

LBO-DVI Series

DIRECTLY PLUGGABLE LINK BRIDGE™
FIBER OPTIC DVI
TRANSMISSION SYSTEM



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SAFETY INSTRUCTIONS AND COMPLIANCE DECLARATIONS
PLEASE OBSERVE THE FOLLOWING SAFETY PRECAUTIONS AS OUR
PRODUCTS CONTAIN
CLASS I LASER PRODUCTS

WARNING

This product is a **CLASS I LASER PRODUCT** only when the units are connected with a fiber optical cable. Do not disconnect the fiber optic connector while the unit is powered up. Exposure to laser radiation is possible when the

laser fiber optic connector is disconnected while the unit is powered up. It should be noted that when the fiber is disconnected, the product will have **CLASS IM INVISIBLE LASER RADIATION**.

Although the fiber optic connectors in this product emit only Class 1 energy that is below the levels considered to be hazardous, one should never stare directly into a fiber optic connector or an unconnected fiber end unless one can be certain that no exposure to laser energy could occur.



CAUTION

Only service personnel are intended to access the interior of the units. It should be cautioned that **CLASS 3 INVISIBLE LASER RADIATION WHEN OPEN, AVOID EXPOSURE TO THE BEAM**. The use of controls, making adjustments, or performing operations other than those specified may result in hazardous radiation exposure. This product has operating wavelengths at 778nm, 800nm with average -0.5dB to 0dBm optical power per wavelength, 825nm, 911nm, and 980nm. The laser is operated in pulse mode within 1 KHz frequency and ¼ duty cycle. The following label or equivalent is located on the surface of laser products. This label indicates that the product is classified as a **CLASS 1 LASER PRODUCT**.



CAUTION



This symbol alerts the user that important literature concerning the operation of this unit has been included. Therefore, it should be read carefully in order to avoid potential problems.



Manufacturer: This symbol shall be accompanied by the name and address of the manufacturer adjacent to the symbol, and the date of manufacture where the date shall be located adjacent to the symbol.

Serial Number: Indicates the manufacturer's serial number so that a specific medical device can be identified.

DO NOT remove cover (or back). There are no user serviceable parts inside. Refer servicing to qualified service personnel.



Product Safety:

This product meets the medical safety requirements.

SN

North American Safety Compliance:

ANSI/AAMI ES60601-1:2005/(R):2012 Medical electrical equipment – Part 1: General requirements for basic safety and essential performance
CAN/CSA-C22.2 No. 60601-1-08 (3rd Ed.) Medical electrical equipment – Part 1: General requirements for basic safety and essential performance
WITH RESPECT TO ELECTRIC SHOCK, FIRE AND MECHANICAL HAZARDS ONLY

EEC Safety Compliance:

These products meet the requirements of EN 60601-1:2005 so as to conform to the Medical Device Directive 93/42/EEC (general safety information) as amended by 2007/47/EC.

This equipment is energized from 100-240 VAC 50 / 60 Hz power source. It is the responsibility of the installer to ensure that the equipment is installed in accordance with applicable hospital, local and national electrical codes.

To power unit down, remove power cable from unit or disconnect power cord from power receptacle. The power supply is the only recognized disconnect device, disconnect the power supply from the AC mains.

LBO Power Supply: (BCI) 80275-5110 BridgePower 5V 2.0A Desktop with Locking Collar

Power Cord: Use a hospital grade power cord with the correct plug for your power source.



Recycling:

Upon termination of the service life of this product please return unit to the manufacturer for proper waste disposal, or follow local governing ordinances and recycling plans regarding the recycling or disposal of this equipment , or contact the Electronic Industries Alliance (www.eiae.org).

Declarations of Conformity

FCC and Council Directives of European Standards:

This device complies with Part 15 of FCC rules and 93/42/EEC of the Council Directives of European Standards Directive as amended by 2007/47/EC. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesirable results.

1. Use the specified cables with this device so as not to interfere with radio and television reception. Use of other cables and / or adapters may cause interference with other electronic equipment.

2. This equipment has been tested and found to comply with the limits pursuant to FCC part 15 and CISPR 11. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

IEC:

This equipment has been tested and found to comply with the limits for medical devices to the IEC 60601-1-2. These limits are designed to provide reasonable protection against harmful interference in a typical medical installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to other devices in the vicinity.

FCC, Council Directives of European Standards and IEC:

There is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult your dealer or an experienced radio/TV technician for help.

Accessory equipment connected to this monitor must be certified according to the respective IEC Standards (i.e., IEC 60950-1) for data processing equipment and IEC 60601-1 for medical equipment). Anyone who connects additional equipment to the signal input part or signal output part configures a medical system, and is therefore responsible that the system complies with the requirements of system standard IEC 60601-1-1. Whoever is responsible for securing the monitor to a system needs to insure that the mounting equipment used with this display complies to IEC standard 60601-1. If in doubt, consult the technical services department or your local representative.

