



**FIBER<sup>®</sup>**  
D R I V E R

**EM316E3**

**EM316E3SF**

**E3 Fiber Modem  
Fiber Driver Module**

**User's Guide**

**Registration Card**

Your name: Mr./Ms \_\_\_\_\_

Organization: \_\_\_\_\_ Dept. \_\_\_\_\_

Your title at organization: \_\_\_\_\_

Telephone: \_\_\_\_\_ Fax: \_\_\_\_\_

Organization's full address: \_\_\_\_\_

\_\_\_\_\_

Country: \_\_\_\_\_

Date of purchase (Month/Day/Year): \_\_\_\_\_

<b>Serial number:</b>

Product was purchased from:

Reseller's name: \_\_\_\_\_

Telephone: \_\_\_\_\_ Fax: \_\_\_\_\_

Reseller's  
full address \_\_\_\_\_

**Answers to the following questions help us to support your product:**

**1. Where and how will the product primarily be used?**

Home  Office  Travel  Company Business  Home Business  Personal Use

**2. How many employees work at installation site?**

1 employee  2-9  10-49  50-99  100-499  500-999  1000+

**3. What network medium/media does your organization use ?**

Fiber-optics  Thick coax Ethernet  Thin coax Ethernet  
 10BASE-T UTP/STP  100BASE-TX  100BASE-T4  100VGAnyLAN  
 Others \_\_\_\_\_

**4. What category best describes your company?**

Aerospace  Engineering  Education  Finance  Hospital  
 Legal  Insurance/Real Estate  Manufacturing  
 Retail/Chain store/Wholesale  Government  
 Transportation/Utilities/Communication  VAR  System house/company  
 Other \_\_\_\_\_

**5. Would you recommend your Fiber Driver product to a friend?**

Yes  No  Don't know yet





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# 1 INTRODUCTION

## About this Manual

### **Before unpacking please refer to section 2 (Hardware Installation)**

This manual is a guide to the installation and operation of the EM316E3 Fiber modem.

Product description describes the product, its functions, features, protocol supported, minimum requirements, and typical applications.

Customer support provides information on return policy and customer support information.

Glossary provides definition to terms used in this manual.

## Product Description

The EM316E3 modules of the Fiber Driver Family are Fiber Modems designed to convert a E3 interface into high-speed fiber optic interface, thus enabling the extension of the E3 maximum spanning distance up to fiber optic distance limit. These units convert the electrical signals from a coax cable to optical signals and transmit them over distances of up to 7km on multimode fiber, or distances of up to 100km on singlemode fiber. The EM316E3 supports ITU-T G.703, ITU-T G.823, and HDB3 line codes.

The EM316E3SF Fiber Driver's single fiber modules use unique technology that provides the ability to combine TX and RX signals onto a single fiber strand. This effectively doubles the available fiber in a network and eliminates the need for additional fiber connections. An identical EM316E3SF unit is required on the other end, using either standard APC (Angled PC) patch cords finish or a 3M VAR APC finish. The standard APC finish provides a <60dB back reflection, whereas the 3M VAR exceeds -70dB. Both APC finishes are polished to an 8° angle and minimize back reflection by forcing the reflected rays into the cladding.

The Fiber Driver family provides conversion solutions with greater distances and better manageability than any other products on the market. Multimode to Single Mode fiber conversion modules offers link distances from 0 km to 100 km.

## Features

- E3 conversion between coax media and fiber media
- Supports ITU-T G.703, ITU-T G.823, and HDB3 standards
- Supports Local, Remote and Line Loop back Test
- Up to 100km Transmission on Single Mode or 7km on Multimode Fiber
- Modules can be Inserted / Removed without powering off the chassis
- Extensive Network Management Support when used with EM316NM

\*For dB budget see: <ftp://ftp.fiberdriver.com/pub/doc/spec/fiberdriver>

## Requirements for Managed Module

EM316NM Management Firmware version 4.0 or later

For firmware released version go to:

