yrs(4), FCC Part 15 Class A, NEBS Level 3, Industry Canada CS-03, MEF9 Service Certification, CE Mark, MEF14 Traffic Management
Warranty	1 year hardware and software

Ordering Information

S2250
(4) 10/100BASE-TX (RJ-45) **[100 m/328 ft.]**
(1) 10/100BASE-TX (RJ-45) **[100 m/328 ft.]**
management port

AUTO NEG | TRANSPARENT LINK PASS THRU | AUTO LINK RESTORE | PAUSE | AUTO CROSS | REMOTE FAULT DETECT

see also: ION Slide-In-Module Gigabit Ethernet Media Converters [pg 81]

SGETF Series

1000BASE-T to 1000BASE-SX/LX Gigabit Ethernet Media Converter

Migrate to Gigabit Ethernet in a cost-effective manner. Used in conjunction with lower cost 1000BASE-T switches, companies can take advantage of the high bandwidth Gigabit Ethernet offers without all of the higher costs. Transition Networks' 1000BASE-T to SX/LX converters allow users to extend the bandwidth to those users outside the reach of the 1000BASE-T standard (up to 125 km).

Features

- Copper & Fiber Auto-Negotiation [pg 22]
- Transparent Link Pass Through [pg 23]
- Automatic Link Restoration [pg 24]
- Pause [pg 23]
- Remote Fault Detect [pg 25]

Optional Accessories *(sold separately)*

SFP Modules [pg 96-104]

Wide Input (24 - 60 VDC) Power Supplies

SPS-2460-PS [pg 95]
Piggy Back Power Supply

SPS-2460-SA [pg 95]
Stand-Alone Power Supply

Mounting Options

E-MCR-05 [pg 95]
12-slot Media Converter Rack

RMS19-SA4-01 [pg 95]
4-slot Media Converter Shelf

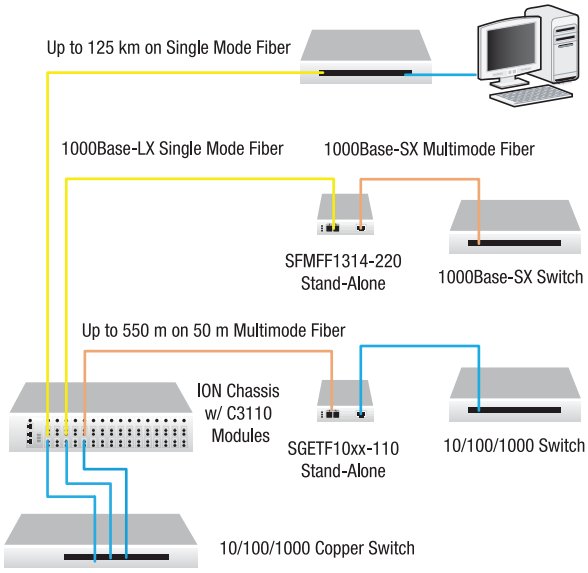
WMBD [pg 95]
DIN Rail Bracket 5.0" [127 mm]

WMBD-F [pg 95]
DIN Rail Bracket (flat, small) 3.1" [79 mm]

WMBL [pg 95]
Wall Mount Bracket 4.0" [102 mm]

WMBV [pg 95]
Vertical Wall Mount Bracket 5.0" [127 mm]

Migrate to Gigabit Ethernet



Specifications

Standards	IEEE Std. 802.3ab and IEEE Std. 802.3
Data Rate	1000 Mbps, Layer-1
6-position Switch	**SW1:** Remote Fiber Fault Detect (Down=Enabled) **SW2:** Symmetric Pause **SW3:** Asymmetric Pause **SW4:** Transparent Link Pass Through (UP=Enabled) **SW5:** Fiber Auto-Negotiation (Down=Enabled) **SW6:** Loopback (Down=Enabled)
Status LEDs	**PWR (Power):** Steady green LED indicates connection to external AC power **RXF (Fiber receive):** Flashing LED indicates reception of data on fiber link **LKF (Fiber link):** Steady LED indicates fiber link connection **RXC (Copper receive):** Flashing LED indicates reception of data on copper link **LKC (Copper link):** Steady LED indicates copper link connection
Dimensions	**Width**: 3.25" [82 mm] **Depth**: 4.8" [122 mm] **Height**: 1.0" [25 mm]
Power	External AC/DC required; 12 VDC, 0.8A min
Environment	0 – 50° C operating; 5% – 95% humidity non-condensing; 0 – 10,000 ft. altitude
Shipping Weight	2 lbs. [0.90 kg]
Safety Compliance	**Wall Mount Power Supply**: UL Listed, C-UL Listed (Canada)
Regulatory Compliance	FCC Class A, CISPR22/EN55022 Class A, EN55024, EN61000, CE Mark
Warranty	Lifetime

Ordering Information

SGETF1013-110
1000BASE-T (RJ-45) **[100 m/328 ft.]**
to 1000BASE-SX 850nm MM (SC)
[62.5/125µm fiber: 220 m/722 ft.]
Link Budget: 7.0 dB
[50/125µm fiber: 550 m/1804 ft.]
Link Budget: 7.0 dB

SGETF1024-110
1000BASE-T (RJ-45) **[100 m/328 ft.]**
to 1000BASE-SX 1300nm Extended MM (62.5/125 µm fiber only) (SC)
[2 km/1.2 mi.] Link Budget: 7.0 dB

SGETF1039-110
1000BASE-T (RJ-45) **[100 m/328 ft.]**
to 1000BASE-SX 850nm MM (LC) (via TN-SFP-SX)
[62.5/125µm fiber: 220 m/722 ft.]
Link Budget: 8.0 dB
[50/125µm fiber: 550 m/1804 ft.]
Link Budget: 8.0 dB

SGETF1014-110
1000BASE-T (RJ-45) **[100 m/328 ft.]**
to 1000BASE-LX 1310nm SM (SC)
[10 km/6.2 mi.] Link Budget: 10.5 dB

SGETF1015-110
1000BASE-T (RJ-45) **[100 m/328 ft.]**
to 1000BASE-LX 1310nm SM (SC)
[25 km/15.5 mi.] Link Budget: 15.0 dB

SGETF1017-110
1000BASE-T (RJ-45) **[100 m/328 ft.]**
to 1000BASE-LX 1550nm SM (SC)
[65 km/40.4 mi.] Link Budget: 20.0 dB

SGETF1035-110
1000BASE-T (RJ-45) **[100 m/328 ft.]**
to 1000BASE-LX 1550nm SM (SC)
[125 km/77.7 mi.] Link Budget: 27.0 dB

SGETF1040-110
1000BASE-T (RJ-45) **[100 m/328 ft.]**
to 1000BASE-X SFP Slot (empty)

Single Fiber Products

Recommended use in pairs [pg 25]

SGETF1029-110
1000BASE-T (RJ-45) **[100 m/328 ft.]**
to 1000BASE-LX 1310nm TX/1550nm RX single fiber SM (SC)
[20 km/12.4 mi.] Link Budget: 13.0 dB

SGETF1029-111
1000BASE-T (RJ-45) **[100 m/328 ft.]**
to 1000BASE-LX 1550nm TX/1310nm RX single fiber SM (SC)
[20 km/12.4 mi.] Link Budget: 13.0 dB

SGETF1029-112
1000BASE-T (RJ-45) **[100 m/328 ft.]**
to 1000BASE-LX 1310nm TX/1550nm RX single fiber SM (SC)
[40 km/24.9 mi.] Link Budget: 20.0 dB

SGETF1029-113
1000BASE-T (RJ-45) **[100 m/328 ft.]**
to 1000BASE-LX 1550nm TX/1310nm RX single fiber SM (SC)
[40 km/24.9 mi.] Link Budget: 20.0 dB

SGETF1029-116
1000BASE-T (RJ-45) **[100 m/328 ft.]**
to 1000BASE-LX 1510nm TX/1590nm RX single fiber SM (SC)
[80 km/49.6 mi.] Link Budget: 24.0 dB

SGETF1029-117
1000BASE-T (RJ-45) **[100 m/328 ft.]**
to 1000BASE-LX 1590nm TX/1510nm RX single fiber SM (SC)
[80 km/49.6 mi.] Link Budget: 24.0 dB

AUTO NEG | AUTO CROSS | LINK PASS THRU | AUTO LINK RESTORE | PAUSE | FIELD UPGRADEABLE FIRMWARE | SOURCE ADDRESS CHANGE

see also: ION Slide-In-Card Media Converters [pg 82]

SGFEB Series

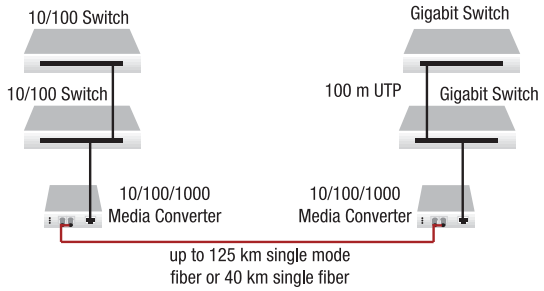
10/100/1000BASE-T to 1000BASE-SX/LX Ethernet Media Converter

- Extend Network Distance
- Bridge legacy 10/100 devices to a Gigabit backbone

Features

- Auto-Negotiation (copper and fiber ports) [pg 22]
- Switch-selectable speeds UTP when Auto-Negotiation is off
- AutoCross™ [pg 22]
- Link Pass Through [pg 23]
- Remote Fault Detect [pg 25]
- Pause [pg 23]

Extend Network Distance



Specifications

Complete list of fiber optic connector specifications [pg 116-123]

Standards	IEEE 802.3, IEEE 802.3ab, IEEE 802.3u, IEEE 802.3z
Data Rate	**Copper:** 10/100/1000 Mbps, Layer-2 **Fiber:** 1000 Mbps
Filtering Addresses	8K MAC Addresses
Max Frame Size	**802.3ac tagged:** 1628 bytes; **untagged:** 1632 bytes
Status LEDs	**PWR:** ON green = Power applied to card **TP (Duplex/Link/Activity):** Orange: ON = Half-duplex Link; BLINK = Activity; Green: ON = Full-duplex Link; BLINK = Activity **TP (10 Mbps/100 Mbps/1000 Mbps):** Off = 10 Mbps; Orange = 100 Mbps; Green = 1000 Mbps **LACT (Fiber Link/Activity):** Green: ON = Link; BLINK = Activity
Dip Switches	**Switch 1:** TX - Enable/Disable Auto-Negotiation **Switch 2:** TX - Force 10 Mbs or 100 Mbs with Switch 1 off **Switch 3:** TX - Force Half or Full duplex with Switch 1 off **Switch 4:** Enable/Disable LPT **Switch 5:** not used **Switch 6:** not used
Jumpers	**J6:** TX - Enable/Disable AutoCross™
Dimensions	**Width:** 3.25" [82 mm] **Depth:** 4.8" [122 mm] **Height:** 1.0" [25 mm]
Power	External AC/DC required: 12 VDC, 1.25 A, unregulated, standard
Power Consumption	4.8 Watts
Environment	0 – 50°C operating, -40°C - 85°C storage 5% – 95% humidity non-condensing, 0 – 10,000 ft. altitude
Shipping Weight	2 lb. [0.9 kg]
Regulatory Compliance	CISPR/EN55022 Class A, EN55024, EN61000, FCC Class A, CE Mark
Safety Compliance	**Wall Mount Power Supply:** UL listed & CSA certified
Warranty	Lifetime

Ordering Information

SGFEB1013-120
10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-SX 850nm multimode (SC)
[62.5/125µm: 220 m/722 ft.]
[50/125µm: 550 m/1804 ft.]
Link Budget: 7.0 dB

SGFEB1024-120
10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-SX 1300nm Extended MM (62.5/125 µm fiber only) (SC)
[up to 2 km] Link Budget: 7.0 dB

SGFEB1014-120
10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-LX 1310nm SM (SC)
[10 km/6.2 mi.] Link Budget: 7.0 dB

SGFEB1015-120
10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-LX 1310nm SM (SC)
[25 km/15.5 mi.] Link Budget: 15.0 dB

SGFEB1017-120
10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-LX 1550nm SM (SC)
[65 km/40.4 mi.] Link Budget: 20.0 dB

SGFEB1035-120
10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-LX 1550nm SM (SC)
[125 km/77.7 mi.] Link Budget: 27.0 dB

SGFEB1040-120
10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-X SFP Slot (empty)

Single Fiber Products

Recommended use in pairs [pg 25]

SGFEB1029-120
10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-LX 1310nm TX/1550nm RX single fiber single mode (SC)
[20 km/12.4 mi.] Link Budget: 13.0 dB

SGFEB1029-121
10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-LX 1550nm TX/1310nm RX single fiber single mode (SC)
[20 km/12.4 mi.] Link Budget: 13.0 dB

SGFEB1029-122
10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-LX 1310nm TX/1550nm RX single fiber single mode (SC)
[40 km/24.9 mi.] Link Budget: 20.0 dB

SGFEB1029-123
10/100/1000BASE-T (RJ-45) **[100 m]**
to 1000BASE-LX 1550nm TX/1310nm RX single fiber single mode (SC)
[40 km/24.9 mi.] Link Budget: 20.0 dB

Optional Accessories *(sold separately)*

SFP Modules [pg 96-104]

Wide Input (24 - 60VDC) Power Supplies

SPS-2460-PS or SPS-2460-SA [pg 95]

Mounting Options

E-MCR-05 [pg 95]
12-slot Media Converter Rack

WMBD [pg 95]
DIN Rail Mount Bracket 5.0" [127 mm]

WMBL [pg 95]
Wall Mount Bracket 4.0" [102 mm]

RMS19-SA4-01 [pg 95]
4-slot Media Converter Shelf

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

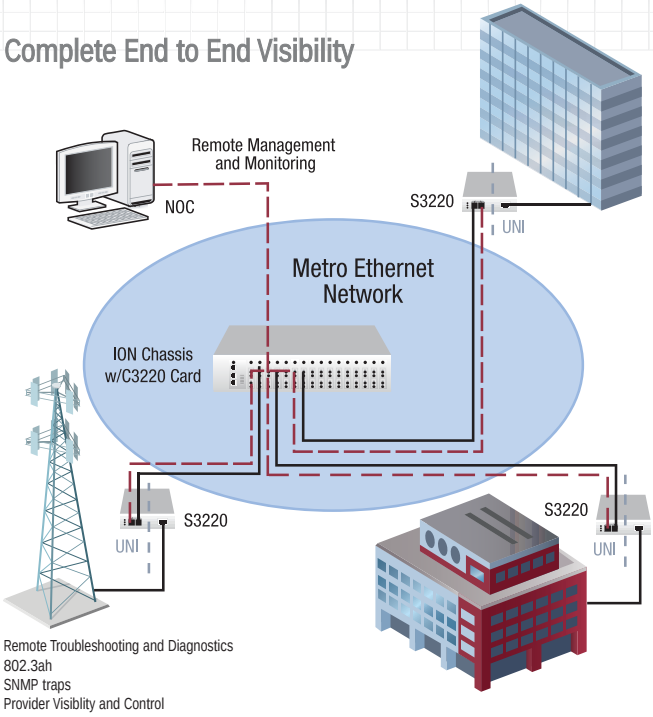
S322x Series

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

Features

- 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 23]
- AutoCross™ [pg 22]
- Auto-Negotiation [pg 22]
- Pause [pg 23]
- Transparent Link Pass Through [pg 23]
- Far-End-Fault [pg 22]
- Remote Loopback [pg 24]
- Field Upgradeable Firmware [pg 24]
- 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
- IEEE 802.1x Port based security
- RADIUS client
- RMON counters for each port
- Bandwidth profiling [pg 24]
- DMI Optical Management
- Cable diagnostic function for copper 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



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 116-123]

Standards	IEEE Std. 802.3, IEEE Std. 802.3ah, IEEE Std 802.1P, IEEE Std. 802.1Q, IEEE Std. 802.1X
Data Rate	**Copper:** 10/100/1000 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.*

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 SFP Slots (empty)

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

Single Fiber Products

Recommended use in pairs [pg 25]

