

## Datasheet

# Odisys™ - Optical Ethernet Distribution Systems



**EM316EFRM**

**EM316F2RM**

### Overview

Simplicity and scalability, along with the wide availability of interoperable equipment has made Ethernet a popular choice for providing seamless end-to-end optical connectivity. Wide acceptance and growing demand reinforces the mindset that Optical Ethernet (OE)-based networks are the most cost effective to deploy and maintain. Once the domain of LAN or Campus backbones, Ethernet has been adopted into today's growing optical infrastructure and now reaches everywhere from the LAN, to the MAN, and the last mile, FTTX access network.

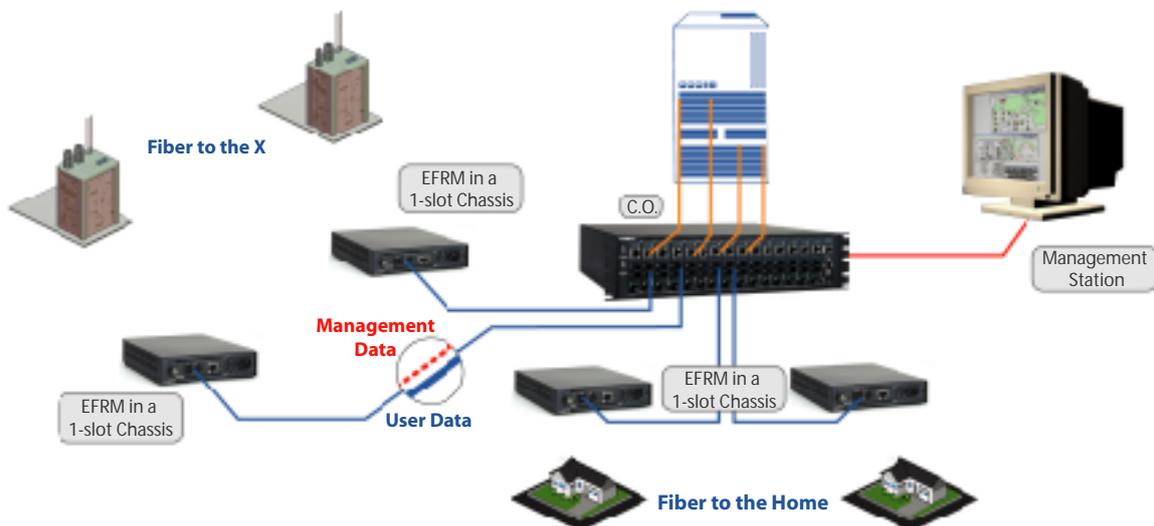
The Fiber Driver® Odisys™ series of managed media modules are specifically designed for OE applications with solutions for Ethernet and Fast Ethernet. All Odisys products incorporate the advanced IP-Less™ remote management feature. IP-Less technology provides end-to-end network management without the IP/SNMP-enabled equipment typically required at the remote side of a link. With the installation of IP-Less modules at each end of a link, only one Fiber Driver Network Management Module (part number EM316NM) is required at the local aggregation point. Multiple links can be monitored and controlled by a single management module.

### Features

- IP-Less™ remote management
- Support for Ethernet and Fast Ethernet
- Dual Fiber, Single Fiber and Redundant Link solutions
- Links of up to 110 km over Single Mode fiber, 8 km over Multimode fiber
- OptiSwitch™ switch/router compatible
- Auto Negotiation and Auto MDI/MDIX copper port
- Link Integrity Notification (LIN) - ensures end-to-end link state continuity
- Remote loopback - validates integrity of link from end to end

### Key Benefits

- Cost saving – remote site does not require additional management module
- Simpler system configuration – one link handles both management and data traffic
- No loss of bandwidth – management channel separate from data channel
- IP friendly - Only one IP address required to manage multiple links



At the heart of the IP-Less technology is the all-new Micro Agent, an onboard management processor. When Odisys modules are used in pairs, the Micro Agents create a logically separate, out-of-band (IP-Less) management channel that shares the same physical path as the data channel. Overlaying the management channel in this manner ensures the full bandwidth of the Ethernet data channel is available to the user while still providing all the management features expected in a Fiber Driver product.

The IP-Less management channel is immune to instabilities in the data channel such as high traffic loads, topology changes caused by Spanning Tree, OSPF, etc., or any changes in external link state. This combination of in-band convenience with out-of-band security makes the Odisys media modules a logical choice for any managed OE environment.