<ftp://ftp.fiberdriver.com/pub/software/em316nm>

For firmware beta version go to:

<ftp://ftp.fiberdriver.com/pub/software/beta/em316nm>

MegaVision Network Management version 1.20 or later

## Connectivity

### Connectors Used

Coax: 75  $\Omega$  BNC (2 connectors: 1 for TX, 1 for RX)

Fiber: SC, or SC-APC (for single fiber)

### Cable Requirement

Coax: RG58/U (Max Length=900 feet)

Fiber: SC-SC fiber cable, or SC-APC fiber cable (for single fiber)

### Port Description

Port# Port Description

Port 1 E3 Coax, Conforms to ITU-T G.703, ITU-T G.823, and HDB3 standards

Port 2 E3 Fiber, Multi-Mode: 1310nm, 0-2km

Multi-Mode: 1310nm, 2-7km

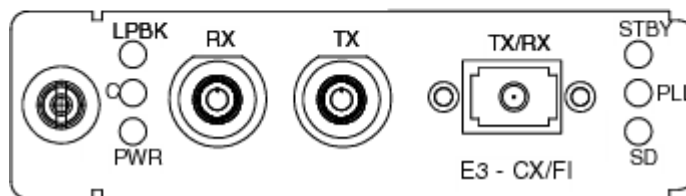
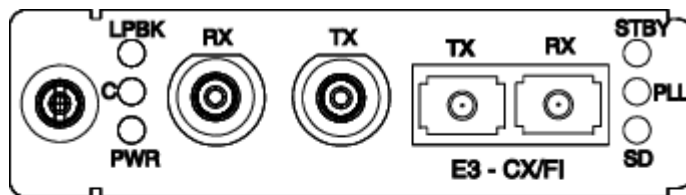
Single Mode: 1310nm, 0-25km

Single Mode: 1310nm, 25-50km

Single Mode: 1550nm, 50-100km

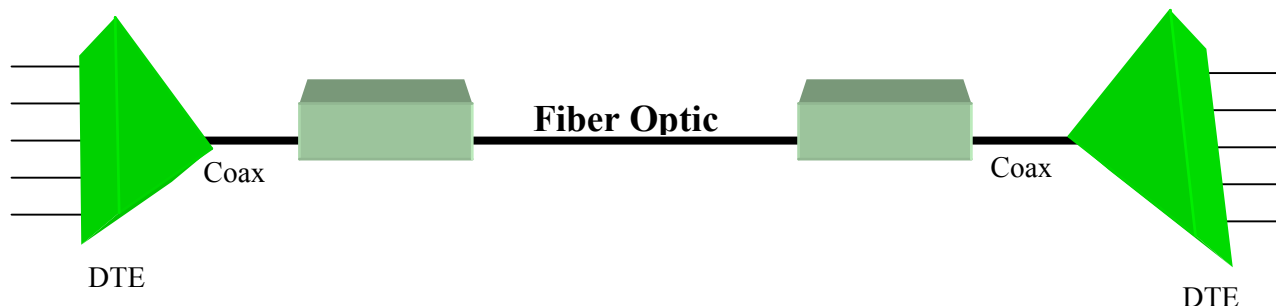
## Display Information (LED Definition)

- PWR: illuminates when unit is powered (green color)
- LPBK: illuminates (yellow color) when local loop back on both interfaces is enabled, OFF (no light or green color) when in normal mode
- C: illuminates when E3 (coax) interface detected a signal above threshold level
- SD: illuminates when Fiber Optic interface detected a signal above threshold level
- PLL: illuminates when phase lock loop (PLL) detected enough transition for locking; (ACT was changed to PLL on the Panel)
- STBY: illuminates (yellow color) when Fiber Optic link is transmitting an idle signal because E3 (coax) signal is absent, OFF (no light) when in normal mode