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 96-104]
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

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

see also: ION Slide-in-Card 10/100/1000BASE-T to 1000BASE-SX/LX [pg 84]

Gigabit Ethernet

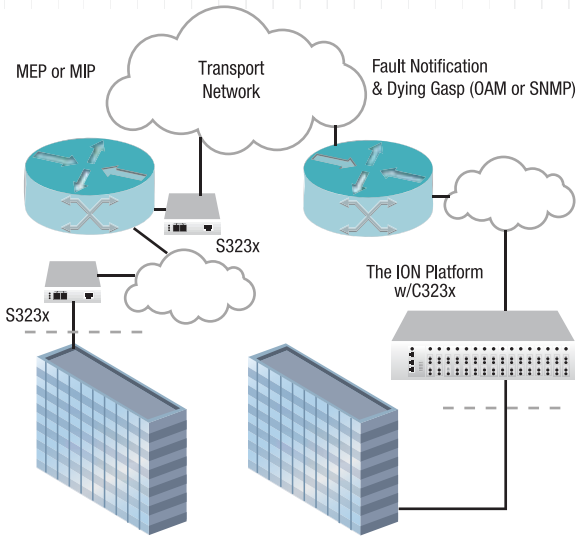
S323x Series

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

Features

- 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 23]
- AutoCross™ [pg 22]
- Auto-Negotiation [pg 22]
- Pause [pg 23]
- Transparent Link Pass Through [pg 23]
- Far-End-Fault [pg 22]
- Remote Loopback [pg 24]
- Field Upgradeable Firmware [pg 24]
- 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
- IEEE 802.1x Port based security
- RADIUS client
- RMON counters for each port
- Bandwidth profiling [pg 24]
- DMI Optical Management
- Cable diagnostic function for copper 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



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 116-123]

Standards	IEEE Std. 802.3, IEEE Std. 802.3ah, IEEE Std 802.1P, IEEE Std. 802.1Q, IEEE Std. 802.1X
Data Rate	**Copper:** 10/100/1000 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 SFP Slots (empty)

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

Single Fiber Products

Recommended use in pairs [pg 25]

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 96-104]

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

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

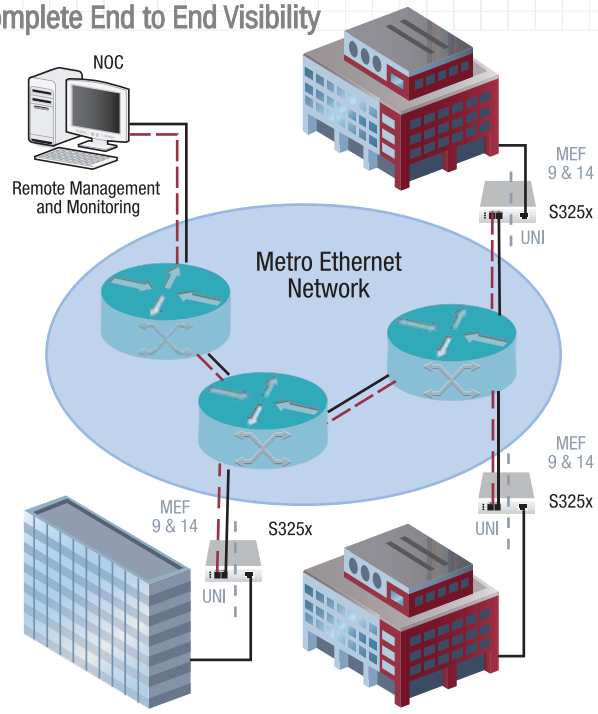
S325x Series

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

Features

- OAM Functionality
  - IEEE 802.3ah Link OAM
  - IEEE 802.1ag Service OAM
  - ITU-T Recommendation Y.1731
- Performance Monitoring
- In-Service Throughput Testing
- Intelligent Loopbacks [pg 24]
- Per-Flow Statistics
- Tapping & Monitoring
- Thru-Traffic Per-flow Statistics
- Dual Monitor Access Ports
- Fast Fault Propagation, <50 ms on all interfaces, client & network ports
- Optical Digital Diagnostics (SFF-8472)
- Dying Gasp (via 802.3ah or SNMP traps)
- VLAN Tagging/De-tagging and VLAN Stacking (.1Q in .1Q)
- Integrated Copper TDR cable integrity testing
- Jumbo Frames support for all features (up to 10,240 bytes)
- Continuous in-service monitoring of Layer 2 & 3 SLA parameters
- User settable SLA threshold crossing alerts using SNMP traps
- Bandwidth Policing [pg 24]
- Integrated Management
  - SNMP v1, v2c Sets & Gets
  - Radius Authentication
  - SSL and SSH
  - Management VLAN
  - Configuration import/export
  - NTP Client (or source)
  - Syslog
  - DNS Client
  - DHCP Client

Complete End to End Visibility



Remote Troubleshooting and Diagnostics
802.3ah
802.1ag

Y.1731
SNMP traps
Provider Visiblity and Control

Designed to demarc the edge of your network, the S325x devices offers advanced packet performance metering and service creation directly from customer premises and cell-sites.

Specifications

Standards	IEEE 802.3ah, IEEE 802.1ag
Data Rate	**Fiber:** 100 Mbps, 1000 Mbps **Copper:** 10/100/1000 Mbps
Max Frame Size	10,240 bytes
Dimensions	**W:** 5.34"[135 mm]; **D:** 5.8" [147 mm]; **H:** 1.6" [40 mm]
Power	External AC/DC adapter (120-240 VAC auto-sensing, 50- 60 Hz), 5 VDC input to unit, Dual (A/B) - 48 VDC Central Office Supply inputs, Cooling: convection cooled (no fans)
Power Consumption	5-8 Watts
Operating Temperature	-5°C to 65°C
Storage Temperature	-40°C to 70°C
Operating Humidity	5-95% (non-condensing)
Shipping Weight	1.37 lbs. [.62 kg]
Regulatory Compliance	IEC 60950, MTBF >53 yrs(4), FCC Part 15 Class A, NEBS Level 3, Industry Canada CS-03, MEF9 Service Certification, CE Mark, MEF14 Traffic Management
Warranty	1 year hardware and software

Ordering Information

S3250
(2) 10/100/1000Base-T (RJ-45)
[100 m/328 ft.]
(2) SFP ports (100 Mbps, 1000 Mbps, or 10/100/1000 Mbps copper SFP)
(1) 10/100BASE-TX (RJ-45)
[100 m/328 ft.]

S3251: Enhanced multi-flow processing & statistics
(2) 10/100/1000Base-T (RJ-45)
[100 m/328 ft.]
(2) SFP ports (100 Mbps, 1000 Mbps, or 10/100/1000 Mbps copper SFP)
(1) 10/100BASE-TX (RJ-45)
[100 m/328 ft.]

S3252: Advanced traffic shaping & packet processing functionality
(2) 10/100/1000Base-T (RJ-45)
[100 m/328 ft.]
(2) SFP ports (100 Mbps, 1000 Mbps, or 10/100/1000 Mbps copper SFP)
(1) 10/100BASE-TX (RJ-45)
[100 m/328 ft.]

S3253: 4 SFP port version of the S3252
(4) SFP ports (100 Mbps, 1000 Mbps, or 10/100/1000 Mbps copper SFP)
(1) 10/100BASE-TX (RJ-45)
[100 m/328 ft.]

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
- Lengthens 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

Ordering Information

IONADP

Point System™ Adapter for the ION chassis, includes bracket and screws

E-MCR-05

12-Slot Media Converter Rack

RMS19-SA4-01

4-Slot Media Converter Shelf

Ordering Information

E-MCR-05 [pg 53]
12-slot Media Converter Rack

RMS19-SA4-01 [pg 53]
4-slot Media Converter Shelf

WMBL; WMBP; WMBV

Wall Mount Brackets

WMBV-E; WMBD

Wall Mount Brackets & Din Rail Brackets

WMBD-E; WMBD-F

DIN Rail Brackets

Ordering Information

WMBL [pg 54]
4.0" [102 mm]
Fits Stand-Alone Converters size 4.7" [119 mm] and ION Stand-Alone devices

WMBP [pg 54]
5.0" [127 mm]
Fits Single or Dual Slot Point System™ Chassis and single slot ION chassis

WMBV [pg 54]
5.0" [127 mm]
Vertical Mount
Fits all Stand-Alone Converters;
Single or Dual Slot Point System™ Chassis

WMBV-E [pg 54]
4.7" [119 mm]
Extended Vertical Mount Fits all Stand-Alone Converters with piggyback power supply attached

WMBD [pg 54]
5.0" [127 mm] DIN Rail Mount Bracket
Fits all Stand-Alone Converters; Single or Dual Slot Point System™ Chassis

WMBD-E [pg 54]
4.3" [109 mm] DIN Rail Mount Bracket (Extended)
Fits all Stand-Alone Converters with piggyback power supply attached

WMBD-F [pg 54]
3.3" [84 mm] DIN Rail Mount Bracket (flat)
Fits all Stand-Alone Converters 3.25" [82 mm] wide

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

SPS-2460-PS [pg 55]
Piggy-Back
For use with: Point System™ stand-alone media converters and ION Stand-Alone devices
3.25" wide
(SBFTF1011-100; SGETF1013-100, etc.)

SPS-2460-SA [pg 55]
Stand-Alone
For use with: All stand-alone media converters; Single-Slot Point System™ Chassis; Dual-Slot Point System™ Chassis, and ION Stand-Alone devices

TN-SFP-xxx

SFP Modules

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 Optical Line Converter 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)

Applications

- Gigabit Ethernet Switches and Routers
- Fibre Channel Switch Infrastructure
- XDSL Applications
- Metro Edge Switching

Specifications

Complete list of fiber optic connector specifications [pg 116-123]

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 116-123]

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-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

TN-SFP-xxx

SFP Modules

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 Optical Line Converter 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 IEEE802.3u 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 22]
- AutoCross™ [pg 22]

Applications

- Gigabit Ethernet Switches and Routers
- Fibre Channel Switch Infrastructure
- XDSL Applications
- Metro Edge Switching

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 116-123]

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-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-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-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.]

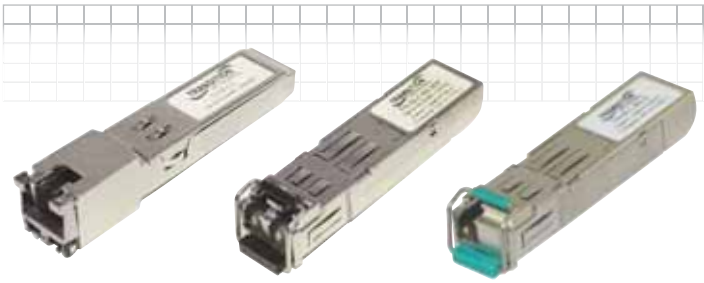
TN-SFP-T-MG
10/100/1000BASE-T (RJ-45)
[100 m/328 ft.]

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

TN-GLC-xxx & TN-SFP-GE-x

SFP Modules



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 IEEE802.3100BASE-FX
- Compliant with IEEE802.3ah100BASE-FX
- Compliant with Intermediate-Reach SONET OC-3/SDH STM-1 (S-1.1)

Can be used on Optical Line Converter xFMFF4040-100

TN-SFP-0GE-x modules

- Compliant with IEEE802.3z 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 116-123]

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	-40°C – 85°C operating -40°C – 100°C storage
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 and connector specifications [pg 116-123]

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-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-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-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-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

*Provides 100BASE-FX interface when plugged into a Gigabit SFP slot on Cisco Catalyst 2970, 3560 & 3750 series switches.

TN-SFP-xxx-Cxx

SFP Modules

Features

- Course 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)

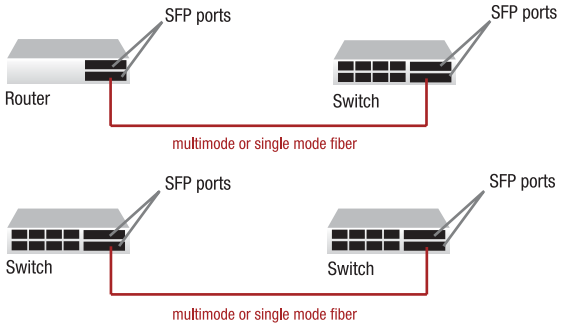
TN-SFP-OC48S-Cxx SFP modules

- 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



Applications

- Gigabit Ethernet Switches and Routers
- Fibre Channel Switch Infrastructure
- XDSL Applications
- Metro Edge Switching

Specifications

Complete list of fiber optic connector specifications [pg 116-123]

Standards	IEEE 802.3 2003; ANSI X3.297-1997 (see additional standards by part number to the left)
Output Wavelength	-5.5nm < λ_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 116-123]

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

xx = center wavelength (l_c)

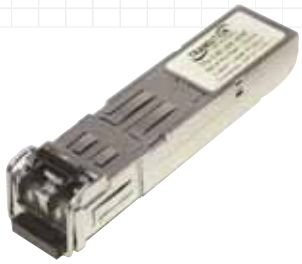
27 = 1270nm	45 = 1450nm
29 = 1290nm	47 = 1470nm
31 = 1310nm	49 = 1490nm
33 = 1330nm	51 = 1510nm
35 = 1350nm	53 = 1530nm
37 = 1370nm	55 = 1550nm
39 = 1390nm	57 = 1570nm
41 = 1410nm	59 = 1590nm
43 = 1430nm	61 = 1610nm

NEW PRODUCT

Small Form Factor Pluggables
CWDM Wavelengths Cisco Compatible

TN-CWDM-xxx-1xx0

SFP Modules



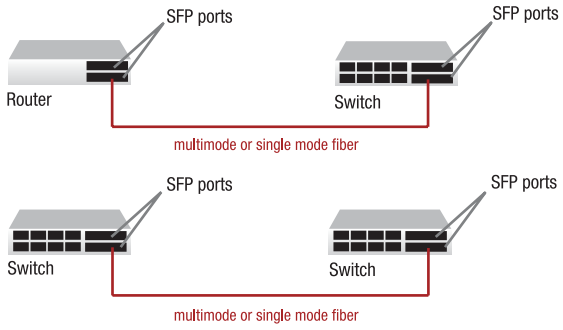
Features

- Course 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 IEEE802.3 100Base-FX

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 116-123]

Standards	IEEE802.3z, IEEE802.3
Output Wavelength	-5.5nm < λ_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 116-123]

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.

TN-J48xxx

SFP Modules

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 IEEE802.3z 1000BASE-SX

TN-J4859C module

- Compliant with IEEE802.3z 1000BASE-LX

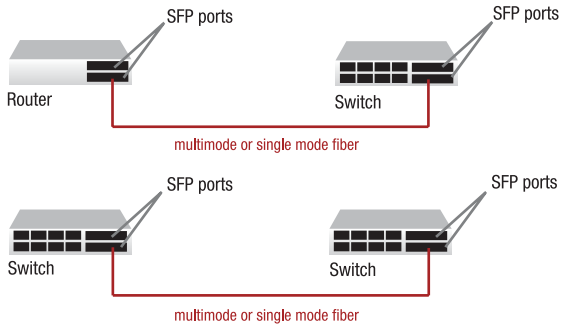
TN-J4860C module

- Compliant with IEEE802.3z 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 116-123]

Standards	IEEE802.3z
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 116-123]

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

NEW PRODUCT

10GBase SFP+ MSA Compatible Duplex LC

TN-10GSFP-xR(x)

10GBase SFP+ Modules

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

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

Specifications

Complete list of fiber optic connector specifications [pg 116-123]

Standards	IEEE802.3ae
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 and connector specifications [pg 116-123]

***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

**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.

NEW PRODUCT

10G XFP MSA Compatible Duplex LC

TN-XFP-xxx

XFP Modules

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

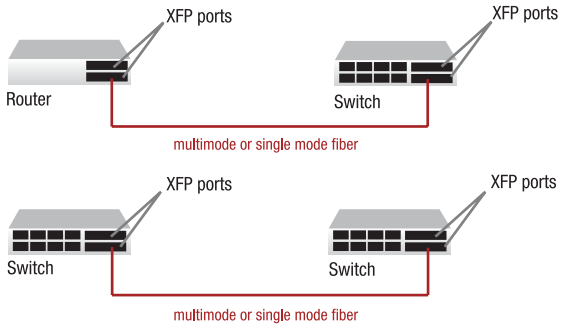
TN-XFP-SR Module

- 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



Applications

- 10G Ethernet Switches and Routers
- 10G Fibre Channel Switch Infrastructure
- Metro Edge Switching

Specifications

Complete list of fiber optic connector specifications [pg 116-123]

Standards	IEEE802.3ae
Output Wavelength	-5.5nm < λ_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:**	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.

