

# Dual Channel Fiber Coupled LED Source

## MODEL QTFS-450-630-LED

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### Instruction Manual



Please read the entire manual prior to use

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**QPHOTONICS, L.L.C.**


LASER DIODES: LARGER SELECTION FOR FAST DELIVERY

## 1. Safety Information

The following safety instructions must be observed whenever fiber coupled LED sources are operated, serviced, or repaired. Failure to comply with any of these instructions or with any precaution or warning contained in the Manual is in violation of the standards of design, manufacture and intended use of the instrument. QPhotonics, LLC assumes no liability for the customer's failure to comply with these safety requirements.

### 1.1 Safety Messages

The following messages may appear in the Manual. Please observe all safety instructions that are associated with this message.

<b>WARNING</b>	<b>The procedure can result in serious injury or loss of life if not carried out in proper compliance with all safety instructions. Ensure that all conditions necessary for safe handling and operation are met before proceeding</b>
<b>CAUTION</b>	<b>The procedure can result in serious damage to or destruction of the instrument if not carried out in compliance with all instructions for proper use. Ensure that all conditions necessary for safe handling and operation are met before proceeding</b>
	<b>Refer to the Manual for instructions on handling and operating the instrument safely.</b>



Please contact QPhotonics or your local representative with any questions related to subjects described within this note.

In no case will QPhotonics be liable to the buyer, or to any third parties, for any consequential or indirect damage, which is caused by product failure, malfunction, or any other problem.

### 1.2 WARNINGS and CAUTIONS



#### **WARNING**

In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Connect LED module to 110V AC wall plug socket using original cable.

LED source must be unpacked at ESD protected work station

<p><b>Never touch fiber connectors with bare hands.</b> Doing so may cause device output power reduction or damage.</p>
<p>Do not operate equipment that may generate high frequency surge energy near LED source or electronic driver.</p>
<p>Do not disassemble the instrument. The LED modules and driver contains no user serviceable parts.</p>
<p>Avoid soaking the driver module in water or any other liquids. Avoid operating instrument in high humidity environment. Doing so may cause fire, electrical shock, or malfunction.</p>
<p>Do not insert or drop any metal or flammable material into the driver module through any aperture. Doing so may cause fire, electrical shock, or malfunction.</p>
<p>Do not remove any screws or panels. Some parts generate high voltage. Removing screws and panels may cause electrical shock.</p>
<p>If abnormal sound or extra high temperature are observed, turn off the power, disconnect the power cord, and contact QPhotonics or your local representative. Continuing to operate under these conditions may cause fire or electrical shock.</p>
<p>If water or any other liquid is spilled into any LED source, turn off the power switch, disconnect power cords and contact us. Continuing to operate under these conditions may cause fire or electrical shock.</p>
<p>If smoke or strange smells are observed, turn off the power switches, disconnect power cords and contact us. Continuing to operate under these conditions may cause fire or electrical shock.</p>
<p>If source is dropped and damaged, turn off the power switch, disconnect power cords and contact QPhotonics. Continuing to operate under these conditions may cause fire or electrical shock</p>
<p><b>Do not look into a fiber or optical connectors of the LED source</b> under the microscope during operation. Wearing appropriate protection goggles is recommended. Consult your local safety officer for domestic regulations.</p>



## CAUTION

<p>Do not place LED's module on unstable or inclined surface. There is a possibility that instrument will fall and cause injury.</p>
<p>Disconnect all cords when moving devices. Failure to do so may damage the cords,</p>

which may cause fire or electrical shock.
Do not place the cords around any heating instrument. Doing so may damage the cords, which may cause fire or electrical shock.
Do not connect or disconnect cords with wet hands. Doing so may cause fire or electrical shock.
Do not pull electrical cords to disconnect. Doing so may damage the cords, which may cause fire or electrical shock. Hold the plug portion and disconnect the cords.
Do not put heavy items on the cords. Doing so may damage the cords, which may cause fire or electrical shock.
Ensure that the cords are disconnected when storing LED module. Ensure that optical connectors on LED modules are closed with caps when not in use or when storing.
Do not bend optical patch-cord. Doing so might damage patch-cord fiber or results in reduction of optical power.
Store LED's module in a cool dry place.
<b>LED module can be instantly damaged, if user does not follow proper start-up, shut-down, and external modulation sequences. Please refer to section 5.2 of the notes for details.</b>
<b>Use only original FC-PC (or FC/UPC) optical adapter/connector to extend the length of pigtail fibers.</b> <i>Perform optical connections only when device is powered off.</i> Try to avoid unnecessary disconnections if possible. Keep optical connectors protected with provided caps when the LED modules are not in use.