## Typical Applications

### EM316E3 (E3 Coax To E3 Fiber Multimode or Singlemode)



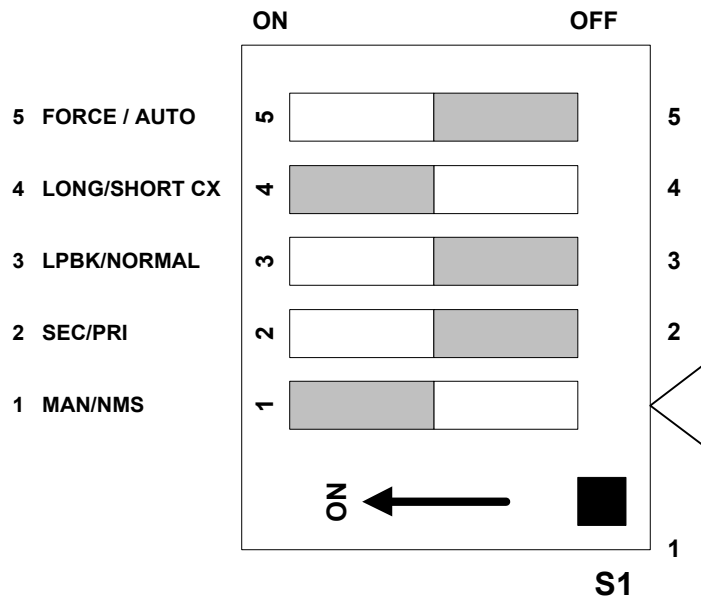
## Configuration

Jumper Settings: (Factory Default)

CONFIGURING THE SWITCH (S1)		
SWITCH	SETTINGS	RESULTS
MAN/NMS	*ON	Force switches selections (loop back) regardless of NMS command
	OFF	Default setting comes from switches after power up, but maybe change by NMS commands
SEC/PRI	ON/OFF	Not used in this application. Reserved for the dual-redundant card. Setting is irrelevant to the card
LPBK/NORMAL	ON	Loop back mode enabled
	OFF	Normal mode enabled
LONG/SHORT	*ON	Cable length is longer than 250 feet
	OFF	Cable length is shorter than 250 feet
SW5	ON/OFF	Setting is irrelevant to this card at this time

**Note:** LONG/SHORT settings shown above are the recommended setup, but can be change to other polarity if better results/performance can be achieved.

**Default Setup:** MAN/NMS, LONG/SHORT: ON. All other switches: OFF



### IMPORTANT NOTICE

The jumper settings shown above should be use only on expansion modules that has printed circuit board assembly (PCBA) number: 1226062-007 or later. This number can be found on a white bar coded label located at the bottom side of the expansion module.



## Theory of Operation

Block diagram of the Modem/Converter is shown below (fig. 1)