Management features common to the Fiber Driver Odisys products include Last Gasp, Link Integrity Notification (LIN), and remote loopback capability. In the event of power loss, the Last Gasp feature allows the module to send out a management alert before shutting down. With LIN enabled, loss of link at any TX/RX point of one module will cause the TX/RX points of the modules at both ends of the effected OE link to be disabled. In this way, switches/routers that are link-state dependant can accurately react to link conditions, primarily in fault tolerant designs. The remote loopback capability gives network administrators the means to test and verify the integrity of the entire link, unlike local loopback, which can test only one side of the link.

The Fast Ethernet (EM316FRM) and Ethernet/Fast Ethernet (EM316EFRM) Odisys converters are single slot modules that are compatible with any AC or DC powered Fiber Driver chassis. They are available with Multimode (MM) or a Singlemode (SM) fiber link ports. Distances up to 8 km can be reached over MM fiber, and up to 110 km over SM fiber.

Also available are Single Fiber SM versions which use proven Fiber Driver technology to combine transmit (TX) and receive (RX) signals onto a single fiber strand over distances of up to 100 km.

In addition, the Ethernet/Fast Ethernet Odisys converter comes standard with an Auto Negotiating 10/100Base-TX data port that features Auto MDI/MDIX detection, allowing for the use of either a straight through or crossover patch cable.

For mission critical applications that require maximum uptime, the Self Healing/Dual Redundant Fast Ethernet Odisys modules (EM316F2RM) provide essential link security. They use a link detect mechanism that automatically switches over to a secondary fiber path in microseconds if link is lost on the primary path. Doing this without any OSPF- or Spanning Tree-induced network topology change eliminates long reconvergence times and any associated loss of data.

A special edition of the Fiber Driver Odisys Ethernet/Fast Ethernet module, the EM316EFRMOS, is designed to work together with MRV Communications' OptiSwitch™ line of switch/routers. They link directly to the OptiSwitch unit at the service aggregation point, which in turn provides full management of the remote Odisys module.

Exclusive to the single fiber Odisys media modules is the optional Fiber Driver Reflection Detection(tm) feature. A common problem encountered during the installation of single fiber links is the mating of a UPC connector to an APC (single fiber) connector, the result of which is severe optical reflection and a corresponding loss of data due to a misalignment of the optics. With Reflection Detection enabled, the media converter is able to detect and report this condition.

For additional information on the Fiber Driver Odisys line of products, including pricing and availability, contact your MRV Communications sales representative.

### Physical Specifications

|                                     |  |
|-------------------------------------|--|
| <b>Operating Temperature Range:</b> | 0°C to 50°C (32°F to 122°F)  |
| <b>Storage Temperature:</b>         | -40°C to 95°C (-40°F to 203°F)   |
| <b>Relative Humidity:</b>           | 85% maximum, non-condensing  |
| <b>Physical Dimensions:</b>         | 25 mm x 75 mm x 175 mm deep (1" x 3" x 7" deep)  |
| <b>Weight:</b>                      | 120 - 240 g (4.2 - 8.5 oz) depending on configuration  |
| <b>Emission Compliance:</b>         | FCC - PART 15, SUBPART B, 1999, CLASS A; CE MARK - EN 50081-1:1992;<br>EN 50082:1997; EN 55024:1998; EN 55022:1998; AS/NZS 3548:1995 |