### **1.3 POWER REQUIREMENTS**

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The LED source requires 110-240V (AC), 50-60 Hz stabilized power, Please, check voltage rating on the module before connecting to the MAINS.

## 2. GENERAL INFORMATION

This is a compact multiple channels LED module, operating in a constant current mode. LED module is designed for laboratory applications demanding low-power broadband sources (Optical spectroscopy, optical sensing, colorimetry, etc.)

Light from LED module is delivered through multimode plastic fiber output pigtail, terminated with FC/PC connectors and can be collimated or focused at different distances using an optional compact fiber collimator. Standard version of device is equipped with 0.98 mm core size plastic fiber pigtails (POF). Higher output power version of source comes with 1.5 mm core size POF pigtails.

LED module unit is fitted with an air cooling system and has internal fuse and short circuit protection for each channel. Optical power of each channel can be set to maximum value or regulated using multi-turn power control knobs on the front panel. Activation of each channel locally or remotely is indicated by two lights positioned above optical fiber outputs. Remote operation of the LED source can be made with a voltage source or signal generator independently for each channel.

The rugged construction of LED sources and driving current stabilization provide excellent short- and long-term *stability*, low sensitivity to *vibration*, *very small crosstalk* between channels, and good optical isolation.

### 2.1 Specifications

Description	Min	Typical	Max	Unit
Output power: channel 1	0.5	8-12	15	mW
Output power: channel 2	0.5	8-12	15	mW
Remote control voltage	0	4	5.5	V
Power consumption	20	35	55	VA
Output connectors	FC/PC (SMA- optional)			
Dimensions		10.0x6.7x2.4		in
Operating temperature	15	25	45	°C

Storage temperature	0	25	65	°C
Humidity			85	%R.H
Voltage, AC	105	110	240	V
Power stability	±0.05	±0.1	±0.9	dB

## 2.2 Components

<b>Part</b>	<b>Part Number</b>	<b>Quantity</b>
LED module driver with air-cooling	QTFS-450-630-LED	1
FC/PC connectorized extension fiber patch-cords	LE-1x-01	2
Getting started Notes	LE-1x-02	1
<b>Optional components</b>		
Cable 1 (power cord)	LE-1x-O-C1	1
FC/PC connectorized collimator (adjustable focus)	Model -014	0
Multi-mode POF pigtailed collimator, FC/PC connectorized	Model-011	0
Measurement fiber U-bench mechanical adapter with magnet holder	Model-U2	0
Mechanical post with sliding arm	Model-P1	0
Small mounting mechanical platform (30x30 cm)	Model-P2S	0
Medium mounting mechanical platform (45x45 cm)	Model-P2M	0
Large mounting mechanical platform (120x65 mm)	Model-P2L	0
FC/PC connectorized fiber with micro-optics	N/A	0

## 2.3 Recommended consumables

It is recommended to keep the following items with fiber-coupled LED modules:

- IPA and lint-free tissue
- FC/PC connector's cleaner
- Infrared viewing card (depending on the LED wavelength)

### 3 External description and connection to external circuits

#### 3.1 LED module QTFS-450-630-LED



Front-view

Back-view

Top-view

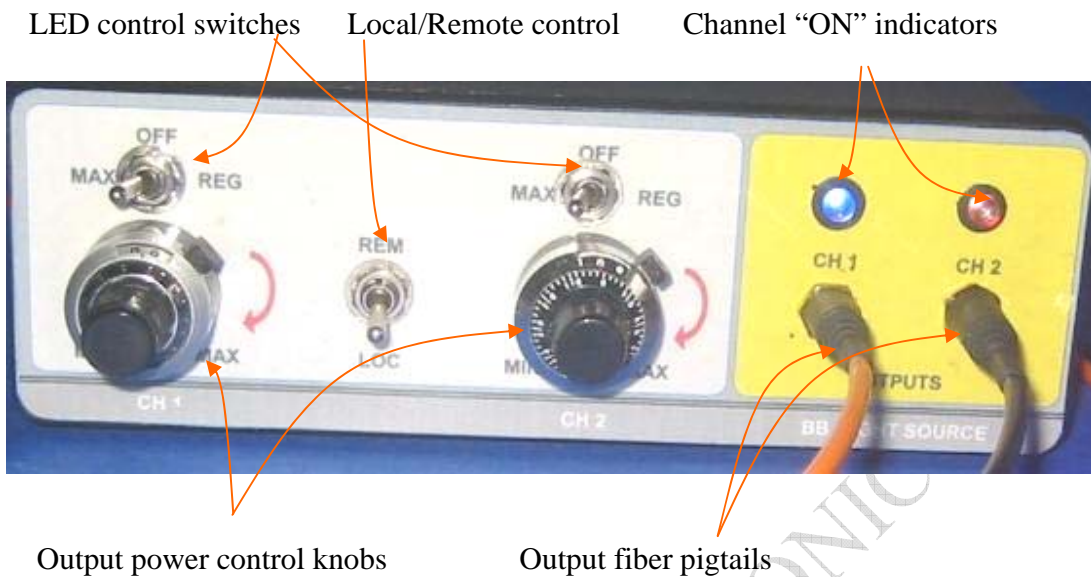
**LED source driver module** is shipped assembled as shown in the figures above. Different types of FC/PC connectorized fibers can be connected to the output fiber pigtailed using FC-type adapters. All electronics, LED assemblies, and air cooling system are integrated in one unit. Two remote “ON/OFF” control electrical inputs have been installed on the device back panel. Output power of each optical channel can be regulated or set to maximum value using front panel controls. Front and back panels of the LED source are made using electrically insulating material. Electrical connection between the LED source and MAINS performed using supplied power cord cable.