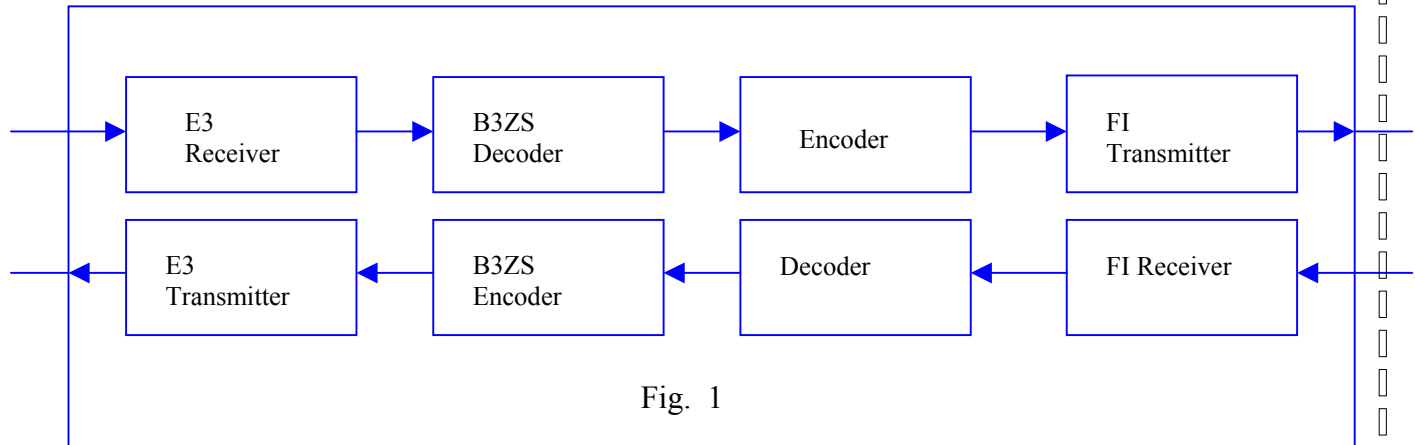


Fig. 1

### **E3 Line Receiver to fiber optic Transmitter:**

The receiver Line Interface Unit (LIU) receives the E3 signal and performs clock recovery and data detection. The data goes through B3ZS Decoding Block to extract NRZ data. It then goes to an encoding block and is ready to be transmitted by the Fiber Optic Transmitter Interface.

### **Fiber optic Receiver to E3 Transmitter:**

The fiber optic Receiver Interface directs the received signal to a decoder in order to extract the NRZ data. The NRZ data is going through B3ZS encoder and then to the E3 Transmitter.

### **Loop Back:**

This feature isolates the optic side from the E3 side, and enables each side to loop back on its own media line as shown below:

#### **Switch LPBK/NORM is set to ON**

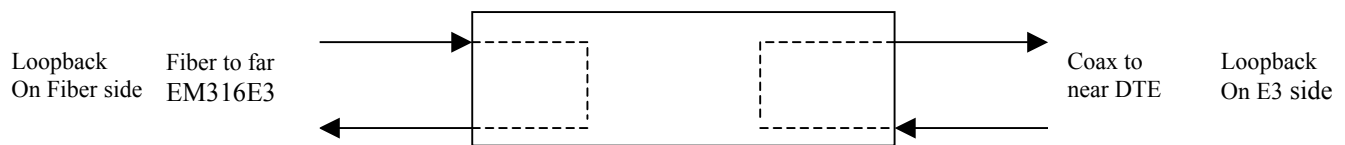


Fig. 2

When switch LPBK/NORMAL is turned ON, the card is configured as follows:

Optic input to the receiver is looped back into optic transmitter, thus enabling remote site to perform loop back on fiber optics. Note that this loop back includes the encoder and decoder blocks of the fiber optic. E3 receiver input is looped back into E3 transmitter, thus enabling full loop back on E3 line side. The route of the loop back includes the logic of decoder and encoder blocks of the E3.