About this Manual

This manual is designed to assist the user with installation, setup and operation of the LBO-DVI-T/R products.

The functional descriptions in this manual are representative of:

60704-0300	LBO-DVI-T
60704-0400	LBO-DVI-R

Manual ID Number: 60000-LBODVI063014

Intended Use and Contraindications

Intended Use:

This device is intended for use in a medical environment to transmit high quality video and graphic images .

Contraindications:

This device is not intended for life support applications.

Operational Failure Conditions and Mitigation

Operational Failure:

End user cannot view the video data from a connected video source due to Incompatibility with video source equipment, or degraded video data, or the unit cannot be powered on.

Mitigation:

Bypass the device by connecting via a failsafe cable from the output of the video source directly to a monitor.

For mission critical applications, we strongly recommend that a replacement unit be immediately available.

SURGE PROTECTION DEVICE RECOMMENDED

This product contains sensitive electrical components that may be damaged by electrical spikes, surges, electric shock, lightning strikes, etc. Use of surge protection systems is highly recommended in order to protect and extend the life of your equipment.

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1.0 PRODUCT DESCRIPTION

The LBO-DVI Series is a high performance, low cost, miniature, directly pluggable Link Bridge™ Fiber Optic DVI Transmission System. It carries one (1) unidirectional DVI video, together with DDC/EDID, through one (1) multimode fiber. This unique fiber optic transmission system lets your digital flat panel display extend up to 400m at WUXGA (1920x1200 @ 60Hz) resolution. Thumb screws are designed in the rear for convenient installation in tight spaces.

No user adjustment is required for the LBO-DVI system due to the use of advanced digital fiber optic transmission system technology with zero compression and zero bit reduction. This allows for a quick and easy setup, offering trouble-free operation for many years to come. The LBO-DVI supports video resolution up to WUXGA (1920 x 1200 @ 60 Hz) or 1080p @ 60Hz HDTV video resolution, with 12-bit deep color capability.

Figure 1-1 illustrates the TX and RX view of the LBO-DVI model.



Figure 1-1
LBO-DVI TX and RX View

2.0 SETUP

The BCI LBO-DVI Series units are used in pairs. One LBO-DVI-T transmitter unit is located at the near-end (source) and connected through one optical fiber, to the LBO-DVI-R receiver located at the far-end (sink) of the link. Figure 2-1 depicts a typical installation for the LBO-DVI-T/R.



Figure 2-1
LBO-DVI Setup

2.1 Mounting

Before installing the units into your housing, make sure there is enough space to pull and connect both the electrical and optical cables without stressing them beyond the manufacturer's limitations (also known as the minimum bend radius).

2.2 Cabling and Connectors

In order to setup the BCI LBO-DVI properly, make sure to observe the following instructions when installing the proper cables. The LBO-DVI requires two parts to the cabling setup, the electrical and the optical.

2.2.1 DVI Video Interface

Use the following instructions to properly connect your component video as illustrated in Figure 2-2.

1. Directly connect the LBO-DVI-T (Transmitter) unit to the user's DVI video source output.
2. For the receive unit, directly connect the LBO-DVI-R (Receiver) unit to the user's DVI video sink input.



Figure 2-2
Electrical Connection

2.2.2 Optical Fiber Connection

Most cable manufacturers identify individual fibers in the fiber cable. Select an appropriate terminated fiber. Each unit's optical ports in the system are specified for use with SC-connectorized Multimode (50u or 62.5um/125 micron) fiber. Follow the ensuing instructions on installing and connecting the fiber optic links:

1. Ensure the power is off before proceeding with the fiber optic cable installation.
2. Prior to connecting the fiber optic cables, remove and save the dust caps from the optical port of both the LBO-DVI units. Clean the fiber optic connector and use a lint-free cloth to thoroughly wipe the side and end of the ferrule.
3. Connect the fiber from one unit to the other connecting the near end LBO-DVI-T unit's optical port to the far end of the LBO-DVI-R unit's optical RX port as illustrated in Figure 2-3.



Figure 2-3
Fiber Optic Connection

2.3 DC Power Connection

Congratulations! You are now ready to power up the LBO-DVI and set up your network connection. In order to make sure that you have a proper installation, please observe the following:

1. Your AC jack has power.
2. The 5VDC power supply is working.
3. Your electrical system has proper grounding (this ensures that your power supply does not suffer from voltage variations).
4. **Power Surge Protection. This is optional**, but highly recommended. A UPS system provides voltage regularity as well as prevents spikes from occurring, thus protecting your LBO-DVI from sensitive voltage conditions.