### DUAL FIBER

| Ordering Info | Part Number   | Function  | Protocol Port / Link                 | Connectors <sup>2</sup> Port/Link | Wavelength (nm) Port / Link | Budget (dB) <sup>2</sup> Port / Link | Range <sup>3</sup> Port / Link |
|---------------|---|---|--------------------------------------|-----------------------------------|-----------------------------|--------------------------------------|--------------------------------|
|               | EM316FRM/M  | Fast Ethernet Copper to Multimode, Dual Fiber with IP-Less™ Remote Management.                                  | Fast Ethernet / Proprietary          | RJ-45 / DSC                       | NA / 1310                   | NA / NA                              | 1-100 m/0-2 km                 |
|               | EM316FRM/MX   | Fast Ethernet Copper to Extended Multimode, Dual Fiber with IP-Less™ Remote Management.                         | Fast Ethernet / Proprietary          | RJ-45 / DSC                       | NA / 1310                   | NA / NA                              | 1-100 m/2-8 km                 |
|               | EM316FRM/S  | Fast Ethernet Copper to Singlemode, Dual Fiber with IP-Less™ Remote Management.                                 | Fast Ethernet / Proprietary          | RJ-45 / DSC                       | NA / 1310                   | NA / 12                              | 1-100 m/0-20 km                |
|               | EM316FRM/S1   | Fast Ethernet Copper to Singlemode, Dual Fiber with IP-Less™ Remote Management.                                 | Fast Ethernet / Proprietary          | RJ-45 / DSC                       | NA / 1310                   | NA / 17                              | 1-100 m/0-35 km                |
|               | EM316FRM/S2   | Fast Ethernet Copper to Singlemode, Dual Fiber with IP-Less™ Remote Management.                                 | Fast Ethernet / Proprietary          | RJ-45 / DSC                       | NA / 1310                   | NA / 24                              | 1-100 m/25-45 km               |
|               | EM316FRM/S3   | Fast Ethernet Copper to Singlemode, Dual Fiber with IP-Less™ Remote Management.                                 | Fast Ethernet / Proprietary          | RJ-45 / DSC                       | NA / 1550                   | NA / 24                              | 1-100 m/35-90 km               |
|               | EM316FRM/S4   | Fast Ethernet Copper to Singlemode, Dual Fiber with IP-Less™ Remote Management.                                 | Fast Ethernet / Proprietary          | RJ-45 / DSC                       | NA / 1550                   | NA / 29                              | 1-100 m/40-110 km              |
|               | EM316EFRM/M   | Auto-negotiate 10/100Base-TX Ethernet Copper to Multimode, Dual Fiber with IP-Less™ Remote Management.          | 10/100Base-TX Ethernet / Proprietary | RJ-45 / DSC                       | NA / 1310                   | NA / NA                              | 1-100 m/0-2 km                 |
|               | EM316EFRM/MX  | Auto-negotiate 10/100Base-TX Ethernet Copper to Extended Multimode, Dual Fiber with IP-Less™ Remote Management. | 10/100Base-TX Ethernet / Proprietary | RJ-45 / DSC                       | NA / 1310                   | NA / NA                              | 1-100 m/2-8 km                 |
| EM316EFRM/S   | Auto-negotiate 10/100Base-TX Ethernet Copper to Extended Multimode, Dual Fiber with IP-Less™ Remote Management. | 10/100Base-TX Ethernet / Proprietary  | RJ-45 / DSC                          | NA / 1330                         | NA / 12                     | 1-100 m/0-35 km                      |                                |
| EM316EFRM/S1  | Auto-negotiate 10/100Base-TX Ethernet Copper to Singlemode, Dual Fiber with IP-Less™ Remote Management.         | 10/100Base-TX Ethernet / Proprietary  | RJ-45 / DSC                          | NA / 1310                         | NA / 17                     | 1-100 m/0-35 km                      |                                |
| EM316EFRM/S2  | Auto-negotiate 10/100Base-TX Ethernet Copper to Singlemode, Dual Fiber with IP-Less™ Remote Management.         | 10/100Base-TX Ethernet / Proprietary  | RJ-45 / DSC                          | NA / 1310                         | NA / 24                     | 1-100 m/25-45 km                     |                                |
| EM316EFRM/S3  | Auto-negotiate 10/100Base-TX Ethernet Copper to Singlemode, Dual Fiber with IP-Less™ Remote Management.         | 10/100Base-TX Ethernet / Proprietary  | RJ-45 / DSC                          | NA / 1550                         | NA / 24                     | 1-100 m/35-90 km                     |                                |
| EM316EFRM/S4  | Auto-negotiate 10/100Base-TX Ethernet Copper to Singlemode, Dual Fiber with IP-Less™ Remote Management.         | 10/100Base-TX Ethernet / Proprietary  | RJ-45 / DSC                          | NA / 1550                         | NA / 29                     | 1-100 m/40-110 km                    |                                |