Ordering Information

Complete list of fiber optic connector specifications [pg 116-123]

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: 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

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

NEW PRODUCT

TN-X2-10GB-xx

X2 Modules

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

Specifications

Complete list of fiber optic connector specifications [pg 116-123]

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 116-123]

TN-X2-10GB-SR
10GBase-SR
X2 w/Digital Diagnostics (DMI) 850nm (SC)
[62.5/125 uM: 33 m/108 ft]
[50/125 uM: 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 (SC)
[10 km/6.2 mi.] Link Budget: 9.4dB

TN-X2-10GB-ER
10GBase-ER
X2 w/Digital Diagnostics (DMI) 1550nm (SC)
[40 km/24.9 mi.] Link Budget: 15.5dB

Course Wavelength Division Multiplexing (CWDM)

CWDM-xxxxxxxxR

Ordering Information

CWDM- _____ _____ _____ R

Module Type	
A	Add/Drop Mux
M	Mux/Demux

Connectors	
LC	LC/PC
SC	SC/PC

Channel Configuration
(Module Type A Only)

1A451	1 Ch. Add/Drop 1510nm (group 451)
1B451	1 Ch. Add/Drop 1530nm (group 451)
1C451	1 Ch. Add/Drop 1550nm (group 451)
1D451	1 Ch. Add/Drop 1570nm (group 451)
1A453	1 Ch. Add/Drop 1530nm (group 453)
1B453	1 Ch. Add/Drop 1550nm (group 453)
1C453	1 Ch. Add/Drop 1570nm (group 453)
1D453	1 Ch. Add/Drop 1590nm (group 453)
1A455	1 Ch. Add/Drop 1550nm (group 455)
1B455	1 Ch. Add/Drop 1570nm (group 455)
1C455	1 Ch. Add/Drop 1590nm (group 455)
1D455	1 Ch. Add/Drop 1610nm (group 455)
1A847	1 Ch. Add/Drop 1470nm (group 847)
1B847	1 Ch. Add/Drop 1490nm (group 847)
1C847	1 Ch. Add/Drop 1510nm (group 847)
1D847	1 Ch. Add/Drop 1530nm (group 847)
1E847	1 Ch. Add/Drop 1550nm (group 847)
1F847	1 Ch. Add/Drop 1570nm (group 847)
1G847	1 Ch. Add/Drop 1590nm (group 847)
1H847	1 Ch. Add/Drop 1610nm (group 847)

East/West Lines with LC Connector
(Module Type A Only)

21847	1 Ch. Add/Drop 1470 port with E/W Lines
21849	1 Ch. Add/Drop 1490 port with E/W Lines
21851	1 Ch. Add/Drop 1510 port with E/W Lines
21853	1 Ch. Add/Drop 1530 port with E/W Lines
21855	1 Ch. Add/Drop 1550 port with E/W Lines
21857	1 Ch. Add/Drop 1570 port with E/W Lines
21859	1 Ch. Add/Drop 1590 port with E/W Lines
21861	1 Ch. Add/Drop 1610 port with E/W Lines

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

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-A1D847SCR
CWDM Add/Drop Mux Module,
1 channel drop (1530nm)
pass 1470nm ~ 1510nm &
pass 1500nm ~ 1610nm

Features

- Increase bandwidth on existing fiber infrastructure [pg 24]
- 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 24]
- "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

**Note: 1310nm channel is wideband (+/- 50nm)*

Other channel configurations may be available upon request. Please contact Transition Networks.

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 (4 ch. group) Specific Optical Specs		
	Operating Wavelength:	1500nm ~ 1620nm
	Center Wavelength (λ_c):	1510nm ~ 1610nm
	Add/Drop Ch. Max Insertion Loss*:	0.7 dB
	Pass Ch. Max Insertion Loss*:	1.0 dB
1 Channel Add/Drop (8 ch. group) Specific Optical Specs		
	Operating Wavelength:	1460nm ~ 1620nm
	Center Wavelength (λ_c):	1470nm ~ 1610nm
	Add/Drop Ch. Max Insertion Loss*:	0.7 dB
	Pass Ch. Max Insertion Loss*:	1.0 dB
General Optical Specs (applies to all CWDM configurations)		
	CWDM Channel Spacing:	20nm
	CWDM Channel Passband:	-5.5nm < λ_c < +7.5nm
	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 **Width:** 8.3" [212 mm] **Depth**: 7.6" [192 mm] **Height**: 1.7" [43 mm]	Rack Mount Bracket **Width:** 18.9" [481 mm] **Depth**: 1.6" [40 mm] **Height**: 1.7" [44 mm]
Environment	0°C to +70°C operating temperature -40°C to +85°C storage temperature	
Warranty	Lifetime	

24-port 100BASE-X 802.3ah OAM Switch

SM24-100SFP-AH

(24) 100BASE-X SFP Ports, (2) 10/100/1000 RJ-45 Ports, (2) Gigabit Combo Ports Managed Switch

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.

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)

- 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

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 96-104]

SM24-100SFP-ACRPS [pg 107]
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**

NEW PRODUCT

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 178].

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

Ordering Information

SM24-100SFP-ACRPS
(1) Redundant Power Supply Port with 19" Rackmount Ears
Used with: SM24-100SFP-AH

SM24-1000SFP-AH

Layer 2 Gigabit Metro Ethernet Switch

Features:

- 802.3ah Link OAM
- 10G Uplink Ports
- **Auto-negotiation:**
  for port speed and duplex mode [pg 22]
- **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:**
  4K 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 802.3-2005 (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 96-104]

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.

AUTO NEG

8-port 10/100/1000BASE-T Layer 2 Managed Switch

MIL-SM24T4DPA

28-port 10/100/1000BASE-T

Management Features

- Switch Management:
  - CLI via console port or Telnet
  - WEB management
  - SNMP v1, v2c,v3
- Firmware & Configuration:
  - Dual firmware images
  - Firmware upgrade via TFTP server
  - Multiple configuration files
  - Configuration file upload/download via TFTP server
- Supports RMON (groups 1, 2, 3 and 9)
  - Spanning Tree Protocol support IEEE 802.1D STP, IEEE 802.1w RSTP, IEEE 802.1s MSTP
  - IEEE 802.1q VLAN, up tp 255 groups, VLAN tagging ID up to 4093, Q in Q supported
  - Support Private VLAN, IEEE802.1v Protocal-based VLAN
  - Support IEEE802.3ad Link Aggregation Control Protocol : Trunk groups: 32, Trunk links: 2~8
  - Support IGMP V1/V2 snooping, IGMP Queried, GVRP
  - Support Qos: 8 hardware queues per port, IEEE 802.1p CoS, IP Precedence, DSCP, TCP/UDP port number, Access Control List, WRR and Strict scheduling
  - Bandwidth Control: 1Mbps granularity for Egress/Ingress
  - Support IEEE802.1x port-based/ MAC-based Access Control
  - RADIUS/TACACS+ authentication
  - SSH/SSL
  - IP Source Guard
- Supports BOOTP, DHCP for IP address assignment
- Supports DHCP snooping
- Supports DHCP option 82 relay
- Supports SNTP
- Event/Error Log/Syslog
- Dynamic ARP inspection (DAI)

The Transition Networks MIL-SM24T4DPA is a Gigabit Ethernet Layer 2 standalone switch featuring 24 10/100/1000 ports and 4 combo Dual-speed 100/1000 Ethernet RJ-45/SFP ports. It is ideal for high performance server aggregations, such as enterprise data centers, high-end or network attached file servers, high speed workgroups backbone upgrades, or the desktop PC for power users.

Specifications

Standards	IEEE 802.3 10BASE-T; IEEE 802.3u 100BASE-TX; IEEE 802.3ab 1000BASE-T; IEEE 802.3z Gigabit fiber; IEEE 802.3x Flow control and Back-pressure; IEEE 802.1D Spanning Tree Protocol (STP) IEEE 802.1w Rapid Spanning Tree Protocol (RSTP) IEEE 802.1s Multiple Spanning Tree Protocol (MSTP) IEEE 802.1Q VLANs, Port-based VLANs, GVRP, IEEE802.3ad Link Aggregation Control Protocol IEEE 802.1x User Authentication; IEEE 802.1p Class of Service
Connectors	(24) RJ-45 10/100/1000BASE-T Ports (4) combo (RJ-45/SFP) Ports (1) Console Port
MAC Address	8K MAC address table
Power Consumption	54 Watts Maximum
Operating Temperature	0° to 45°C (32° to 104°)
Operating Humidity	5% to 95% (non-condensing)
Dimensions	**Width:** 17.0" [440 mm] **Depth:** 6.7" [172 mm] **Height:** 1.7" [44 mm]
EMI	FCC Class A, VCCI Class A
Safety Compliance	CSA/NRTL, TUV/GS
Technical Support Warranty	Free technical support and advanced warranty support & for 5 years. Includes free telephone support, 24-hour support via web and FTP.

Ordering Information

MIL-SM24T4DPA
24-port 10/100/1000Base-T Switch plus (4) 100/1000Base-x SFP/RJ-45 combo ports includes 19" Rack Mount ears

Optional Accessories *(sold separately)*
SFP Modules [pg 96-104]

Features

- IPV4/IPV6 Dual Stack
- IPv6 Address Types Stack: Multicast/Nicest
- IPv6 Neighbor Discovery
- ICMPv6 Redirect
- IPv6 SNMP/HTTP/Telnet/SSH/RADIUS/TACACS+/ACL

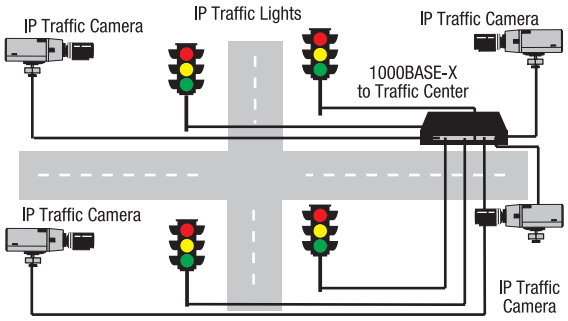
9-port 10/100/1000 Layer 2
Indoor/Protected Outdoor Remote IP-Managed Switch

MIL-SM8002TG
(7) 10/100/1000BASE-T + (2) SFP/RJ-45 Combo Ports

Additional Features

- IGMP query and snooping
- 802.1X Authentication
- RADIUS
- Port Mirroring
- 8K MAC Address
- Telnet/Web-based management
- TFTP firmware and configuration upgrade
- Enable/disable ports
- Auto-Negotiation [pg 22]
- Forced modes, 10H/10H/100H/100F/1000F
- Auto-MDIX on all ports
- 802.3X Flow control and Back-pressure
- 16 Mb System Memory
- 8 Mb Flash ROM
- 1 Mbps Buffer
- Q-inQ VLAN & COS Support
- Broadcast storm filter
- DHCP Client, Relay, Server
- SNTP and SMTP support
- MAC Address Security
- Bandwidth Allocation [pg 24]
- QoS port-based/Tag based, IPv4, Tos/Ipv4, IPv6, DiffServ
- Ingress & Egress MAC address filter & static source MAC address lock

Connect Indoor or Protected Outdoor Ethernet Devices over High Speed Dual Gigabit Links



Specifications

Standards	IEEE Std. 802.3 10BASE-T; IEEE Std. 802.3u 100BASE-TX; IEEE Std. 802.3z Gigabit fiber; IEEE Std. 802.3ab 1000BASE-T; IEEE Std. 802.3x Flow control and Back-pressure; IEEE Std. 802.3ad Port trunk with LACP; IEEE Std. 802.1d Spanning Tree Protocol; IEEE Std. 802.1w Rapid spanning tree; IEEE Std. 802.1p Class of service IEEE Std. 802.1q VLAN Tagging IEEE Std. 802.1x User Authentication
Protocols	CSMA/CD
Technology	Store and Forward switching architecture
Connectors	10/100/1000 copper: 9x RJ-45 with AutoCross™ (Auto MDI/MDI-X), Two SFP ports
MAC Address	8K MAC address table
Memory Buffer	128 Kbytes
Network Cable	**10BASE-T:** 2-pair UTP/STP Cat. 3, 4, 5 cable; EIA/TIA- 568 100-ohm (100 m) **100BASE-TX:** 2-pair UTP/STP Cat. 5 cable; EIA/TIA- 568 100-ohm (100 m); **1000BASE-T:** 4-pair UTP/STP Cat. 5e cable; EIA/TIA- 568 100-ohm (100 m)
Backplane	18 Gbps
LEDs	**RJ-45 port:** 10/100/1000; Link/Activity; Full duplex/Collision **Fiber:** Link/Activity **Power:** On/Off
Power Supply	**Internal power:** 100 – 240 VAC
Power Consumption	10 Watts max.
Operation Temperature	0° to 60°C (32° to 140°F)
Operation Humidity	10% to 90% (non-condensing)
Dimensions	**Width:** 8.5" [217 mm] **Depth:** 5.5" [140 mm] **Height:** 1.7" [43 mm]
EMI	FCC Class A, CE Mark
Safety Compliance	UL, cUL
Technical Support & Warranty	Free technical support and advanced warranty sup port for 5 years. Includes free telephone support, 24-hour support via web and FTP.

Ordering Information

MIL-SM8002TG
9-port 10/100/1000 Indoor/Outdoor Remotely Managed switch with (2) SFP combo Gigabit ports (Gigabit SFP ports)

Optional Accessories *(sold separately)*
SFP Modules [pg 96-104]

Mounting Bracket

MIL-RMSM8 [pg 199]
19" Rack Mount Bracket

MIL-BRSM8 [pg 199]
Wall Mount Bracket

(7) 10/100/1000 ports + (2) SFP/RJ-45 Combo ports

- 7-port 10/100/1000BASE-T Ports
- Auto MDI/MDI-X
- (2) 1000BASE-X SFP/RJ45 combo ports
- Indoor/Outdoor installation up to 60°C (140°F)
- Non-blocking switching architecture
- IEEE 802.1q VLAN
- IEEE 802.1p Class of Service 4 priority queues

Software Features

- **Management:** Remote IP-Based Management, Web Management, SNMP V1/2/3, Telnet, Menu based CLI
- **Firmware update:** TFTP firmware upgrade and configuration backup
- **System default:** Restore function for system default
- **Port Trunk:** Supports IEEE 802.3ad port trunk with link aggregation control protocol (LACP). Up to 3 trunk groups and maximum group member up to 8 ports.
- **VLAN:** Port Based VLAN; IEEE 802.1Q, 4096 VLAN IDs, 256/2048 static/dynamic VLAN groups, 256 GVRP Groups
- **Quality of Service:** Support port based, Tag based and IPv4 ToS, IPv4/IPv6 Diff Serve
- **Class of Service:** Per port supports 4 priority queues
- **Spanning Tree:** Supports IEEE 802.1w rapid spanning tree and IEEE 802.1d
- **Port Mirror:** Supports TX or bi-directional RX packet mirroring
- **IGMP:** Supports IGMP V1, V2
- **Broadcast Storm:** Enable/Disable, 5%, 10%, 20%, 25%

8-port Gigabit Layer 2 Remote IP-Managed Switch

MIL-SM4004TG

(4) port 10/100/1000BASE-T + (4) 100/1000 SFP ports

The MIL-SM4004TG series of layer 2 managed switches provide high performance non-blocking switching. The switch has 4 auto-sensing 10/100/1000BASE-TX RJ-45 ports and 4 dual speed 100/1000 SFP ports.