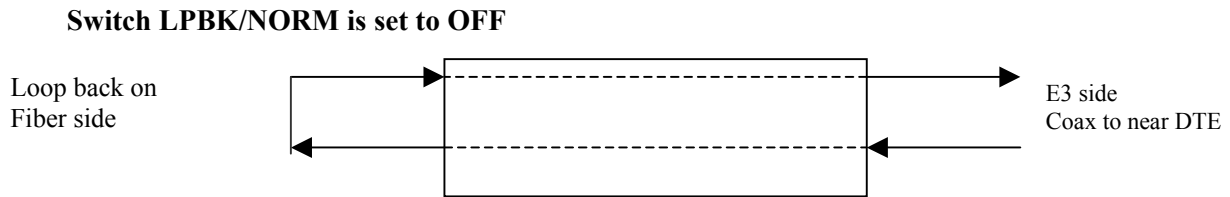


Fig. 3a: External loop back on fiber optic

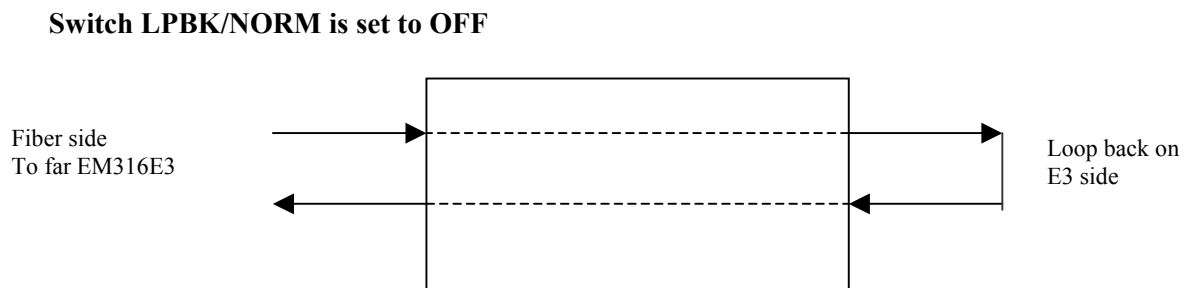


Fig. 3b: External loop back on fiber optic

**Loop Back Control: By NMS command or manually by a switch**

Loop back can be forced regardless of management by turning switch 1 MAN/NMS to ON and switch 3 NORM/LPBK to ON.

NOTE: It is also possible to configure an external loop, either on E3 side or the fiber side, the switch LPBK/NORMAL should remain in NORM position since the card is in its Normal mode. For external Fiber optic loop back, connect a fiber between RX SC connector and TX SC connector see (fig 3a). For external E3 loop back connect a coax cable between RX BNC connector to TX BNC connector (fig 3b)

## 2 HARDWARE INSTALLATION

### PREPARATION

#### STEP 1 Follow all Safety Regulations

- 1 Eliminate static electricity in the workplace by grounding operators, equipment, and devices (components and computer boards). Grounding prevents static charge buildup and electrostatic potential differences. Transporting products in special electrostatic shielding packages avert electrical field damage.
  
- 2 An effective workplace should be outfitted with the following items:
  - a) ESD protective clothing/smocks: Street clothing must not come in contact with components or computer boards since the various materials in clothing can generate high static charges. ESD protective smocks, manufactured with conductive fibers, are recommended.
  
  - b) Electrostatic shielding containers or totes: These containers (bags, boxes, etc.) are made of specially formulated materials, which protect sensitive devices during transport and storage.
  
  - c) Antistatic or dissipative carriers: These provide ESD protection during component movement in the manufacturing process. It must be noted that antistatic materials alone will not provide complete protection. They must be used in conjunction with other methods such as totes or electrostatic shielding bags.
  
  - d) Dissipative tablemat: The mat should provide a controlled discharge of static voltages and must be grounded. The surface resistance is designed such that sliding a computer board or component across its surface will not generate more than 100 V.
  
  - e) Personal grounding: A wrist strap or ESD cuff is kept in constant contact with bare skin and has a cable for attaching it to the ESD ground. The purpose of the wrist strap is to drain off the operator's static charge. The wrist strap cord has a current-limiting resistor for personnel safety. Wrist straps must be tested frequently to ensure that they are undamaged and operating correctly. When a wrist strap is impractical, special heel straps or shoes can be used. These items are effective only when used in conjunction with a dissipative floor.

- f) ESD protective floor or mat: The mat must be grounded through a current-limiting resistor. The floor or mat dissipates the static charge of personnel approaching the workbench. Special conductive tile or floor treatment can be used when mats are not practical or cause a safety hazard. Chairs should be conductive or grounded with a drag chain to the flooring.

## **STEP 2 Determine the best location for the chassis.**

Affix the chassis to a 19" or 23" rack using the enclosed rack mount ears, or place the unit on a secure, flat surface. Ensure that the unit is within reach of the necessary connections (i.e. power outlet, Ethernet connections, and, if the chassis will be monitored via serial port, and either a PC, UNIX workstation, or modem).

## **STEP 3 Make sure there is enough space to pull and connect both the electrical and optical cables without stressing them beyond the manufacturer's limitation (bend radius minimum).**

## **STEP 4 Plug in the chassis**

Connect the power cord (s) to the chassis and an outlet. Turn the power switch (es) to ON position. The wide-ranging power supply adjusts to any outlet.