### DUAL FIBER

| Ordering Info | Part Number    | Function   | Protocol Port / Link                 | Connectors <sup>2</sup> Port/Link | Wavelength (nm) Port / Link | Budget (dB) <sup>2</sup> Port / Link | Range <sup>3</sup> Port / Link |
|---------------|----------------|--|--------------------------------------|-----------------------------------|-----------------------------|--------------------------------------|--------------------------------|
|               | EM316EFRMOS/M  | OptiSwitch™ compatible, Auto-negotiate 10/100 Base-TX Ethernet Copper to Multimode, Dual Fiber with IP-Less™ Remote Management.          | 10/100Base-TX Ethernet / Proprietary | RJ-45 / DSC                       | NA / 1310                   | NA / NA                              | 1-100 m/0-2 km                 |
|               | EM316EFRMOS/MX | OptiSwitch™ compatible, Auto-negotiate 10/100 Base-TX Ethernet Copper to Extended Multimode, Dual Fiber with IP-Less™ Remote Management. | 10/100Base-TX Ethernet / Proprietary | RJ-45 / DSC                       | NA / 1310                   | NA / NA                              | 1-100 m/2-8 km                 |
|               | EM316EFRMOS/S  | OptiSwitch™ compatible, Auto-negotiate 10/100 Base-TX Ethernet Copper to Singlemode, Dual Fiber with IP-Less™ Remote Management.         | 10/100Base-TX Ethernet / Proprietary | RJ-45 / DSC                       | NA / 1330                   | NA / 12                              | 1-100 m/0-35 km                |
|               | EM316EFRMOS/S1 | OptiSwitch™ compatible, Auto-negotiate 10/100 Base-TX Ethernet Copper to Singlemode, Dual Fiber with IP-Less™ Remote Management.         | 10/100Base-TX Ethernet / Proprietary | RJ-45 / DSC                       | NA / 1310                   | NA / 17                              | 1-100 m/0-35 km                |
|               | EM316EFRMOS/S2 | OptiSwitch™ compatible, Auto-negotiate 10/100 Base-TX Ethernet Copper to Singlemode, Dual Fiber with IP-Less™ Remote Management.         | 10/100Base-TX Ethernet / Proprietary | RJ-45 / DSC                       | NA / 1310                   | NA / 24                              | 1-100 m/25-45 km               |
|               | EM316EFRMOS/S3 | OptiSwitch™ compatible, Auto-negotiate 10/100 Base-TX Ethernet Copper to Singlemode, Dual Fiber with IP-Less™ Remote Management.         | 10/100Base-TX Ethernet / Proprietary | RJ-45 / DSC                       | NA / 1550                   | NA / 24                              | 1-100 m/35-90 km               |
|               | EM316EFRMOS/S4 | OptiSwitch™ compatible, Auto-negotiate 10/100 Base-TX Ethernet Copper to Singlemode, Dual Fiber with IP-Less™ Remote Management.         | 10/100Base-TX Ethernet / Proprietary | RJ-45 / DSC                       | NA / 1550                   | NA / 29                              | 1-100 m/40-110 km              |

<sup>1</sup>Default connectors listed, others optional.

<sup>2</sup>Higher budgets available.

<sup>3</sup>All specifications, distance claims and operational parameters are based on industry average fiber cable performance: 9µ Singlemode performance of 0.25 dB/km for 1550 nm and 0.5 dB/km for 1310 nm, and 62.5µ Multimode performance of 3 dB/km for 850 nm and 1.5 dB/km for 1300 nm. For non-standard fiber applications or additional information contact MRV Communications DL = Dispersion Limited

### SINGLE FIBER

| Ordering Info | Part Number    | Function  | Protocol Port / Link        | Connectors <sup>2</sup> Port/Link | Wavelength (nm) Port / Link | Budget (dB) <sup>2</sup> Port / Link | Range <sup>3</sup> Port / Link |
|---------------|----------------|---|-----------------------------|-----------------------------------|-----------------------------|--------------------------------------|--------------------------------|
|               | EM316FRMSF/S2  | Fast Ethernet Copper to Singlemode, Single Fiber with IP-Less™ Remote Management.                         | Fast Ethernet / Proprietary | RJ-45 / SC-APC                    | NA / 1310                   | NA / 18                              | 1-100 m/0-35 km                |
|               | EM316FRMSF/S3  | Fast Ethernet Copper to Singlemode, Single Fiber with IP-Less™ Remote Management.                         | Fast Ethernet / Proprietary | RJ-45 / SC-APC                    | NA / 1550                   | NA / 18                              | 1-100 m/25-70 km               |
|               | EM316FRMSF/S4  | Fast Ethernet Copper to Singlemode, Single Fiber with IP-Less™ Remote Management.                         | Fast Ethernet / Proprietary | RJ-45 / SC-APC                    | NA / 1550                   | NA / 24                              | 1-100 m/35-100 km              |
|               | EM316EFRMSF/S2 | Auto-negotiate 10/100Base-TX Ethernet Copper to Singlemode, Single Fiber with IP-Less™ Remote Management. | Fast Ethernet / Proprietary | RJ-45 / SC-APC                    | NA / 1310                   | NA / 18                              | 1-100 m/0-35 km                |
|               | EM316EFRMSF/S3 | Auto-negotiate 10/100Base-TX Ethernet Copper to Singlemode, Single Fiber with IP-Less™ Remote Management. | Fast Ethernet / Proprietary | RJ-45 / SC-APC                    | NA / 1550                   | NA / 18                              | 1-100 m/25-70 km               |
|               | EM316EFRMSF/S4 | Auto-negotiate 10/100Base-TX Ethernet Copper to Singlemode, Single Fiber with IP-Less™ Remote Management. | Fast Ethernet / Proprietary | RJ-45 / SC-APC                    | NA / 1550                   | NA / 24                              | 1-100 m/35-100 km              |