Management features include port based, dynamic and static VLANs, GVRP, VLAN tagging, IGMP Snooping or querying, port mirroring, port security. Security includes static addressing, filtering and blocking of packets to identified MAC addresses. Four priority queues insure minimum delay for voice over IP or multimedia network data. Non-blocking 16 Gbps architecture assures rapid packet delivery while 8,000 MAC address table provides swift lookup and packet forwarding.

Additional Features

- IGMP query and snooping
- 802.1X Authentication
- Port Mirroring
- 8K MAC Address
- Telnet/Web-based management
- TFTP firmware upgrade
- Enable/disable ports
- Auto-Negotiation [pg 22]
- Forced modes, 10H/10H/100H/100F/1000F
- Auto-MDIX on all ports
- 802.3X Flow control
- Back-pressure
- X-Ring Support
- 1 Mbps Buffer
- Broadcast storm filter
- DHCP Client, Relay, Server
- SNTP and SMTP support
- MAC Address Security
- Bandwidth Allocation [pg 24]
- QoS port-based/Tag based, IPv4, Tos/Ipv4, IPv6, DiffServ
- Ingress & Egress MAC address filter & static source MAC address lock

(4) 10/100/1000 Base-T ports + (4) SFP 1000BASE-X ports

- 4-port 10/100/1000BASE-T
- (4) 100/1000 SFP Ports
- Auto MDI/MDI-X
- Non-blocking switching architecture
- IEEE 802.1q VLAN tagging GVRP/MVR
- IEEE 802.1p Class of Service 4 priority queues

Specifications

Standards	IEEE Std. 802.3 10BASE-T; IEEE Std. 802.3u 100BASE-TX; IEEE Std. 802.3z Gigabit fiber; IEEE Std. 802.3ab 1000BASE-T; IEEE Std. 802.3x Flow control and Back-pressure; IEEE Std. 802.3ad Port trunk with LACP; IEEE Std. 802.1d Spanning Tree Protocol; IEEE Std. 802.1w Rapid spanning tree; IEEE Std. 802.1p Class of service IEEE Std. 802.1q VLAN Tagging IEEE Std. 802.1x User Authentication
Protocols	CSMA/CD
Technology	Store and Forward switching architecture
Connectors	10/100/1000 copper: 4x RJ-45 with AutoCross™ (Auto MDI/MDI-X), 4 100/1000 SFP ports, 1 RS-232 D B-9 Female
MAC Address	8K MAC address table
Packet Buffer	1 Mbps
Network Cable	**10BASE-T:** 2-pair UTP/STP Cat. 3, 4, 5 cable; EIA/TIA-568 100-ohm (100 m) **100BASE-TX:** 2-pair UTP/STP Cat. 5 cable; EIA/TIA-568 100-ohm (100 m); **1000BASE-T:** 4-pair UTP/STP Cat. 5e cable; EIA/TIA-568 100-ohm (100 m)
Backplane	16 Gbps
LEDs	**RJ-45 port:** 10/100/1000; Link/Activity; Full duplex/Collision **Fiber:** Link/Activity **Power:** On/Off
Power Supply	Internal power: 100 – 240 VAC 50/6 0Hz
Power Consumption	15 Watts max.
Operation Temperature	0° to 45°C (32° to 113°F)
Operation Humidity	10% to 90% (non-condensing)
Dimensions	**Width:** 8.54" [217 mm] **Depth:** 5.51" [140 mm] **Height:** 1.69" [43 mm]
EMI	FCC Class A, CE Mark
Safety Compliance	UL, cUL
Technical Support & Warranty	Free technical support and advanced warranty support for 5 years. Includes free telephone support, 24-hour support via web and FTP.

Ordering Information

MIL-SM4004TG
4-port 10/100/1000
Remotely Managed switch with
(4) Dual-Speed SFP Ports

Optional Accessories *(sold separately)*

SFP Modules [pg 96-104]

Mounting Bracket

MIL-RMSM8 [pg 199]
19" Rack Mount Bracket

MIL-BRSM8 [pg 199]
Wall Mount Bracket

Software Features

- **Management:**
  Remote IP-Based Management, Web Management, SNMP V1/2/3, Telnet, Menu based CLI
- **Firmware update:**
  TFTP firmware upgrade and configuration backup
- **System default:**
  Restore function for system default
- **Port Trunk:**
  Supports IEEE 802.3ad port trunk with link aggregation control protocol (LACP). The trunk group up to 2 and maximum trunk port member up to 2 ports.
- **VLAN:**
  Port Based VLAN; IEEE 802.1Q, 4096 VLAN IDs, 256/2048 static/dynamic VLAN groups, 256 GVRP Groups
- **Quality of Service:**
  Support port based, Tag based and IPv4 ToS
- **Class of Service:**
  4 priority queues
- **Spanning Tree:**
  Supports IEEE 802.1w rapid spanning tree and IEEE 802.1d
- **Port Mirror:**
  Supports TX/RX/Bi-Directional packet mirror
- **IGMP:**
  Supports IGMP V1, V2
- **Storm Control**
  Bandwidth Allocation on Broadcast [pg 24]

Switch Mounting

Wall Mount Accessories & Rack Mount Assembly

The MILAN range of switches have the power and design to operate in multiple environments; as a desktop, workgroup or departmental switch.

In order to meet the demands of various operating environments, these products have been designed to accommodate switch mounting accessories to allow for wall or rack mounting of the devices.

MIL-BRSW

MIL-BRSW801W

MIL-RMSM8; MIL-RMS801; MIL-SM8TX MIL-BRSM8

Ordering Information

MIL-BRSW
Wall Mount Accessory for
MIL-S500, MIL-S501 and MIL-S800

MIL-BRSM801W
Wall Mount Accessory for MIL-SM800

MIL-RMSM8
19" Rack Mount Assembly
for MIL-SM8002TG, MIL-SM4004TG
and MIL-SM802GAF

MIL-RMS801
19" Rack Mount Assembly
for MIL-SM800x

MIL-RMSM8TX
19" Rack Mount Assembly
for MIL-SM8TXAF2GPA

MIL-BRSM8
Wall Mount Bracket
for MIL-SM8002TG, MIL-SM4004TG,
MIL-SM8T1GPA, MIL-SM802GAF,
and MIL-SM8TXAF2GPA

Features

- Flexibility in design and deployment
- Securely fasten to wall or desk
- 19" rack mount options

Specifications

Warranty	Comprehensive 5 years

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 course, 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:

$$\text{Fiber Length} = \frac{[\text{Optical budget}] - [\text{link loss}]}{[\text{fiber loss/km}]}$$

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.

$$\text{Fiber Length} = \frac{[(-8.0\ \text{dB}) - (-34.0\ \text{dB})] - [0.3\ \text{dB} \times 5] - [0.75\ \text{dB} \times 2] - [3.0\ \text{dB}]}{[0.4\ \text{dB/km}]}$$

$$\text{Fiber Length} = \frac{[26.0\ \text{dB}] - [0.5\ \text{dB}] - [1.5\ \text{dB}] - [3.0\ \text{dB}]}{[0.4\ \text{dB/km}]} = 52.5\ \text{km}$$

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.

Industrial Test Levels

EMS Type Tests				
Test		**Description**	**Test Levels**	**Severity Level**
IEC61000-4-2	ESD	Air Discharge	+/- 8KV	3
		Contact Discharge	+/- 6KV	3
		ESD Contact Indirect	+/- 6KV	3
IEC61000-4-3	Radiated RFI	Housing	10V/m, 80 MHz – 1 GHz AM 1 KHz, 80% modulation 10V/m, 0.9 – 1.8 GHz FM 200 Hz, 50% modulation	3
IEC61000-4-4	Burst (Fast Transient)	PWR Supply Lines	+/- 2KV	3
		Communication Lines	+/- 1KV	3
		Relay	+/- 1KV	3
IEC61000-4-5	Surge	PWR Supply Lines	+/- 2KV, 12 ohm, CM +/- 1KV, 2 ohm, DM	3
		Relay	+/- 2KV, 12 ohm, CM +/- 1KV, 2 ohm, DM	3
IEC61000-4-6	Induced (Conducted RFI)	PWR Supply Lines	10 Vrms, 150 KHz – 80 MHz AM 1 KHz, 80% modulation	3
		Communication Lines	10 Vrms, 150 KHz – 80 MHz AM 1 KHz, 80% modulation	3
		Relay	10 Vrms, 150 KHz – 80 MHz AM 1 KHz, 80% modulation	3

Environmental Type Tests			
Test		**Description**	**Test Levels**
IEC60068-2-6	Vibration		10 – 500 – 10 HZ, 0.5 oct./min, 4g, X, Y, Z (3 axes)
IEC60068-2-27	Shock		50 g, 11ms, 4g, +/- X, +/- Y, +/- Z (6 direction)
IEC60068-2-32	Free Fall		75 cm, 1 corner, 3 edges, 6 faces (total 10 drops)

Fiber Specification Table

Product SKU	Min TX PWR	Max TX PWR	RX Sensitivity	Max In PWR	Link Budget	Page
C2110-1011	-19.0 dBm	-13.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	78
C2110-1013	19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	78
C2110-1014	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	78
C2110-1015	-5.0 dBm	-2.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	78
C2110-1016	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	78
C2110-1017	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	78
C2110-1019	-15.2 dBm	-8.0 dBm	-32.5 dBm	-3.0 dBm	17.3 dB	78
C2110-1029-A1	-14.0 dBm	-8.0 dBm	-33.0 dBm	-3.0 dBm	19.0 dB	78
C2110-1029-A2	-14.0 dBm	-8.0 dBm	-33.0 dBm	-3.0 dBm	19.0 dB	78
C2110-1029-B1	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	78
C2110-1029-B2	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	78
C2110-1029-D1	-2.0 dBm	3.0 dBm	-35.0 dBm	-3.0 dBm	33.0 dB	78
C2110-1029-D2	-3.0 dBm	2.0 dBm	-35.0 dBm	-3.0 dBm	32.0 dB	78
C2110-1035	0.0 dBm	5.0 dBm	-36.0 dBm	-3.0 dBm	36.0 dB	78
C2210-1011	-19.0 dBm	-13.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	79
C2210-1013	19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	79
C2210-1014	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	79
C2210-1015	-5.0 dBm	-2.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	79
C2210-1016	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	79
C2210-1017	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	79
C2210-1019	-15.2 dBm	-8.0 dBm	-32.5 dBm	-3.0 dBm	17.3 dB	79
C2210-1029-A1	-14.0 dBm	-8.0 dBm	-33.0 dBm	-3.0 dBm	19.0 dB	79
C2210-1029-A2	-14.0 dBm	-8.0 dBm	-33.0 dBm	-3.0 dBm	19.0 dB	79
C2210-1029-B1	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	79
C2210-1029-B2	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	79
C2210-1035	0.0 dBm	5.0 dBm	-36.0 dBm	-3.0 dBm	36.0 dB	79
C2210-1039	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	79
C2220-1011	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	80
C2220-1011-D	-19.0 dBm	-12.0 dBm	-31.0 dBm	-8.0 dBm	12.0 dB	80
C2220-1013	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	80
C2220-1013-D	-19.0 dBm	-12.0 dBm	-31.0 dBm	-8.0 dBm	12.0 dB	80
C2220-1014	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	80
C2220-1014-D	-14.0 dBm	-8.0 dBm	-32.0 dBm	-8.0 dBm	18.0 dB	80
C2220-1015	-5.0 dBm	-2.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	80
C2220-1015-D	-10.0 dBm	-4.0 dBm	-34.0 dBm	-8.0 dBm	24.0 dB	80
C2220-1016	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	32.0 dB	80
C2220-1017	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	80
C2220-1029-A1	-14.0 dBm	-8.0 dBm	-33.0 dBm	-3.0 dBm	19.0 dB	80
C2220-1029-A2	-14.0 dBm	-8.0 dBm	-33.0 dBm	-3.0 dBm	19.0 dB	80
C2220-1029-B1	8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	80
C2220-1029-B2	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	80
C2220-1029-DA1	-14.0 dBm	-8.0 dBm	-33.0 dBm	-8.0 dBm	19.0 dB	80
C2220-1029-DA2	-14.0 dBm	-8.0 dBm	-33.0 dBm	-8.0 dBm	19.0 dB	80
C3110-1013	-9.5 dBm	-4.0 dBm	-18.0 dBm	0.0 dBm	8.5 dB	81
C3110-1014	-9.5 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	10.5 dB	81
C3110-1015	-5.0 dBm	0.0 dBm	-20.0 dBm	-3.0 dBm	15.0 dB	81
C3110-1017	-3.0 dBm	2.0 dBm	-24.0 dBm	-3.0 dBm	21.0 dB	81
C3110-1024	-10.0 dBm	-3.0 dBm	-17.0 dBm	-3.0 dBm	7.0 dB	81
C3110-1029-A1	-8.0 dBm	-3.0 dBm	-21.0 dBm	-3.0 dBm	13.0 dB	81
C3110-1029-A2	-8.0 dBm	-3.0 dBm	-21.0 dBm	-3.0 dBm	13.0 dB	81
C3110-1029-B1	-3.0 dBm	2.0 dBm	-23.0 dBm	-3.0 dBm	20.0 dB	81
C3110-1029-B2	-3.0 dBm	2.0 dBm	-23.0 dBm	-3.0 dBm	20.0 dB	81
C3110-1035	0.0 dBm	5.0 dBm	-27.0 dBm	-3.0 dBm	27.0 dB	81
C3210-1013	-9.5 dBm	-4.0 dBm	-18.0 dBm	0.0 dBm	8.5 dB	82
C3210-1014	-9.5 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	10.5 dB	82
C3210-1015	-5.0 dBm	0.0 dBm	-20.0 dBm	-3.0 dBm	15.0 dB	82
C3210-1017	-3.0 dBm	2.0 dBm	-24.0 dBm	-3.0 dBm	21.0 dB	82
C3210-1024	-10.0 dBm	-3.0 dBm	-17.0 dBm	-3.0 dBm	7.0 dB	82
C3210-1029-A1	-8.0 dBm	-3.0 dBm	-21.0 dBm	-3.0 dBm	13.0 dB	82
C3210-1029-A2	8.0 dBm	-3.0 dBm	-21.0 dBm	-3.0 dBm	13.0 dB	82
C3210-1029-B1	-3.0 dBm	2.0 dBm	-23.0 dBm	-3.0 dBm	20.0 dB	82
C3210-1029-B2	-3.0 dBm	2.0 dBm	-23.0 dBm	-3.0 dBm	20.0 dB	82
C3210-1029-D1	-2.0 dBm	3.0 dBm	-26.0 dBm	-3.0 dBm	24.0 dB	82
C3210-1029-D2	-2.0 dBm	3.0 dBm	-26.0 dBm	-3.0 dBm	24.0 dB	82
C3210-1035	0.0 dBm	5.0 dBm	-27.0 dBm	-3.0 dBm	27.0 dB	82
C3220-1013	-9.5 dBm	-4.0 dBm	-18.0 dBm	0.0 dBm	8.5 dB	83
C3220-1013-D	-9.0 dBm	-4.0 dBm	-18.0 dBm	0.0 dBm	9.0 dB	83
C3220-1014	-9.5 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	10.5 dB	83
C3220-1014-D	-9.0 dBm	-3.0 dBm	-21.0 dBm	-3.0 dBm	12.0 dB	83
C3220-1015	0.0 dBm	0.0 dBm	-20.0 dBm	-3.0 dBm	15.0 dB	83
C3220-1015-D	0.0 dBm	0.0 dBm	-24.0 dBm	-3.0 dBm	19.0 dB	83
C3220-1017	-3.0 dBm	2.0 dBm	-24.0 dBm	-3.0 dBm	21.0 dB	83
C3220-1029-A1	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	83
C3220-1029-A2	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	83
C3220-1029-B1	-3.0 dBm	2.0 dBm	-23.0 dBm	-3.0 dBm	20.0 dB	83
C3220-1029-B2	-3.0 dBm	2.0 dBm	-23.0 dBm	-3.0 dBm	20.0 dB	83
C3220-1029-DA1	-9.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	11.0 dB	83
C3220-1029-DA2	-9.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	11.0 dB	83
C3220-1035	0.0 dBm	5.0 dBm	-27.0 dBm	-3.0 dBm	27.0 dB	83
C3230-1013	-9.5 dBm	-4.0 dBm	-18.0 dBm	0.0 dBm	8.5 dB	84
C3230-1013-D	-9.0 dBm	-4.0 dBm	-18.0 dBm	0.0 dBm	9.0 dB	84
C3230-1014	-9.5 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	10.5 dB	84
C3230-1014-D	-9.0 dBm	-3.0 dBm	-21.0 dBm	-3.0 dBm	12.0 dB	84
C3230-1015	0.0 dBm	0.0 dBm	-20.0 dBm	-3.0 dBm	15.0 dB	84
C3230-1015-D	0.0 dBm	0.0 dBm	-24.0 dBm	-3.0 dBm	19.0 dB	84
C3230-1017	-3.0 dBm	2.0 dBm	-24.0 dBm	-3.0 dBm	21.0 dB	84
C3230-1029-A1	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	84
C3230-1029-A2	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	84
C3230-1029-B1	-3.0 dBm	2.0 dBm	-23.0 dBm	-3.0 dBm	20.0 dB	84
C3230-1029-B2	-3.0 dBm	2.0 dBm	-23.0 dBm	-3.0 dBm	20.0 dB	84
C3230-1029-DA1	-9.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	11.0 dB	84
C3230-1029-DA2	-9.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	11.0 dB	84
C3230-1035	0.0 dBm	5.0 dBm	-27.0 dBm	-3.0 dBm	27.0 dB	84
C4TEF1011-100	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	51
C4TEF1011-110	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	52
C4TEF1013-100	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	51
C4TEF1013-110	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	52
C4TEF1014-100	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	51
C4TEF1014-110	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	52
C4TEF1015-100	-8.0 dBm	-2.0 dBm	-34.0 dBm	-7.0 dBm	26.0 dB	51
C4TEF1015-110	-8.0 dBm	-2.0 dBm	-34.0 dBm	-7.0 dBm	26.0 dB	52
C4TEF1016-100	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	51
C4TEF1016-110	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	52
C4TEF1017-100	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	51