## **STEP 5 Unpacking the unit**

Verify that no visible damage has been caused to the outer box. Remove all material from the packing box and confirm receipt of the following:

Fiber Driver module unit  
User's manual (this manual in printed format or on a CD)

In the unlikely event that anything is missing, contact your authorized dealer or representative. If it becomes necessary to return the unit, repackage the unit in its original box.

## UNIT INSTALLATION

**STEP 1** Remove required amount of blank panels from the NC316BU-xx.

**NOTE:** Per FCC regulations, either a panel or a module should **always** cover chassis slots.

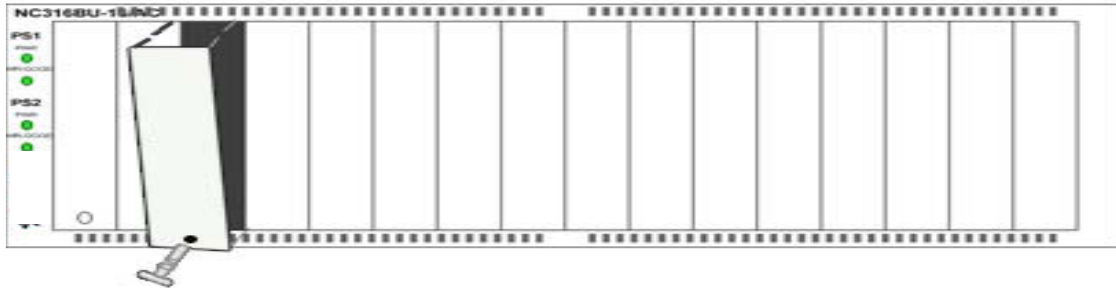


FIGURE 1.1 Take out the required amount of blank panels.

**STEP 2** Align the edges of the EM316 module to the rail inside the chassis, see pictures below.

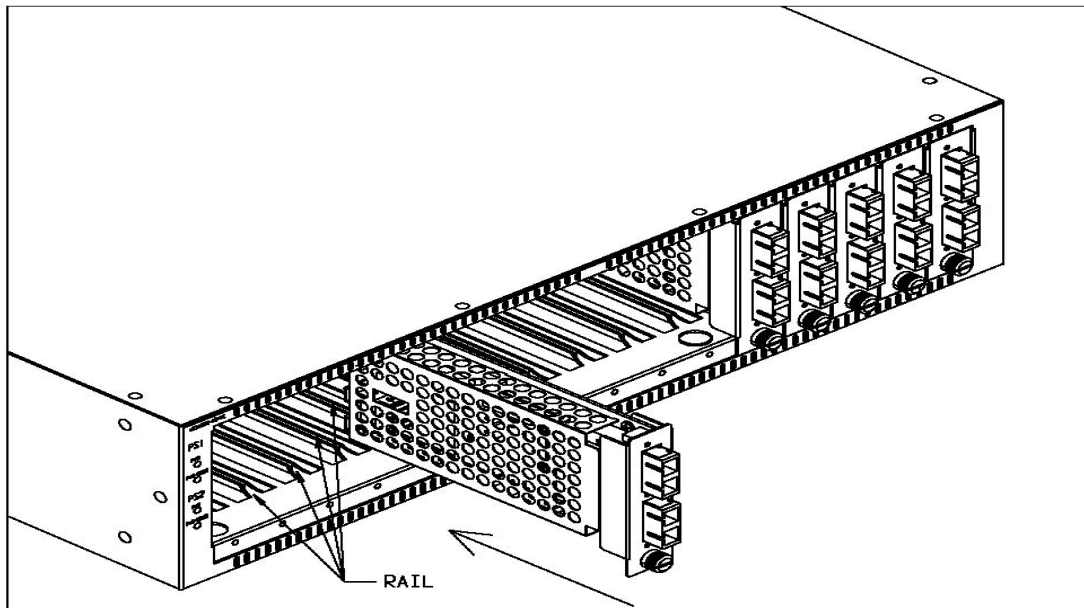


FIGURE 1.2 Align the edges of the EM316 to the rail inside the chassis and then insert the unit.