LED module functions are:

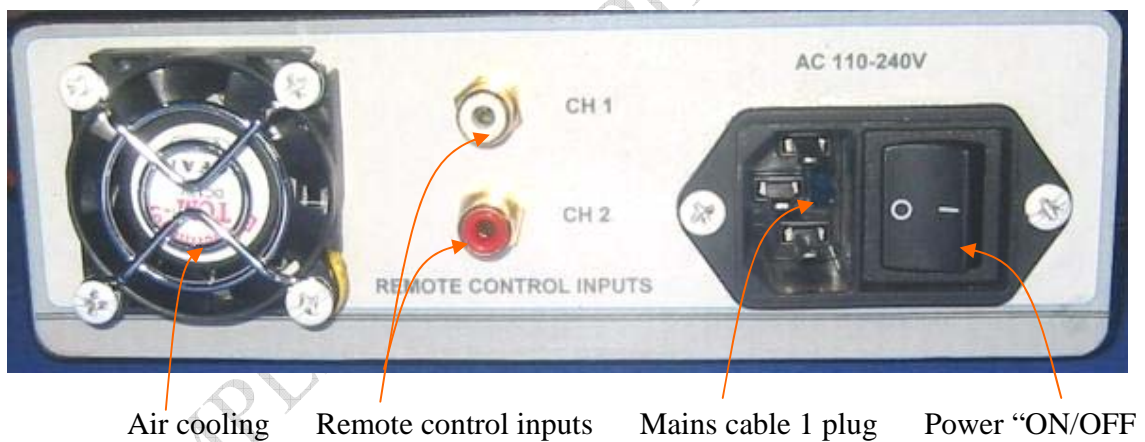
- Connect device to 110/240 V AC (“AC 110-240 V”)
- Optical output fiber pigtailed (“Outputs”)
- Control output power (“CH X knobs”)
- Disable/Enable/Control LED sources (“MAX/OFF/REG” switches)
- Inputs for remote “ON/OFF” control (“Remote control inputs”)
- Local or remote control selection (“LOC/REM” switch)
- Channel “ON” indicators (LED’s above fibers)



### QTFS-450-630-LED module front panel



### QTFS-450-630-LED module back panel



### 3.2 Optional modules/components

**Remote control option** used to turn "On-Off" module channels, when LED operation mode control switch is in "REG" or "MAX" positions. Positive polarity (3.5-5 V) voltage source of remote control signal connection to RCA plug on device body marked with "REMOTE" sign is required. LED source corresponding channel will be in OFF-state, when remote control voltage is zero and in "ON-state, when remote control voltage is 3.5-5V. When device is working in remote control mode, output optical power level is set by the power control knob at the front panel.



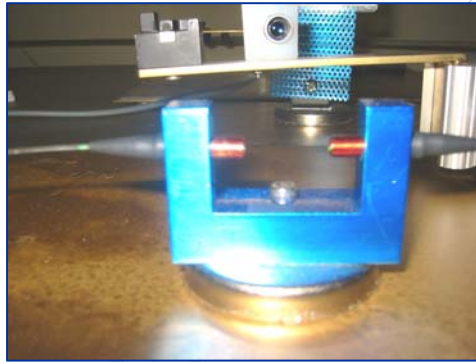
**FC/PC connectorized patch-cord** used for extension of the laser module pigtail length, for optical connections between the LED source module and other optional modules