Fiber Specification Table

Product SKU	Min TX PWR	Max TX PWR	RX Sensitivity	Max In PWR	Link Budget	Page
C4TEF1017-110	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	52
C4TEF1029-100	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	51
C4TEF1029-101	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	51
C4TEF1029-102	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	51
C4TEF1029-103	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	51
C4TEF1029-110	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	52
C4TEF1029-111	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	52
C4TEF1029-112	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	52
C4TEF1029-113	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	52
C4TEF1035-100	0.0 dBm	5.0 dBm	-36.0 dBm	-3.0 dBm	36.0 dB	51
C4TEF1035-110	0.0 dBm	5.0 dBm	-36.0 dBm	-3.0 dBm	36.0 dB	52
CBFFG1013-105	-9.5 dBm	-4.0 dBm	-17.0 dBm	0.0 dBm	7.5 dB	43
CBFFG1013-115	-9.0 dBm	-4.0 dBm	-18.0 dBm	0.0 dBm	9.0 dB	43
CBFFG1014-105	-9.5 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	10.5 dB	43
CBFFG1014-115	-9.0 dBm	-3.0 dBm	-21.0 dBm	-3.0 dBm	12.0 dB	43
CBFFG1015-105	-5.0 dBm	0.0 dBm	-20.0 dBm	-3.0 dBm	15.0 dB	43
CBFFG1015-115	-5.0 dBm	0.0 dBm	-24.0 dBm	-3.0 dBm	19.0 dB	43
CBFFG1017-105	-3.0 dBm	2.0 dBm	-24.0 dBm	-3.0 dBm	21.0 dB	43
CBFFG1024-105	-10.0 dBm	-3.0 dBm	-17.0 dBm	-3.0 dBm	7.0 dB	43
CBFFG1035-105	0.0 dBm	5.0 dBm	-27.0 dBm	-3.0 dBm	27.0 dB	43
CBFFG1029-105	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	43
CBFFG1029-115	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	43
CBFFG1029-106	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	43
CBFFG1029-116	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	43
CBFFG1029-107	-3.0 dBm	2.0 dBm	-23.0 dBm	-3.0 dBm	20.0 dB	43
CBFFG1029-108	-3.0 dBm	2.0 dBm	-23.0 dBm	-3.0 dBm	20.0 dB	43
CCSCF3011-110	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	48
CCSCF3013-110	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	48
CCSCF3014-110	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	48
CCSCF3015-110	-8.0 dBm	-2.0 dBm	-34.0 dBm	-7.0 dBm	26.0 dB	48
CCSCF3016-110	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	48
CCSCF3017-110	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	48
CCSCF3029-110	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	48
CCSCF3029-111	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	48
CCSCF3029-112	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	48
CCSCF3029-113	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	48
CCSCF3029-114	-5.0 dBm	0.0 dBm	-34.0 dBm	-3.0 dBm	29.0 dB	48
CCSCF3029-115	-5.0 dBm	0.0 dBm	-34.0 dBm	-3.0 dBm	29.0 dB	48
CCSCF3029-116	-3.0 dBm	2.0 dBm	-35.0 dBm	-3.0 dBm	32.0 dB	48
CCSCF3029-117	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	48
CFBRM1011-100	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	42
CFBRM1011-110	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	42
CFBRM1013-100	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	42
CFBRM1013-110	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	42
CFBRM1014-100	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	42
CFBRM1014-110	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	42
CFBRM1015-100	-8.0 dBm	-2.0 dBm	-34.0 dBm	-7.0 dBm	26.0 dB	42
CFBRM1015-110	-8.0 dBm	-2.0 dBm	-34.0 dBm	-7.0 dBm	26.0 dB	42
CFBRM1016-100	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	42
CFBRM1017-100	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	42
CFBRM1029-100	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	42
CFBRM1029-101	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	42
CFBRM1029-102	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	42
CFBRM1029-103	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	42
CFBRM1029-110	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	42
CFBRM1029-111	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	42
CFBRM1035-100	0.0 dBm	5.0 dBm	-36.0 dBm	-3.0 dBm	36.0 dB	42
CFMFF1313-200	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	41
CFMFF1313-220	-10.0 dBm	-4.0 dBm	-17.0 dBm	0.0 dBm	7.0 dB	44
CFMFF1314-200 MM	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	41
CFMFF1314-200 SM	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	41
CFMFF1314-220 MM	-10.0 dBm	-4.0 dBm	-17.0 dBm	0.0 dBm	7.0 dB	44
CFMFF1314-220 SM	-13.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	7.0 dB	44
CFMFF1314-280 MM	-10.0 dBm	-4.0 dBm	-17.0 dBm	0.0 dBm	7.0 dB	45
CFMFF1314-280 SM	-2.0 dBm	3.0 dBm	-35.0 dBm	-3.0 dBm	33.0 dB	45
CFMFF1315-200 MM	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	41
CFMFF1315-200 SM	-8.0 dBm	-2.0 dBm	-34.0 dBm	-7.0 dBm	26.0 dB	41
CFMFF1315-220 MM	-10.0 dBm	-4.0 dBm	-17.0 dBm	0.0 dBm	7.0 dB	44
CFMFF1315-220 SM	-5.0 dBm	0.0 dBm	-20.0 dBm	-3.0 dBm	15.0 dB	44
CFMFF1315-280 MM	-10.0 dBm	-4.0 dBm	-17.0 dBm	0.0 dBm	7.0 dB	45
CFMFF1315-280 SM	-5.0 dBm	0.0 dBm	-20.0 dBm	-3.0 dBm	15.0 dB	45
CFMFF1316-200 MM	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	41
CFMFF1316-200 SM	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	41
CFMFF1317-200 MM	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	41
CFMFF1317-200 SM	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	41
CFMFF1317-220 MM	-10.0 dBm	-4.0 dBm	-17.0 dBm	0.0 dBm	7.0 dB	44
CFMFF1317-220 SM	-3.0 dBm	2.0 dBm	-23.0 dBm	-3.0 dBm	20.0 dB	44
CFMFF1317-280 MM	-10.0 dBm	-4.0 dBm	-17.0 dBm	0.0 dBm	7.0 dB	45
CFMFF1317-280 SM	-3.0 dBm	2.0 dBm	-24.0 dBm	-3.0 dBm	21.0 dB	45
CFMFF1324-220 MM	-10.0 dBm	-4.0 dBm	-17.0 dBm	0.0 dBm	7.0 dB	44
CFMFF1324-220 MME	-10.0 dBm	-3.0 dBm	-17.0 dBm	-3.0 dBm	7.0 dB	44
CFMFF1324-280 MM	-10.0 dBm	-4.0 dBm	-17.0 dBm	0.0 dBm	7.0 dB	45
CFMFF1324-280 MME	-10.0 dBm	-3.0 dBm	-17.0 dBm	-3.0 dBm	7.0 dB	45
CFMFF1329-200 MM	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	41
CFMFF1329-200 SM	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	41
CFMFF1329-201 MM	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	41
CFMFF1329-201 SM	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	41
CFMFF1329-202 MM	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	41
CFMFF1329-202 SM	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	41
CFMFF1329-203 MM	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	41
CFMFF1329-203 SM	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	41
CFMFF1329-220 MM	-19.0 dBm	-14.0 dBm	-26.0 dBm	-14.0 dBm	7.0 dB	44
CFMFF1329-220 SM	-8.0 dBm	-3.0 dBm	-21.0 dBm	-3.0 dBm	13.0 dB	44
CFMFF1329-221 MM	-19.0 dBm	-14.0 dBm	-26.0 dBm	-14.0 dBm	7.0 dB	44
CFMFF1329-221 SM	-8.0 dBm	-3.0 dBm	-21.0 dBm	-3.0 dBm	13.0 dB	44
CFMFF1329-222 MM	-19.0 dBm	-14.0 dBm	-26.0 dBm	-14.0 dBm	7.0 dB	44
CFMFF1329-222 SM	-3.0 dBm	2.0 dBm	-23.0 dBm	-8.0 dBm	20.0 dB	44
CFMFF1329-223 MM	-19.0 dBm	-14.0 dBm	-26.0 dBm	-14.0 dBm	7.0 dB	44
CFMFF1329-223 SM	-3.0 dBm	2.0 dBm	-23.0 dBm	-8.0 dBm	20.0 dB	44
CFMFF1329-280 MM	-10.0 dBm	-4.0 dBm	-17.0 dBm	0.0 dBm	7.0 dB	45
CFMFF1329-280 SM	-8.0 dBm	-3.0 dBm	-21.0 dBm	-3.0 dBm	13.0 dB	45
CFMFF1329-281 MM	-10.0 dBm	-4.0 dBm	-17.0 dBm	0.0 dBm	7.0 dB	45
CFMFF1329-281 SM	-8.0 dBm	-3.0 dBm	-21.0 dBm	-3.0 dBm	13.0 dB	45
CFMFF1329-282 MM	-10.0 dBm	-4.0 dBm	-17.0 dBm	0.0 dBm	7.0 dB	45

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Product SKU	Min TX PWR	Max TX PWR	RX Sensitivity	Max In PWR	Link Budget	Page
CFMFF1329-282 SM	-3.0 dBm	2.0 dBm	-23.0 dBm	-8.0 dBm	20.0 dB	45
CFMFF1329-283 MM	-10.0 dBm	-4.0 dBm	-17.0 dBm	0.0 dBm	7.0 dB	45
CFMFF1329-283 SM	-3.0 dBm	2.0 dBm	-23.0 dBm	-8.0 dBm	20.0 dB	45
CFMFF1329-286 MM	-10.0 dBm	-4.0 dBm	-17.0 dBm	0.0 dBm	7.0 dB	45
CFMFF1329-286 SM	-2.0 dBm	3.0 dBm	-26.0 dBm	-3.0 dBm	24.0 dBm	45
CFMFF1329-287 MM	-2.0 dBm	3.0 dBm	-26.0 dBm	-3.0 dBm	24.0 dB	45
CFMFF1329-287 SM	-2.0 dBm	3.0 dBm	-26.0 dBm	-3.0 dBm	24.0 dB	45
CFMFF1335-220 MM	-10.0 dBm	-4.0 dBm	-17.0 dBm	0.0 dBm	7.0 dB	44
CFMFF1335-220 SM	0.0 dBm	5.0 dBm	-27.0 dBm	-3.0 dBm	27.0 dB	44
CFMFF1335-280 MM	-10.0 dBm	-4.0 dBm	-17.0 dBm	0.0 dBm	7.0 dB	45
CFMFF1335-280 SM	0.0 dBm	5.0 dBm	-27.0 dBm	-3.0 dBm	27.0 dB	45
CFMFF1414-200 SM	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	41
CFMFF1414-220 SM	-13.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	7.0 dB	44
CFMFF1414-280 SM	-13.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	7.0 dB	45
CFMFF1415-200 SM	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	41
CFMFF1415-200 SM	-8.0 dBm	-2.0 dBm	-34.0 dBm	-7.0 dBm	26.0 dB	41
CFMFF1424-220 MM	-10.0 dBm	-3.0 dBm	-17.0 dBm	-3.0 dBm	7.0 dB	44
CFMFF1424-220 SM	-13.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	7.0 dB	44
CFMFF1429-200 MM	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	41
CFMFF1429-200 SM	-13.0 dBm	-6.0 dBm	-32.0 dBm	-6.0 dBm	19.0 dB	41
CFMFF1429-201 MM	15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	41
CFMFF1429-201 SM	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	41
CFMFF1429-202 MM	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	41
CFMFF1429-202 SM	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	41
CFMFF1429-203 MM	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	41
CFMFF1429-203 SM	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	41
CRMFE1011-200	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	40
CRMFE1013-200	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	40
CRMFE1014-200	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	40
CRMFE1015-200	-8.0 dBm	-2.0 dBm	-34.0 dBm	-7.0 dBm	26.0 dB	40
CRMFE1016-200	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	40
CRMFE1017-200	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	40
CRMFE1029-200	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	40
CRMFE1029-201	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	40
CRMFE1029-202	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	40
CRMFE1029-203	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	40
CRMFE1035-200	0.0 dBm	5.0 dBm	-36.0 dBm	-3.0 dBm	36.0 dB	40
CSDTF1011-120	-19.0 dBm	-14.0 dBm	-32.5 dBm	-14.0 dBm	13.5 dB	50
CSDTF1012-120	-27.0 dBm	-10.0 dBm	-34.0 dBm	-14.0 dBm	7.0 dB	50
CSDTF1013-120	-19.0 dBm	-14.0 dBm	-32.5 dBm	-14.0 dBm	13.5 dB	50
CSDTF1014-120	-19.0 dBm	-14.0 dBm	-34.0 dBm	-3.0 dBm	15.0 dB	50
CSDTF1015-120	-8.0 dBm	-2.0 dBm	-38.0 dBm	-8.0 dBm	30.0 dB	50
CSDTF1016-120	-5.0 dBm	0.0 dBm	-38.0 dBm	-7.0 dBm	33.0 dB	50
CSDTF1017-120	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	50
CSDTF1022-120	-15.0 dBm	-5.0 dBm	-25.0 dBm	-14.0 dBm	10.0 dB	50
CSDTF1027-120	-19.0 dBm	-15.0 dBm	-32.5 dBm	-14.0 dBm	13.5 dB	50
CSDTF1029-120	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	50
CSDTF1029-121	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	50
CSDTF1029-122	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	50
CSDTF1029-123	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	50
E-100BTX-FX-05	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	85
E-100BTX-FX-05(100)	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	85
E-100BTX-FX-05(101)	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	85
E-100BTX-FX-05(102)	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	85
E-100BTX-FX-05(103)	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	85
E-100BTX-FX-05(LC)	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	85
E-100BTX-FX-05(LH)	-8.0 dBm	-2.0 dBm	-34.0 dBm	-7.0 dBm	26.0 dB	85
E-100BTX-FX-05(LW)	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	85
E-100BTX-FX-05(MT)	-19.0 dBm	-14.0 dBm	-33.5 dBm	-14.0 dBm	14.5 dB	85
E-100BTX-FX-05(SC)	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	85
E-100BTX-FX-05(SM)	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	85
E-100BTX-FX-05(SMLC)	-15.2 dBm	-8.0 dBm	-32.5 dBm	-3.0 dBm	17.3 dB	85
E-100BTX-FX-05(XL)	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	85
E-100BTX-FX-05(XLW)	0.0 dBm	5.0 dBm	-36.0 dBm	-3.0 dBm	36.0 dB	85
F-SM-MM-02 MM	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	57
F-SM-MM-02 SM	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	57
F-SM-MM-02(LH) MM	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	57
F-SM-MM-02(LH) SM	-8.0 dBm	-2.0 dBm	-34.0 dBm	-7.0 dBm	26.0 dB	57
F-SM-MM-02(LW) MM	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	57
F-SM-MM-02(LW) SM	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	57
F-SM-MM-02(XL) MM	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	57
F-SM-MM-02(XL) SM	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	57
F-SM-MM-06 MM	-19.0 dBm	-14.0 dBm	-26.0 dBm	-14.0 dBm	7.0 dB	66
F-SM-MM-06 SM	-15.0 dBm	-8.0 dBm	-28.0 dBm	-7.0 dBm	13.0 dB	66
F-SM-MM-06(XL) MM	-19.0 dBm	-14.0 dBm	-26.0 dBm	-14.0 dBm	7.0 dB	66
F-SM-MM-06(XL) SM	-3.0 dBm	2.0 dBm	-29.0 dBm	-7.0 dBm	26.0 dB	66
S2220-1011	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	87
S2220-1011-D	-19.0 dBm	-12.0 dBm	-31.0 dBm	-8.0 dBm	12.0 dB	87
S2220-1013	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	87
S2220-1013-D	-19.0 dBm	-12.0 dBm	-31.0 dBm	-8.0 dBm	12.0 dB	87
S2220-1014	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	87
S2220-1014-D	-14.0 dBm	-8.0 dBm	-32.0 dBm	-8.0 dBm	18.0 dB	87
S2220-1015	-5.0 dBm	-2.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	87
S2220-1015-D	-10.0 dBm	-4.0 dBm	-34.0 dBm	-8.0 dBm	24.0 dB	87
S2220-1016	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	87
S2220-1017	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	87
S2220-1029-A1	-14.0 dBm	-8.0 dBm	-33.0 dBm	-3.0 dBm	19.0 dB	87
S2220-1029-A2	-14.0 dBm	-8.0 dBm	-33.0 dBm	-3.0 dBm	19.0 dB	87
S2220-1029-B1	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	87
S2220-1029-B2	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	87
S2220-1029-DA1	-14.0 dBm	-8.0 dBm	-33.0 dBm	-8.0 dBm	19.0 dB	87
S2220-1029-DA2	14.0 dBm	-8.0 dBm	-33.0 dBm	-8.0 dBm	19.0 dB	87
S2220-1035	0.0 dBm	5.0 dBm	-36.0 dBm	-3.0 dBm	36.0 dB	87
S3220-1013	-9.5 dBm	-4.0 dBm	-18.0 dBm	0.0 dBm	8.5 dB	91
S3220-1013-D	-9.0 dBm	-4.0 dBm	-18.0 dBm	0.0 dBm	9.0 dB	91
S3220-1014	-9.5 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	10.5 dB	91
S3220-1014-D	-9.0 dBm	-3.0 dBm	-21.0 dBm	-3.0 dBm	12.0 dB	91
S3220-1015	0.0 dBm	0.0 dBm	-20.0 dBm	-3.0 dBm	15.0 dB	91
S3220-1015-D	0.0 dBm	0.0 dBm	-24.0 dBm	-3.0 dBm	19.0 dB	91
S3220-1017	-3.0 dBm	2.0 dBm	-24.0 dBm	-3.0 dBm	21.0 dB	91
S3220-1029-A1	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	91
S3220-1029-A2	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	91
S3220-1029-B1	-3.0 dBm	2.0 dBm	-23.0 dBm	-3.0 dBm	20.0 dB	91
S3220-1029-B2	-3.0 dBm	2.0 dBm	-23.0 dBm	-3.0 dBm	20.0 dB	91