### 3 TROUBLESHOOTING

The Fiber Driver series are highly reliable units. If there are any operating problems, the fault probably lies in some other aspect of the configuration. However, if after following the troubleshooting steps below (in order), you find that the unit is still not functioning correctly, please contact your local representative.

Review all link LEDs to ensure that those ports you believe should be functioning are properly attached to a cable.

Verify the correct fiber optic cables are being used, i.e. multi-mode or single mode.

Review all link LEDs to ensure that those ports you believe should be functioning are properly configured.

If the suspect ports are not configured properly, re-configure the port through SNMP management or the Administrative Interface.

Ensure that the equipment attached to this module is configured properly.

Verify that the output power of the fiber optic port(s) is within manufacturer's specification for output power, for more information please see the link below:

<ftp://ftp.fiberdriver.com/pub/doc/spec/fiberdriver>

Verify that the dB loss of the Fiber cable you are connecting to is within the dB budget for this module, for more information please see the link below:

<ftp://ftp.fiberdriver.com/pub/doc/spec/fiberdriver>

## 4 TECHNICAL SPECIFICATIONS

### Electrical

5VDC @ 2 Amps Max

Hot Swappable

### Operating Temperature Range

0°C - +50 °C (32°F – 122°F)

### Storage temp

-10°C - +60°C (14°F – 140°F)

### Relative Humidity

85% maximum non-condensing

### Emissions Compliance

FCC Part 15, Subpart B, 1999 Class A

CE Mark

EN 50081-1: 1992

EN 50082-1: 1997

EN 55024: 1998

EN 55022: 1998

AS/NZS 3548: 1995

### Physical Dimensions

1" high x 3" wide x 7" deep (2.54cm x 7.62cm x 12.78cm)

### Weight

9.6 oz (0.36 kg)

### Color

Black



## 5 CUSTOMER SUPPORT

### Contact Information

If you have any questions, please do not hesitate to contact us at:

#### **Americas Support**

MRV (East Coast USA)  
295 Foster Street  
Littleton, MA 01460-2016  
Tech Support: (800) 338-5316  
Tech Support: (978) 952-4700  
E-mail: [support@fiberdriver.com](mailto:support@fiberdriver.com)  
Fax: (978) 952-4880  
URL: <http://www.fiberdriver.com>

MRV (West Coast USA)  
20415 Nordhoff St.  
Chatsworth, CA 91311  
Tel. (800) 338-5316  
Tel. (818) 773-0900

#### **International Support**

MRV International  
Business Park Moerfelden  
Waldeckerstrasse 13  
64546 Moerfelden – Walldorf  
Germany  
Tel. (49) 6105/2070  
Fax (49) 6105/207-100

### Manual Information

The most recent version of this manual may be found on our ftp site:

<ftp://ftp.fiberdriver.com/pub/doc/manuals/>

## 5 GLOSSARY

Complete definition of networking terms (jargon) used in this manual, may be found on our ftp site:

<ftp://ftp.fiberdriver.com/pub/doc/Glossary.pdf>

## 6 ORDERING INFORMATION

Please visit us at <http://www.fiberdriver.com> for the latest updates on our products.

### **Fiber Driver Division of MRV**

Chatsworth, CA 91311

Phone: (818) 772-6235 or (800) 966-4444

Fax: (818) 772-0576

Fiber Driver Inquiries: [info@fiberdriver.com](mailto:info@fiberdriver.com)

Marketing: [marketing@fiberdriver.com](mailto:marketing@fiberdriver.com)

Repair Services: [rma@fiberdriver.com](mailto:rma@fiberdriver.com)

\*Note: For dB budget see: <ftp://ftp.fiberdriver.com/pub/doc/spec/fiberdriver>

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