### DUAL WAVELENGTH SINGLE FIBER (Sold in pairs only)

| Ordering Info | Part Number   | Function  | Protocol Port / Link        | Connectors <sup>2</sup> Port/Link | Wavelength (nm) Port / Link | Budget (dB) <sup>2</sup> Port / Link | Range <sup>3</sup> Port / Link |
|---------------|---|---|-----------------------------|-----------------------------------|-----------------------------|--------------------------------------|--------------------------------|
|               | EM316WFRMC/S2   | Fast Ethernet Copper to Singlemode, Single Fiber with IP-Less™ Remote Management. | Fast Ethernet / Proprietary | RJ-45 / SC                        | NA / 1310,1550              | NA / 14 (@1310 nm)                   | 1-100 m/0 - 25 km              |
|               | EM316WFRMT/S2   | Fast Ethernet Copper to Singlemode, Single Fiber with IP-Less™ Remote Management. | Fast Ethernet / Proprietary | RJ-45 / SC                        | NA / 1310, 1550             | NA / 22 (@1310 nm)                   | 1-100 m/20 - 45 km             |
|               | EM316WFRMC/S3   | Fast Ethernet Copper to Singlemode, Single Fiber with IP-Less™ Remote Management. | Fast Ethernet / Proprietary | RJ-45 / SC                        | NA / 1520, 1550             | NA / 28                              | 1-100 m/40-100 km              |
|               | EM316WFRMT/S3   | Fast Ethernet Copper to Singlemode, Single Fiber with IP-Less™ Remote Management. | Fast Ethernet / Proprietary | RJ-45 / SC                        | NA / 1520, 1550             | NA / 28                              | 1-100 m/40-100 km              |
|               | EM316WFRMC/S4   | Fast Ethernet Copper to Singlemode, Single Fiber with IP-Less™ Remote Management. | Fast Ethernet / Proprietary | RJ-45 / SC                        | NA / 1310, 1550             | NA / 14 (@1310 nm)                   | 1-100 m/0-25 km                |
|               | EM316WFRMT/S4   | Fast Ethernet Copper to Singlemode, Single Fiber with IP-Less™ Remote Management. | Fast Ethernet / Proprietary | RJ-45 / SC                        | NA / 1310, 1550             | NA / 22 (@1310 nm)                   | 1-100 m/20-45 km               |
|               | EM316WFRMC/S2   | Fast Ethernet Copper to Singlemode, Single Fiber with IP-Less™ Remote Management. | Fast Ethernet / Proprietary | RJ-45 / SC                        | NA / 1310, 1550             | NA / 14 (@1310 nm)                   | 1-100 m/0-25 km                |
|               | EM316WFRMT/S2   | Fast Ethernet Copper to Singlemode, Single Fiber with IP-Less™ Remote Management. | Fast Ethernet / Proprietary | RJ-45 / SC                        | NA / 1310, 1550             | NA / 22 (@1310 nm)                   | 1-100 m/20-45 km               |
|               | EM316WFRMC/S3   | Fast Ethernet Copper to Singlemode, Single Fiber with IP-Less™ Remote Management. | Fast Ethernet / Proprietary | RJ-45 / SC                        | NA / 1520, 1550             | NA / 28                              | 1-100 m/40-100 km              |
| EM316WFRMT/S3 | Fast Ethernet Copper to Singlemode, Single Fiber with IP-Less™ Remote Management. | Fast Ethernet / Proprietary   | RJ-45 / SC                  | NA / 1520, 1550                   | NA / 28                     | 1-100 m/40-100 km                    |                                |