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Product SKU	Min TX PWR	Max TX PWR	RX Sensitivity	Max In PWR	Link Budget	Page
S3220-1029-DA1	-9.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	11.0 dB	91
S3220-1029-DA2	-9.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	11.0 dB	91
S3220-1035	0.0 dBm	5.0 dBm	-27.0 dBm	-3.0 dBm	27.0 dB	91
S3230-1013	-9.5 dBm	-4.0 dBm	-18.0 dBm	0.0 dBm	8.5 dB	92
S3230-1013-D	-9.0 dBm	-4.0 dBm	-18.0 dBm	0.0 dBm	9.0 dB	92
S3230-1014	-9.5 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	10.5 dB	92
S3230-1014-D	-9.0 dBm	-3.0 dBm	-21.0 dBm	-3.0 dBm	12.0 dB	92
S3230-1015	0.0 dBm	0.0 dBm	-20.0 dBm	-3.0 dBm	15.0 dB	92
S3230-1015-D	0.0 dBm	0.0 dBm	-24.0 dBm	-3.0 dBm	19.0 dB	92
S3230-1017	-3.0 dBm	2.0 dBm	-24.0 dBm	-3.0 dBm	21.0 dB	92
S3230-1029-A1	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	92
S3230-1029-A2	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	92
S3230-1029-B1	-3.0 dBm	2.0 dBm	-23.0 dBm	-3.0 dBm	20.0 dB	92
S3230-1029-B2	-3.0 dBm	2.0 dBm	-23.0 dBm	-3.0 dBm	20.0 dB	92
S3230-1029-DA1	-9.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	11.0 dB	92
S3230-1029-DA2	-9.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	11.0 dB	92
S3230-1035	0.0 dBm	5.0 dBm	-27.0 dBm	-3.0 dBm	27.0 dB	92
S4TEF1011-100	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	72
S4TEF1011-110	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	73
S4TEF1013-100	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	72
S4TEF1013-110	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	73
S4TEF1014-100	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	72
S4TEF1014-110	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	73
S4TEF1015-100	-8.0 dBm	-2.0 dBm	-34.0 dBm	-7.0 dBm	26.0 dB	72
S4TEF1015-110	-8.0 dBm	-2.0 dBm	-34.0 dBm	-7.0 dBm	26.0 dB	73
S4TEF1016-100	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	72
S4TEF1016-110	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	73
S4TEF1017-100	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	72
S4TEF1017-110	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	73
S4TEF1029-100	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	72
S4TEF1029-101	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	72
S4TEF1029-102	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	72
S4TEF1029-103	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	72
S4TEF1029-110	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	73
S4TEF1029-111	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	73
S4TEF1029-112	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	73
S4TEF1029-113	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	73
S4TEF1035-100	0.0 dBm	5.0 dBm	-36.0 dBm	-3.0 dBm	36.0 dB	72
S4TEF1035-110	0.0 dBm	5.0 dBm	-36.0 dBm	-3.0 dBm	36.0 dB	73
SBFFG1013-105	-9.5 dBm	-4.0 dBm	-17.0 dBm	0.0 dBm	7.5 dB	61
SBFFG1013-115	-9.0 dBm	-4.0 dBm	-18.0 dBm	0.0 dBm	9.0 dB	61
SBFFG1014-105	-9.5 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	10.5 dB	61
SBFFG1014-115	-9.0 dBm	-3.0 dBm	-21.0 dBm	-3.0 dBm	12.0 dB	61
SBFFG1015-105	-5.0 dBm	0.0 dBm	-20.0 dBm	-3.0 dBm	15.0 dB	61
SBFFG1015-115	-5.0 dBm	0.0 dBm	-24.0 dBm	-3.0 dBm	19.0 dB	61
SBFFG1017-105	-3.0 dBm	2.0 dBm	-24.0 dBm	-3.0 dBm	21.0 dB	61
SBFFG1024-105	-10.0 dBm	-3.0 dBm	-17.0 dBm	-3.0 dBm	7.0 dB	61
SBFFG1035-105	0.0 dBm	5.0 dBm	-27.0 dBm	-3.0 dBm	27.0 dB	61
SBFFG1029-105	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	61
SBFFG1029-115	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	61
SBFFG1029-106	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	61
SBFFG1029-116	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	61
SBFFG1029-107	-3.0 dBm	2.0 dBm	-23.0 dBm	-3.0 dBm	20.0 dB	61
SBFFG1029-108	-3.0 dBm	2.0 dBm	-23.0 dBm	-3.0 dBm	20.0 dB	61
SBFTF1011-105	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	86
SBFTF1013-105	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	86
SBFTF1014-105	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	86
SBFTF1015-105	-5.0 dBm	-2.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	86
SBFTF1016-105	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	32.0 dB	86
SBFTF1017-105	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	86
SBFTF1019-105	-15.2 dBm	-8.0 dBm	-32.5 dBm	-3.0 dBm	17.3 dB	86
SBFTF1029-105	-14.0 dBm	-8.0 dBm	-33.0 dBm	-3.0 dBm	19.0 dB	86
SBFTF1029-106	-14.0 dBm	-8.0 dBm	-33.0 dBm	-3.0 dBm	19.0 dB	86
SBFTF1029-107	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	86
SBFTF1029-108	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	86
SBFTF1035-105	5.0 dBm	0.0 dBm	-38.0 dBm	-8.0 dBm	33.0 dB	86
SBFTF1039-105	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	86
SBFTF1040-105	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	86
SCSCF3011-110	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	67
SCSCF3013-110	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	67
SCSCF3014-110	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	67
SCSCF3015-110	-8.0 dBm	-2.0 dBm	-34.0 dBm	-7.0 dBm	26.0 dB	67
SCSCF3016-110	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	67
SCSCF3017-110	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	67
SCSCF3029-110	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	67
SCSCF3029-111	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	67
SCSCF3029-112	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	67
SCSCF3029-113	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	67
SCSCF3029-114	-5.0 dBm	0.0 dBm	-34.0 dBm	-3.0 dBm	29.0 dB	67
SCSCF3029-115	-5.0 dBm	0.0 dBm	-34.0 dBm	-3.0 dBm	29.0 dB	67
SCSCF3029-116	-3.0 dBm	2.0 dBm	-35.0 dBm	-3.0 dBm	32.0 dB	67
SCSCF3029-117	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	67
SFBRM1011-100	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	58
SFBRM1011-110	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	58
SFBRM1011-180	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	59
SFBRM1011-190	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	59
SFBRM1013-100	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	58
SFBRM1013-110	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	58
SFBRM1013-180	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	59
SFBRM1013-190	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	59
SFBRM1014-100	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	58
SFBRM1014-110	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	58
SFBRM1014-180	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	59
SFBRM1014-190	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	59
SFBRM1015-100	-8.0 dBm	-2.0 dBm	-34.0 dBm	-7.0 dBm	26.0 dB	58
SFBRM1015-110	-8.0 dBm	-2.0 dBm	-34.0 dBm	-7.0 dBm	26.0 dB	58
SFBRM1015-180	-8.0 dBm	-2.0 dBm	-34.0 dBm	-7.0 dBm	26.0 dB	59
SFBRM1016-100	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	58
SFBRM1016-180	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	59
SFBRM1017-100	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	58
SFBRM1017-180	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	59
SFBRM1029-100	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	58
SFBRM1029-101	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	58
SFBRM1029-102	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	58