The LBO-DVI derives power from an external 5VDC power supply. This power supply is a wall mounted AC/DC adapter, 100-240 VAC, 50-60 Hz, at 1.0A. This power supply comes standard for the LBO-DVI unless otherwise specified.

To provide power to the LBO-DVI, simply connect the power cord, already provided with the units, and connect it to the wall jack. (You will find one power cord per unit). Once the power cord has been connected to the wall jack, connect 5VDC to the unit and the unit should power up immediately.

If you have any problems or concerns, regarding the installation, make sure that you have taken the proper steps to ensure a proper power connection. Otherwise, feel free to contact us for any questions you may have.

3.0 OPERATION

After the installation procedure is completed, the units are ready for operation. To operate the BCI LBO-DVI units, simply apply power as indicated in the previous step. The following table describes the LED activity.

LED Indicator	Description
PWR/LINK	RED when +5VDC is applied to the unit, but no optical link. GREEN when +5VDC is applied to the unit and optical link is established

Table 1
LED Indicator

4.0 MAINTENANCE AND TROUBLESHOOTING

4.1 Maintenance

There is no operator maintenance other than keeping the units clean.

4.2 Troubleshooting

If the BCI LBO-DVI units do not operate properly after installation, check for: possible cable breaks, loose connections, and incorrect cable connections. If a problem exists on the fiber link, please check your fiber connectors for improperly cleaned fiber cables and connectors. If problems persist that may be fiber related, contact BCI at 1-800-214-0222 for further assistance.

For electrical problems, perform the following troubleshooting procedures:

- 1. If the POWER indicator is OFF, check for the following:**
 - a. The line cord is plugged into the unit and your outlet has power.
- 2. If the POWER indicator is ON, but the units are not working, check for the following:**
 - a. Make sure the appropriate (Multimode) fibers are being used.
 - b. Fiber and fiber connectors are not broken.
 - c. For each unit, the transmit (TX) fiber is connected to the other unit's receiver (RX).

5.0 SPECIFICATIONS

Video

Resolution	Up to 1080p @ 60Hz or 1920x1200 @ 60Hz
Connector	DVI Male Plug
Protocol	DDC/EDID/HDCP Compatible

Optical

Fiber Type	Multimode
Number of Fibers	1
Connector	SC

Physical

Dimension (H x W x D)	0.64" x 1.58" x 3.12"
Power Level (max.)	+5VDC @ 1.0A
LED Indicator	Power/Link
Operating Temperature	0 to +50°C
Humidity	0 to 95% RH, non-condensing

6.0 SERVICE PROCEDURE

6.1 Replacement Policy

Standard products found defective on arrival (DOA) will be replaced, based on availability, within 24 to 48 hours anywhere in the U.S. Please call Customer Service at **800-214-0222** for information.

6.2 Return/Repair Service

The BCI LBO-DVI System contains no user serviceable components. If you have a problem with your unit, please contact the Customer Service Department. To facilitate our return/repair processing please contact Broadata Communications, Inc. to obtain a Return Material Authorization (RMA). Please include the following information:

- Product model number
- Serial Number
- Complete description of problem
- Hardware installation description

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(310) 530-1416
(310) 530-5958 (Facsimile)
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Website: www.broadatacom.com

7.0 LIMITED WARRANTY

Broadata Communications, Inc. (BCI) warrants, for a period of one year from date of shipment, each product sold shall be free from defects in material and workmanship. BCI will correct, either by repair, or at BCI's election, by replacement, any said products that in our sole discretion prove to be defective and are returned to the manufacturing location within 30 days after such defect is ascertained. All warranties are limited to defects arising under normal use and do not include malfunctions or failure resulting from misuse, abuse, neglect, alterations, electrical power problems, usage not in accordance with product instructions, improper installation, or damage determined by BCI to have been caused by the Buyer or repair made by a third party. Limited warranties granted on products are to the initial customer end-user and are not transferable. OUR LIABILITY UNDER THIS WARRANTY SHALL IN ANY CASE BE LIMITED TO THE INVOICE VALUE OF THE PRODUCT SOLD AND BCI SHALL NOT BE LIABLE TO ANYONE FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES ARISING FROM THE USE OF ITS PRODUCTS OR THE SALE THEREOF. We make NO WARRANTY AS TO THE MERCHANTABILITY OF ANY GOODS, OR THAT THEY ARE FIT FOR ANY PARTICULAR PURPOSE OR END APPLICATION NOR DO WE MAKE ANY WARRANTY, EXPRESSED OR IMPLIED OTHER THAN AS STATED ABOVE.

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