### SELF HEALING/REDUNDANT LINK

| Ordering Info | Part Number  | Function   | Protocol Port / Link | Connectors <sup>2</sup> Port/Link | Wavelength (nm) Port / Link | Budget (dB) <sup>2</sup> Port / Link | Range <sup>3</sup> Port / Link |
|---------------|--------------|--|----------------------|-----------------------------------|-----------------------------|--------------------------------------|--------------------------------|
|               | EM316F2RM/M  | Fast Ethernet Self Healing Copper to Dual Fiber Multimode with Remote Management.          | Fast Ethernet        | RJ-45 / LC                        | 1310 / 1310                 | NA / NA                              | 1-100 m/0 - 4 km               |
|               | EM316F2RM/MX | Fast Ethernet Self Healing Copper to Dual Fiber Extended Multimode with Remote Management. | Fast Ethernet        | RJ-45 / LC                        | 1310 / 1310                 | 0 / NA                               | 1-100 m/2 - 8 km               |
|               | EM316F2RM/S1 | Fast Ethernet Self Healing Copper to Dual Fiber Single Mode with Remote Management.        | Fast Ethernet        | RJ-45 / LC                        | 1310 / 1310                 | 0 / 17                               | 1-100 m/0 - 35 km              |
|               | EM316F2RM/S2 | Fast Ethernet Self Healing Copper to Dual Fiber Single Mode with Remote Management.        | Fast Ethernet        | RJ-45 / LC                        | 1310 / 1310                 | 5 / 24                               | 1-100 m/25-50 km               |
|               | EM316F2RM/S3 | Fast Ethernet Self Healing Copper to Dual Fiber Single Mode with Remote Management.        | Fast Ethernet        | RJ-45 / LC                        | 1550 / 1550                 | 5 / 24                               | 1-100 m/50 - 100 km            |

<sup>1</sup>Default connectors listed, others optional.

<sup>2</sup>Higher budgets available.

<sup>3</sup>All specifications, distance claims and operational parameters are based on industry average fiber cable performance: 9µ Singlemode performance of 0.25 dB/km for 1550 nm and 0.5 dB/km for 1310 nm, and 62.5µ Multimode performance of 3 dB/km for 850 nm and 1.5 dB/km for 1300 nm. For non-standard fiber applications or additional information contact MRV Communications DL = Dispersion Limited

### SINGLE FIBER SELF HEALING

| Ordering Info | Part Number    | Function  | Protocol Port / Link  | Connectors <sup>1</sup> Port/Link | Wavelength (nm) Port / Link | Budget (dB) <sup>2</sup> Port / Link | Range <sup>3</sup> Port / Link |
|---------------|----------------|---|---|-----------------------------------|-----------------------------|--------------------------------------|--------------------------------|
|               |                | EM316F2RMSF/S2  | Fast Ethernet Self Healing Copper to Single Mode Single Fiber with Remote Management. | Fast Ethernet                     | RJ-45 / SC-APC              | 1310 / 1310                          | 0 / 18                         |
|               | EM316F2RMSF/S3 | Fast Ethernet Self Healing Copper to Single Mode Single Fiber with Remote Management. | Fast Ethernet   | RJ-45 / SC-APC                    | 1550 / 1550                 | 0 / 18                               | 0-100 m/50-100 km              |

<sup>1</sup>Default connectors listed, others optional.

<sup>2</sup>Higher budgets available.

<sup>3</sup>All specifications, distance claims and operational parameters are based on industry average fiber cable performance; 9 $\mu$  Singlemode performance of 0.25 dB/km for 1550 nm and 0.5 dB/km for 1310 nm, and 62.5 $\mu$  Multimode performance of 3 dB/km for 850 nm and 1.5 dB/km for 1300 nm. For non-standard fiber applications or additional information contact MRV Communications DL = Dispersion Limited

MRV has more than 50 offices throughout the world. Addresses, phone numbers, and fax numbers are listed at [www.mrv.com](http://www.mrv.com). Please e-mail us at [sales@mrv.com](mailto:sales@mrv.com) or call us for assistance.

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