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Product SKU	Min TX PWR	Max TX PWR	RX Sensitivity	Max In PWR	Link Budget	Page
SFBRM1029-103	-8.0 dBm	-3.0 dBm	-32.0 dBm	-3.0 dBm	25.0 dB	58
SFBRM1029-110	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	58
SFBRM1029-111	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	58
SFBRM1029-180	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	59
SFBRM1029-181	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	59
SFBRM1029-182	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	59
SFBRM1029-183	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	59
SFBRM1029-190	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	59
SFBRM1029-191	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	59
SFBRM1035-100	0.0 dBm	5.0 dBm	-36.0 dBm	-3.0 dBm	36.0 dB	58
SFBRM1035-180	0.0 dBm	5.0 dBm	-36.0 dBm	-3.0 dBm	36.0 dB	59
SFBRM1040-180	0.0 dBm	5.0 dBm	-36.0 dBm	-3.0 dBm	36.0 dB	59
SFMFF1313-200	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	57
SFMFF1313-220	-9.5 dBm	-4.0 dBm	-17.0 dBm	0.0 dBm	7.5 dB	62
SFMFF1314-210 MM	-19.0 dBm	-14.0 dBm	-31.0 dBm	-14.0 dBm	12.0 dB	66
SFMFF1314-210 SM	-15.0 dBm	-8.0 dBm	-26.0 dBm	-14.0 dBm	11.0 dB	66
SFMFF1314-220 MM	-10.0 dBm	-4.0 dBm	-17.0 dBm	0.0 dBm	7.0 dB	62
SFMFF1314-220 SM	-13.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	7.0 dB	62
SFMFF1314-280 MM	-10.0 dBm	-4.0 dBm	-17.0 dBm	0.0 dBm	7.0 dB	63
SFMFF1314-280 SM	-13.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	7.0 dB	63
SFMFF1315-220 MM	-10.0 dBm	-4.0 dBm	-17.0 dBm	0.0 dBm	7.0 dB	62
SFMFF1315-220 SM	-5.0 dBm	0.0 dBm	-20.0 dBm	-3.0 dBm	15.0 dB	62
SFMFF1315-280 MM	-10.0 dBm	-4.0 dBm	-17.0 dBm	0.0 dBm	7.0 dB	63
SFMFF1315-280 SM	-5.0 dBm	0.0 dBm	-20.0 dBm	-3.0 dBm	15.0 dB	63
SFMFF1316-210 MM	-19.0 dBm	-14.0 dBm	-26.0 dBm	-14.0 dBm	7.0 dB	66
SFMFF1316-210 SM	-3.0 dBm	2.0 dBm	-28.0 dBm	-7.0 dBm	25.0 dB	66
SFMFF1317-210 MM	-19.0 dBm	-14.0 dBm	-26.0 dBm	-14.0 dBm	7.0 dB	66
SFMFF1317-210 SM	-3.0 dBm	2.0 dBm	-28.0 dBm	-7.0 dBm	25.0 dB	66
SFMFF1317-220 MM	-10.0 dBm	-4.0 dBm	-17.0 dBm	0.0 dBm	7.0 dB	62
SFMFF1317-220 SM	-3.0 dBm	2.0 dBm	-23.0 dBm	-3.0 dBm	20.0 dB	62
SFMFF1317-280 MM	-10.0 dBm	-4.0 dBm	-17.0 dBm	0.0 dBm	7.0 dB	63
SFMFF1317-280 SM	-3.0 dBm	2.0 dBm	-24.0 dBm	-3.0 dBm	21.0 dB	63
SFMFF1324-220 MM	-10.0 dBm	-4.0 dBm	-17.0 dBm	0.0 dBm	7.0 dB	62
SFMFF1324-220 MME	-10.0 dBm	-3.0 dBm	-17.0 dBm	-3.0 dBm	7.0 dB	62
SFMFF1324-280 MM	-10.0 dBm	-4.0 dBm	-17.0 dBm	0.0 dBm	7.0 dB	63
SFMFF1324-280 MME	-10.0 dBm	-3.0 dBm	-17.0 dBm	-3.0 dBm	7.0 dB	63
SFMFF1329-200 MM	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	57
SFMFF1329-200 SM	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	57
SFMFF1329-201 MM	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	57
SFMFF1329-201 SM	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	57
SFMFF1329-202 MM	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	57
SFMFF1329-202 SM	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	57
SFMFF1329-203 MM	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	57
SFMFF1329-203 SM	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	57
SFMFF1329-204 MM	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	57
SFMFF1329-204 SM	-5.0 dBm	0.0 dBm	-34.0 dBm	-3.0 dBm	29.0 dB	57
SFMFF1329-205 MM	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	57
SFMFF1329-205 SM	-6.0 dBm	0.0 dBm	-34.0 dBm	-3.0 dBm	28.0 dB	57
SFMFF1329-210 MM	-19.0 dBm	-14.0 dBm	-26.0 dBm	-14.0 dBm	7.0 dB	66
SFMFF1329-210 SM	-14.0 dBm	-8.0 dBm	-28.0 dBm	-8.0 dBm	14.0 dB	66
SFMFF1329-211 MM	-19.0 dBm	-14.0 dBm	-26.0 dBm	-14.0 dBm	7.0 dB	66
SFMFF1329-211 SM	-14.0 dBm	-8.0 dBm	-28.0 dBm	-8.0 dBm	14.0 dB	66
SFMFF1329-220 MM	-19.0 dBm	-14.0 dBm	-26.0 dBm	-14.0 dBm	7.0 dB	62
SFMFF1329-220 SM	-8.0 dBm	-3.0 dBm	-21.0 dBm	-3.0 dBm	13.0 dB	62
SFMFF1329-221 MM	-19.0 dBm	-14.0 dBm	-26.0 dBm	-14.0 dBm	7.0 dB	62
SFMFF1329-221 SM	-8.0 dBm	-3.0 dBm	-21.0 dBm	-3.0 dBm	13.0 dB	62
SFMFF1329-222 MM	-19.0 dBm	-14.0 dBm	-26.0 dBm	-14.0 dBm	7.0 dB	62
SFMFF1329-222 SM	-3.0 dBm	2.0 dBm	-23.0 dBm	-8.0 dBm	20.0 dB	62
SFMFF1329-223 MM	-19.0 dBm	-14.0 dBm	-26.0 dBm	-14.0 dBm	7.0 dB	62
SFMFF1329-223 SM	-3.0 dBm	2.0 dBm	-23.0 dBm	-8.0 dBm	20.0 dB	62
SFMFF1329-280 MM	-10.0 dBm	-4.0 dBm	-17.0 dBm	0.0 dBm	7.0 dB	63
SFMFF1329-280 SM	-8.0 dBm	-3.0 dBm	-21.0 dBm	-3.0 dBm	13.0 dB	63
SFMFF1329-281 MM	-10.0 dBm	-4.0 dBm	-17.0 dBm	0.0 dBm	7.0 dB	63
SFMFF1329-281 SM	-8.0 dBm	-3.0 dBm	-21.0 dBm	-3.0 dBm	13.0 dB	63
SFMFF1329-282 MM	-10.0 dBm	-4.0 dBm	-17.0 dBm	0.0 dBm	7.0 dB	63
SFMFF1329-282 SM	-3.0 dBm	2.0 dBm	-23.0 dBm	-8.0 dBm	20.0 dB	63
SFMFF1329-283 MM	-10.0 dBm	-4.0 dBm	-17.0 dBm	0.0 dBm	7.0 dB	63
SFMFF1329-283 SM	-3.0 dBm	2.0 dBm	-23.0 dBm	-8.0 dBm	20.0 dB	63
SFMFF1329-286 MM	-10.0 dBm	-4.0 dBm	-17.0 dBm	0.0 dBm	7.0 dB	63
SFMFF1329-286 SM	-2.0 dBm	3.0 dBm	-26.0 dBm	-3.0 dBm	24.0 dB	63
SFMFF1329-287 MM	-10.0 dBm	-4.0 dBm	-17.0 dBm	0.0 dBm	7.0 dB	63
SFMFF1329-287 SM	-2.0 dBm	3.0 dBm	-26.0 dBm	-3.0 dBm	24.0 db	63
SFMFF1335-220 MM	-10.0 dBm	-4.0 dBm	-17.0 dBm	0.0 dBm	7.0 dB	62
SFMFF1335-220 SM	0.0 dBm	5.0 dBm	-27.0 dBm	-3.0 dBm	27.0 dB	62
SFMFF1335-280 MM	-10.0 dBm	-4.0 dBm	-17.0 dBm	0.0 dBm	7.0 dB	63
SFMFF1335-280 SM	0.0 dBm	5.0 dBm	-27.0 dBm	-3.0 dBm	27.0 dB	63
SFMFF1414-220 SM	-13.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	7.0 dB	57
SFMFF1414-280	-13.0 dbm	-3.0 dBm	-20.0 dBm	-3.0 dBm	7.0 dB	63
SFMFF1415-200 SM	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	57
SFMFF1415-200 SMLH	-8.0 dBm	-2.0 dBm	-34.0 dBm	-7.0 dBm	26.0 dB	57
SFMFF1417-200 MM	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	57
SFMFF1417-200 SM	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	57
SFMFF1424-220 MME	-10.0 dBm	-3.0 dBm	-17.0 dBm	-3.0 dBm	7.0 dB	62
SFMFF1424-220 SM	-13.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	7.0 dB	62
SFMFF1429-200 MM	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	57
SFMFF1429-200 SM	-13.0 dBm	-6.0 dBm	-32.0 dBm	-6.0 dBm	19.0 dB	57
SFMFF1429-201 MM	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	57
SFMFF1429-201 SM	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	57
SFMFF1429-202 MM	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	57
SFMFF1429-202 SM	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	57
SFMFF1429-203 MM	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	25.0 dB	57
SFMFF1429-220 SM	-9.5 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	10.5 dB	62
SFMFF1429-220 MM	-8.0 dBm	-3.0 dBm	-21.0 dBm	-3.0 dBm	13.0 dB	62
SFMFF1429-221 SM	-9.5 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	10.5 dB	62
SFMFF1429-221 MM	-8.0 dBm	-3.0 dBm	-21.0 dBm	-3.0 dBm	13.0 dB	62
SGETF1013-110	-9.5 dBm	-3.0 dBm	-20.0 dBm	3.0 dBm	7.0 dB	89
SGETF1014-110	-9.5 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	10.5 dB	89
SGETF1015-110	-5.0 dBm	0.0 dBm	-21.0 dBm	-3.0 dBm	16.0 dB	89
SGETF1017-110	-3.0 dBm	2.0 dBm	-24.0 dBm	-3.0 dBm	21.0 dB	89
SGETF1024-110	-10.0 dBm	-3.0 dBm	-17.0 dBm	-3.0 dBm	7.0 dB	89
SGETF1029-110	-8.0 dBm	-3.0 dBm	-21.0 dBm	-3.0 dBm	13.0 dB	89
SGETF1029-111	-9.0 dBm	-3.0 dBm	-21.0 dBm	-3.0 dBm	12.0 dB	89
SGETF1029-112	-3.0 dBm	2.0 dBm	-23.0 dBm	-3.0 dBm	20.0 dB	89
SGETF1029-113	-3.0 dBm	2.0 dBm	-23.0 dBm	-3.0 dBm	20.0 dB	89

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SGETF1029-116	-2.0 dBm	3.0 dBm	-26.0 dBm	-3.0 dBm	24.0 dB	89
SGETF1029-117	-2.0 dBm	3.0 dBm	-26.0 dBm	-3.0 dBm	24.0 dB	89
SGETF1035-110	0.0 dBm	5.0 dBm	-27.0 dBm	-9.0 dBm	27.0 dB	89
SGETF1039-110	-9.0 dBm	-4.0 dBm	-17.0 dBm	-3.0 dBm	8.0 dB	89
SGFEB1013-120	-9.0 dBm	-4.0 dBm	-17.0 dBm	-3.0 dBm	8.0 dB	90
SGFEB1014-120	-13.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	7.0 dB	90
SGFEB1015-120	-5.0 dBm	0.0 dBm	-20.0 dBm	-3.0 dBm	15.0 dB	90
SGFEB1017-120	-3.0 dBm	2.0 dBm	-23.0 dBm	-3.0 dBm	20.0 dB	90
SGFEB1024-120	-10.0 dBm	-3.0 dBm	-17.0 dBm	3.0 dBm	7.0 dB	90
SGFEB1029-120	-8.0 dBm	-3.0 dBm	-21.0 dBm	-3.0 dBm	13.0 dB	90
SGFEB1029-121	-8.0 dBm	-3.0 dBm	-21.0 dBm	-3.0 dBm	13.0 dB	90
SGFEB1029-122	-3.0 dBm	2.0 dBm	-23.0 dBm	-8.0 dBm	20.0 dB	90
SGFEB1029-123	-3.0 dBm	2.0 dBm	-23.0 dBm	-8.0 dBm	20.0 dB	90
SGFEB1035-120	0.0 dBm	5.0 dBm	-27.0 dBm	-3.0 dBm	27.0 dB	90
SRMFE1011-200	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	56
SRMFE1013-200	-19.0 dBm	-14.0 dBm	-30.0 dBm	-14.0 dBm	11.0 dB	56
SRMFE1014-200	-15.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	16.0 dB	56
SRMFE1015-200	-8.0 dBm	-2.0 dBm	-34.0 dBm	-7.0 dBm	26.0 dB	56
SRMFE1016-200	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	56
SRMFE1017-200	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	56
SRMFE1029-200	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	56
SRMFE1029-201	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	56
SRMFE1029-202	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	56
SRMFE1029-203	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	56
SSDTF1011-120	-19.0 dBm	-14.0 dBm	-32.5 dBm	-14.0 dBm	13.5 dB	68
SSDTF1012-120	-27.0 dBm	-10.0 dBm	-34.0 dBm	-14.0 dBm	7.0 dB	68
SSDTF1013-120	-19.0 dBm	-14.0 dBm	-32.5 dBm	-14.0 dBm	13.5 dB	68
SSDTF1014-120	-19.0 dBm	-14.0 dBm	-34.0 dBm	-3.0 dBm	15.0 dB	68
SSDTF1015-120	-8.0 dBm	-2.0 dBm	-38.0 dBm	-8.0 dBm	30.0 dB	68
SSDTF1016-120	-5.0 dBm	0.0 dBm	-38.0 dBm	-7.0 dBm	33.0 dB	68
SSDTF1017-120	-5.0 dBm	0.0 dBm	-34.0 dBm	-7.0 dBm	29.0 dB	68
SSDTF1022-120	-15.0 dBm	-5.0 dBm	-25.0 dBm	-14.0 dBm	10.0 dB	68
SSDTF1027-120	-19.0 dBm	-15.0 dBm	-32.5 dBm	-14.0 dBm	13.5 dB	68
SSDTF1029-120	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	68
SSDTF1029-121	-13.0 dBm	-6.0 dBm	-32.0 dBm	-3.0 dBm	19.0 dB	68
SSDTF1029-122	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	68
SSDTF1029-123	-8.0 dBm	-3.0 dBm	-33.0 dBm	-3.0 dBm	25.0 dB	68
TN-10GSFP-LR1	-8.0 dBm	0.5 dBm	-14.4 dBm	0.5 dBm	6.4 dB	102
TN-10GSFP-LR2	-3.0 dBm	1.0 dBm	-14.4 dBm	1.0 dBm	11.4 dB	102
TN-10GSFP-LR4	1.5 dBm	5.0 dBm	-15.0 dBm	1.0 dBm	16.5 dB	102
TN-10GSFP-LR7	3.0 dBm	6.0 dBm	-22.0 dBm	-8.0 dBm	25.0 dB	102
TN-10GSFP-SR	-7.3 dBm	1.5 dBm	-9.9 dBm	-1.0 dBm	6.4 dB	102
TN-CWDM-SFP-1xx0	-5.0 dBm	0.0 dBm	-24.0 dBm	3.0 dBm	24.0 dBm	100
TN-CWDM-100LX-1xx0	-5.0 dBm	0.0 dBm	-34.0 dBm	0.0 dBm	29.0 dBm	100
TN-GLC-FE-100BX-D	-14.0 dBm	-8.0 dBm	-32.0 dBm	0.0 dBm	18.0 dB	98
TN-GLC-FE-100BX-D-20	-14.0 dBm	-8.0 dBm	-34.0 dBm	-3.0 dBm	20.0 dB	98
TN-GLC-FE-100BX-D-40	-8.0 dBm	-3.0 dBm	-34.0 dBm	-3.0 dBm	26.0 dB	98
TN-GLC-FE-100BX-D-80	-2.0 dBm	3.0 dBm	-34.0 dBm	-3.0 dBm	32.0 dB	98
TN-GLC-FE-100BX-U	-14.0 dBm	-8.0 dBm	-32.0 dBm	0.0 dBm	18.0 dB	98
TN-GLC-FE-100BX-U-20	-14.0 dBm	-8.0 dBm	-34.0 dBm	-3.0 dBm	20.0 dB	98
TN-GLC-FE-100BX-U-40	-8.0 dBm	-3.0 dBm	-34.0 dBm	-3.0 dBm	26.0 dB	98
TN-GLC-FE-100BX-U-80	-2.0 dBm	3.0 dBm	-34.0 dBm	-3.0 dBm	32.0 dB	98

Product SKU	Min TX PWR	Max TX PWR	RX Sensitivity	Max In PWR	Link Budget	Page
TN-GLC-FE-100FX	-23.5 dBm	-14.0 dBm	-32.0 dBm	-8.0 dBm	8.5 dB	98
TN-GLC-LHX-SM	-3.0 dBm	2.0 dBm	-25.0 dBm	-3.0 dBm	22.0 dB	98
TN-GLC-FE-100LX	-15.0 dBm	-8.0 dBm	-34.0 dBm	0.0 dBm	19.0 dB	98
TN-GLC-GE-100FX	-23.5 dBm	-14.0 dBm	-32.0 dBm	-8.0 dBm	8.5 dB	98
TN-GLC-LH-SM	-9.5 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	10.5 dB	98
TN-GLC-SX-MM	-9.5 dBm	-3.5 dBm	-18.0 dBm	-1.0 dBm	8.5 dB	98
TN-GLC-SX-MM-2K	-9.0 dBm	-1.0 dBm	-19.0 dBm	-1.0 dBm	10.0 dB	98
TN-GLC-ZX-SM	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	98
TN-GLC-ZX-SM-15	2.0 dBm	7.0 dBm	-35.0 dBm	-10.0 dBm	37.0 dB	98
TN-SFP-BXD	-9.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	11.0 dB	96
TN-SFP-BXD2	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	96
TN-SFP-BXU	-9.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	11.0 dB	96
TN-SFP-BXU2	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	96
TN-SFP-ELX1	-9.5 dBm	-3.0 dBm	-21.0 dBm	-3.0 dBm	11.5 dB	97
TN-SFP-ESX5	-10.0 dBm	-3.0 dBm	-18.0 dBm	-3.0 dBm	8.0 dB	97
TN-SFP-ESX6	-10.0 dBm	-3.0 dBm	-18.0 dBm	-3.0 dBm	8.0 dB	97
TN-SFP-FC2XM	-9.0 dBm	-4.0 dBm	-15.0 dBm	-3.0 dBm	6.0 dB	97
TN-SFP-FC2XS15	-5.0 dBm	0.0 dBm	-18.0 dBm	0.0 dBm	13.0 dB	97
TN-SFP-FC2XS2	-9.5 dBm	-3.0 dBm	-18.0 dBm	-3.0 dBm	8.5 dB	97
TN-SFP-FC2XS40	-2.0 dBm	3.0 dBm	-28.0 dBm	-9.0 dBm	26.0 dB	97
TN-SFP-LX1	-9.5 dBm	-3.0 dBm	-21.0 dBm	-3.0 dBm	11.5 dB	97
TN-SFP-LX12	0.0 dBm	5.0 dBm	-32.0 dBm	-9.0 dBm	32.0 dB	97
TN-SFP-LX16	1.0 dBm	5.0 dBm	-36.0 dBm	-10.0 dBm	37.0 dB	97
TN-SFP-LX16-C27	1.0 dBm	5.0 dBm	-36.0 dBm	-10.0 dBm	37.0 dB	99
TN-SFP-LX16-C29	1.0 dBm	5.0 dBm	-36.0 dBm	-10.0 dBm	37.0 dB	99
TN-SFP-LX16-C31	1.0 dBm	5.0 dBm	-36.0 dBm	-10.0 dBm	37.0 dB	99
TN-SFP-LX16-C33	1.0 dBm	5.0 dBm	-36.0 dBm	-10.0 dBm	37.0 dB	99
TN-SFP-LX16-C35	1.0 dBm	5.0 dBm	-36.0 dBm	-10.0 dBm	37.0 dB	99
TN-SFP-LX16-C37	1.0 dBm	5.0 dBm	-36.0 dBm	-10.0 dBm	37.0 dB	99
TN-SFP-LX16-C39	1.0 dBm	5.0 dBm	-36.0 dBm	-10.0 dBm	37.0 dB	99
TN-SFP-LX16-C41	1.0 dBm	5.0 dBm	-36.0 dBm	-10.0 dBm	37.0 dB	99
TN-SFP-LX16-C43	1.0 dBm	5.0 dBm	-36.0 dBm	-10.0 dBm	37.0 dB	99
TN-SFP-LX16-C45	1.0 dBm	5.0 dBm	-36.0 dBm	-10.0 dBm	37.0 dB	99
TN-SFP-LX16-C47	1.0 dBm	5.0 dBm	-36.0 dBm	-10.0 dBm	37.0 dB	99
TN-SFP-LX16-C49	1.0 dBm	5.0 dBm	-36.0 dBm	-10.0 dBm	37.0 dB	99
TN-SFP-LX16-C51	1.0 dBm	5.0 dBm	-36.0 dBm	-10.0 dBm	37.0 dB	99
TN-SFP-LX16-C53	1.0 dBm	5.0 dBm	-36.0 dBm	-10.0 dBm	37.0 dB	99
TN-SFP-LX16-C55	1.0 dBm	5.0 dBm	-36.0 dBm	-10.0 dBm	37.0 dB	99
TN-SFP-LX16-C57	1.0 dBm	5.0 dBm	-36.0 dBm	-10.0 dBm	37.0 dB	99
TN-SFP-LX16-C59	1.0 dBm	5.0 dBm	-36.0 dBm	-10.0 dBm	37.0 dB	99
TN-SFP-LX16-C61	1.0 dBm	5.0 dBm	-36.0 dBm	-10.0 dBm	37.0 dB	99
TN-SFP-LX1T	-9.5 dBm	-3.0 dBm	-21.0 dBm	-3.0 dBm	11.5 dB	97
TN-SFP-LX3	-5.0 dBm	0.0 dBm	-24.0 dBm	-3.0 dBm	19.0 dB	97
TN-SFP-LX5	-5.0 dBm	0.0 dBm	-24.0 dBm	-3.0 dBm	19.0 dB	97
TN-SFP-LX8	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	97
TN-SFP-LX8-C27	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	97
TN-SFP-LX8-C29	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	97
TN-SFP-LX8-C31	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	97
TN-SFP-LX8-C33	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	97
TN-SFP-LX8-C35	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	97
TN-SFP-LX8-C37	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	97
TN-SFP-LX8-C39	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	97

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TN-SFP-LX8-C41	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	97
TN-SFP-LX8-C43	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	97
TN-SFP-LX8-C45	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	97
TN-SFP-LX8-C47	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	97
TN-SFP-LX8-C49	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	97
TN-SFP-LX8-C51	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	97
TN-SFP-LX8-C53	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	97
TN-SFP-LX8-C55	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	97
TN-SFP-LX8-C57	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	97
TN-SFP-LX8-C59	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	97
TN-SFP-LX8-C61	0.0 dBm	5.0 dBm	-24.0 dBm	-3.0 dBm	24.0 dB	97
TN-SFP-LXB11	-9.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	11.0 dB	94
TN-SFP-LXB11T	-9.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	11.0 dB	96
TN-SFP-LXB12	-9.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	11.0 dB	96
TN-SFP-LXB12T	-9.0 dBm	-3.0 dBm	-20.0 dBm	-3.0 dBm	11.0 dB	96
TN-SFP-LXB21	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	96
TN-SFP-LXB21T	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	96
TN-SFP-LXB22	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	96
TN-SFP-LXB22T	-8.0 dBm	-3.0 dBm	-22.0 dBm	-3.0 dBm	14.0 dB	96
TN-SFP-LXB41	-3.0 dBm	2.0 dBm	-23.0 dBm	-3.0 dBm	20.0 dB	96
TN-SFP-LXB42	-3.0 dBm	2.0 dBm	-23.0 dBm	-3.0 dBm	20.0 dB	96
TN-SFP-OC12M	-19.0 dBm	-12.0 dBm	-26.0 dBm	-8.0 dBm	7.0 dB	97
TN-SFP-OC12S	-14.0 dBm	-8.0 dBm	-28.0 dBm	-5.0 dBm	14.0 dB	97
TN-SFP-OC12S-C27	0.0 dBm	5.0 dBm	-29.0 dBm	-8.0 dBm	29.0 dB	97
TN-SFP-OC12S-C29	0.0 dBm	5.0 dBm	-29.0 dBm	-8.0 dBm	29.0 dB	97
TN-SFP-OC12S-C31	0.0 dBm	5.0 dBm	-29.0 dBm	-8.0 dBm	29.0 dB	97
TN-SFP-OC12S-C33	0.0 dBm	5.0 dBm	-29.0 dBm	-8.0 dBm	29.0 dB	97
TN-SFP-OC12S-C35	0.0 dBm	5.0 dBm	-29.0 dBm	-8.0 dBm	29.0 dB	97
TN-SFP-OC12S-C37	0.0 dBm	5.0 dBm	-29.0 dBm	-8.0 dBm	29.0 dB	97
TN-SFP-OC12S-C39	0.0 dBm	5.0 dBm	-29.0 dBm	-8.0 dBm	29.0 dB	97
TN-SFP-OC12S-C41	0.0 dBm	5.0 dBm	-29.0 dBm	-8.0 dBm	29.0 dB	97
TN-SFP-OC12S-C43	0.0 dBm	5.0 dBm	-29.0 dBm	-8.0 dBm	29.0 dB	97
TN-SFP-OC12S-C45	0.0 dBm	5.0 dBm	-29.0 dBm	-8.0 dBm	29.0 dB	97
TN-SFP-OC12S-C47	0.0 dBm	5.0 dBm	-29.0 dBm	-8.0 dBm	29.0 dB	97
TN-SFP-OC12S-C49	0.0 dBm	5.0 dBm	-29.0 dBm	-8.0 dBm	29.0 dB	97
TN-SFP-OC12S-C51	0.0 dBm	5.0 dBm	-29.0 dBm	-8.0 dBm	29.0 dB	97
TN-SFP-OC12S-C53	0.0 dBm	5.0 dBm	-29.0 dBm	-8.0 dBm	29.0 dB	97
TN-SFP-OC12S-C55	0.0 dBm	5.0 dBm	-29.0 dBm	-8.0 dBm	29.0 dB	97
TN-SFP-OC12S-C57	0.0 dBm	5.0 dBm	-29.0 dBm	-8.0 dBm	29.0 dB	97
TN-SFP-OC12S-C59	0.0 dBm	5.0 dBm	-29.0 dBm	-8.0 dBm	29.0 dB	97
TN-SFP-OC12S-C61	0.0 dBm	5.0 dBm	-29.0 dBm	-8.0 dBm	29.0 dB	97
TN-SFP-OC12S4	-3.0 dBm	2.0 dBm	-28.0 dBm	-8.0 dBm	25.0 dB	97
TN-SFP-OC3M	-19.0 dBm	-12.0 dBm	-30.0 dBm	-8.0 dBm	11.0 dB	97
TN-SFP-OC3MT	-19.0 dBm	-12.0 dBm	-30.0 dBm	-8.0 dBm	11.0 dB	97
TN-SFP-OC3S	-14.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	17.0 dB	97
TN-SFP-OC3ST	-14.0 dBm	-8.0 dBm	-31.0 dBm	-8.0 dBm	17.0 dB	97
TN-SFP-OC3S3	-14.0 dBm	-8.0 dBm	-34.0 dBm	-8.0 dBm	20.0 dB	97
TN-SFP-OC3S8	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	97
TN-SFP-OC3S8-C27	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	97
TN-SFP-OC3S8-C29	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	97
TN-SFP-OC3S8-C31	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	97
TN-SFP-OC3S8-C33	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	97

Product SKU	Min TX PWR	Max TX PWR	RX Sensitivity	Max In PWR	Link Budget	Page
TN-SFP-OC3S8-C35	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	97
TN-SFP-OC3S8-C37	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	97
TN-SFP-OC3S8-C39	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	97
TN-SFP-OC3S8-C41	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	97
TN-SFP-OC3S8-C43	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	97
TN-SFP-OC3S8-C45	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	97
TN-SFP-OC3S8-C47	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	97
TN-SFP-OC3S8-C49	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	97
TN-SFP-OC3S8-C51	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	97
TN-SFP-OC3S8-C53	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	97
TN-SFP-OC3S8-C55	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	97
TN-SFP-OC3S8-C57	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	97
TN-SFP-OC3S8-C59	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	97
TN-SFP-OC3S8-C61	-5.0 dBm	0.0 dBm	-34.0 dBm	-8.0 dBm	29.0 dB	97
TN-SFP-OC3S10	-3.0 dBm	2.0 dBm	-34.0 dBm	-8.0 dBm	31.0 dB	99
TN-SFP-OC3S12	0.0 dBm	5.0 dBm	-34.0 dBm	-8.0 dBm	34.0 dB	99
TN-SFP-OC3S16-C27	2.0 dBm	5.0 dBm	-35.0 dBm	-10.0 dBm	37.0 dB	99
TN-SFP-OC3S16-C29	2.0 dBm	5.0 dBm	-35.0 dBm	-10.0 dBm	37.0 dB	99
TN-SFP-OC3S16-C31	2.0 dBm	5.0 dBm	-35.0 dBm	-10.0 dBm	37.0 dB	99
TN-SFP-OC3S16-C33	2.0 dBm	5.0 dBm	-35.0 dBm	-10.0 dBm	37.0 dB	99
TN-SFP-OC3S16-C35	2.0 dBm	5.0 dBm	-35.0 dBm	-10.0 dBm	37.0 dB	99
TN-SFP-OC3S16-C37	2.0 dBm	5.0 dBm	-35.0 dBm	-10.0 dBm	37.0 dB	99
TN-SFP-OC3S16-C39	2.0 dBm	5.0 dBm	-35.0 dBm	-10.0 dBm	37.0 dB	99
TN-SFP-OC3S16-C41	2.0 dBm	5.0 dBm	-35.0 dBm	-10.0 dBm	37.0 dB	99
TN-SFP-OC3S16-C43	2.0 dBm	5.0 dBm	-35.0 dBm	-10.0 dBm	37.0 dB	99
TN-SFP-OC3S16-C45	2.0 dBm	5.0 dBm	-35.0 dBm	-10.0 dBm	37.0 dB	99
TN-SFP-OC3S16-C47	2.0 dBm	5.0 dBm	-35.0 dBm	-10.0 dBm	37.0 dB	99
TN-SFP-OC3S16-C49	2.0 dBm	5.0 dBm	-35.0 dBm	-10.0 dBm	37.0 dB	99
TN-SFP-OC3S16-C51	2.0 dBm	5.0 dBm	-35.0 dBm	-10.0 dBm	37.0 dB	99
TN-SFP-OC3S16-C53	2.0 dBm	5.0 dBm	-35.0 dBm	-10.0 dBm	37.0 dB	99
TN-SFP-OC3S16-C55	2.0 dBm	5.0 dBm	-35.0 dBm	-10.0 dBm	37.0 dB	99
TN-SFP-OC3S16-C57	2.0 dBm	5.0 dBm	-35.0 dBm	-10.0 dBm	37.0 dB	99
TN-SFP-OC3S16-C59	2.0 dBm	5.0 dBm	-35.0 dBm	-10.0 dBm	37.0 dB	99
TN-SFP-OC3S16-C61	2.0 dBm	5.0 dBm	-35.0 dBm	-10.0 dBm	37.0 dB	99
TN-SFP-OC48S-C27	-2.0 dBm	3.0 dBm	-20.0 dBm	0.0 dBm	18.0 dB	97
TN-SFP-OC48S-C29	-2.0 dBm	3.0 dBm	-20.0 dBm	0.0 dBm	18.0 dB	97
TN-SFP-OC48S-C31	-2.0 dBm	3.0 dBm	-20.0 dBm	0.0 dBm	18.0 dB	97
TN-SFP-OC48S-C33	-2.0 dBm	3.0 dBm	-20.0 dBm	0.0 dBm	18.0 dB	97
TN-SFP-OC48S-C35	-2.0 dBm	3.0 dBm	-20.0 dBm	0.0 dBm	18.0 dB	97
TN-SFP-OC48S-C37	-2.0 dBm	3.0 dBm	-20.0 dBm	0.0 dBm	18.0 dB	97
TN-SFP-OC48S-C39	-2.0 dBm	3.0 dBm	-20.0 dBm	0.0 dBm	18.0 dB	97
TN-SFP-OC48S-C41	-2.0 dBm	3.0 dBm	-20.0 dBm	0.0 dBm	18.0 dB	97
TN-SFP-OC48S-C43	-2.0 dBm	3.0 dBm	-20.0 dBm	0.0 dBm	18.0 dB	97
TN-SFP-OC48S-C45	-2.0 dBm	3.0 dBm	-20.0 dBm	0.0 dBm	18.0 dB	97
TN-SFP-OC48S-C47	-2.0 dBm	3.0 dBm	-20.0 dBm	0.0 dBm	18.0 dB	97
TN-SFP-OC48S-C49	-2.0 dBm	3.0 dBm	-20.0 dBm	0.0 dBm	18.0 dB	97
TN-SFP-OC48S-C51	-2.0 dBm	3.0 dBm	-20.0 dBm	0.0 dBm	18.0 dB	97
TN-SFP-OC48S-C53	-2.0 dBm	3.0 dBm	-20.0 dBm	0.0 dBm	18.0 dB	97
TN-SFP-OC48S-C55	-2.0 dBm	3.0 dBm	-20.0 dBm	0.0 dBm	18.0 dB	97
TN-SFP-OC48S-C57	-2.0 dBm	3.0 dBm	-20.0 dBm	0.0 dBm	18.0 dB	97
TN-SFP-OC48S-C59	-2.0 dBm	3.0 dBm	-20.0 dBm	0.0 dBm	18.0 dB	97
TN-SFP-OC48S-C61	-2.0 dBm	3.0 dBm	-20.0 dBm	0.0 dBm	18.0 dB	97

Fiber Specification Table

Product SKU	Min TX PWR	Max TX PWR	RX Sensitivity	Max In PWR	Link Budget	Page
TN-SFP-SX	-9.0 dBm	4.0 dBm	-17.0 dBm	-3.0 dBm	8.0 dB	97
TN-SFP-SXD	-9.0 dBm	-4.0 dBm	-17.0 dBm	-3.0 dBm	8.0 dB	97
TN-X2-10GB-ER	-1.0 dBm	4.0 dBm	-16.5 dBm	0.5 dBm	15.5 dB	104
TN-X2-10GB-LR	-5.0 dBm	0.5 dBm	-14.4 dBm	0.5 dBm	9.4 dB	104
TN-X2-10GB-SR	-7.0 dBm	-1.3 dBm	-11.1 dBm	0.5 dBm	4.1 dB	104
TN-XFP-ER	1.5 dBm	5.0 dBm	-15.0 dBm	-15.0 dBm	16.5 dB	103
TN-XFP-LR1	-8.2 dBm	0.5 dBm	-14.4 dBm	-14.4 dBm	6.2 dB	103
TN-XFP-LR1-T	-8.2 dBm	0.5 dBm	-14.4 dBm	-14.4 dBm	6.2 dB	103
TN-XFP-LR2	-3.0 dBm	1.0 dBm	-15.0 dBm	-15.0 dBm	12.0 dB	103
TN-XFP-LR2-T	-3.0 dBm	1.0 dBm	-15.0 dBm	-15.0 dBm	12.0 dB	103
TN-XFP-SR	-6.5 dBm	-1.5 dBm	-9.9 dBm	-7.5 dBm	3.4 dB	103
TN-XFP-ZR	-1.0 dBm	4.0 dBm	-23.0 dBm	-23.0 dBm	22.0 dB	103

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