**FC/PC adapter** used for connection between FC/PC connectorized optical cables.

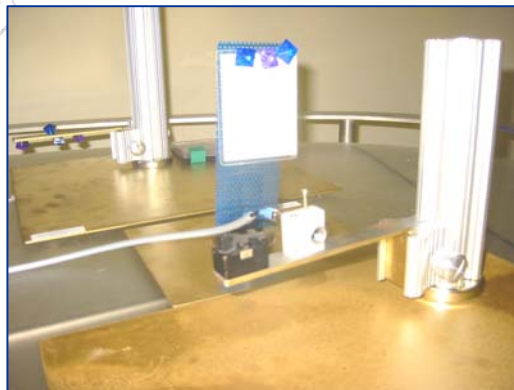
**Optical fiber snap-on collimator (model 014)** provides collimation or focusing of light emitted from the end of FC/PC connectorized patch-cord/pigtail. Fiber collimator can be directly attached to FC/PC connector at the end of pigtail.

**Optical fiber collimator (model 011) or Multi-mode POF pigtailed collimator, FC/PC connectorized.** When plugged into LED channel, provides collimation or focusing of light emitted from the end of plastic optical fiber.

**Measurement fiber U-bench** mechanical adapter with magnet holder provides way to perform transmission spectra measurements of different samples positioned between two fiber-collimation pigtails.



**Set of mechanical platforms and holders (magnetic)** is a cost effective solution for setting up basic optical measurement working place. Includes mechanical base (platforms) of different size, long traveling distance stages, holders



**IR viewing card** provides visualization of IR radiation emitted from the TS LD-01S laser source module. IR card can visualize IR optical signals with wavelength up to 1600 nm.

## 4 Inspection/connections

### 4.1 Initial Inspection and electrical cords connections

1. Please inspect the shipping container for any indications of excessive shock to the contents.
- 2. Package must be unpacked on ESD protected workstation.**
3. Inspect the contents of shipping container to ensure that shipment is complete
4. Visually inspect delivered parts of the LED source and all accompanying components and cables for structural damage.

Please inform QPhotonics immediately and, if necessary, the carrier, of any damage to shipped components, defective or missing parts, or if the LE-1BG does not pass initial visual inspection.

<b>WARNING</b>	<b>To avoid electrical shock, do not initialize or operate the source if there is any sign of damage to any of the components.</b>
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### 4.2 Assembly and operation of the LED source.

**WARNING:** Please unpack delivered device on ESD protected workstation. Use all necessary ESD protection measures, when working with device.

- After unpacking, place laser source on the flat surface and make sure that ventilation fan and ventilation holes are not obstructed.
- Release fiber pigtail from the tape holders. Clean FC/PC connectors, using fiber cleaner. Avoid bending and twisting of the fiber pigtails. Keep fibers fixed (using clear weak adhesive tape).
- Remove protection plastic cups from the fiber pigtails.
- Connect the module to the wall-plug socket using cable 1.
- Switch “ON” power switch at the back panel of module, air-cooling fan on the back of the module will start to rotate.
- Select “LOC” mode using front panel switch and put front panel channel switches into position “REG”. Both LED channels will start to operate. Set desired output power using power control knobs (clock-wise turn will increase the power). Allow LED sources temperature to stabilize for 2-5 minutes. When channel switches are in “MAX” position, corresponding LED will produce maximum output power.
- To perform initial test of the LED module :

- connect output fiber pigtail to an OSA or Power Meter

<b>WARNING</b>	<b>LED source emits significant optical power. Do not look into FC/PC receptacle under the microscope. Use protective goggles when the source is on.</b>
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- LED source is in operation

Operation in REMOTE CONTROL mode:

- Put front panel switch into “REM” position. Connect external remote control positive polarity voltage sources to “REMOTE” inputs using provided RCA connectorized cable. LED channels will start to operate when +3 to +5V voltage is connected to “REMOTE” inputs. When front panel switch is in “REM” position, light output power from the source can be regulated using front panel “POWER” control knobs. The level of output power set using “POWER” knob is the same in internal and external (remote) control mode. When The repetition rate of the remote control signal can be up to ~1 kHz.
- DAC computer boards, most of pulse generators, computer-controlled 5 V power supplies and other similar devices, supplying 3.5-5V positive polarity voltage and up to 15 mA current, can be used as remote control signal sources.

<b>WARNING</b>	<b>PLEASE MEASURE THE VOLTAGE BETWEEN AN EXTERNAL REMOTE CONTROL SIGNAL SOURCE GROUND AND LED SOURCE RC INPUT GROUND ELECTRODE BEFORE MAKING CONNECTION. TO PREVENT PERMANENT DAMAGE OF THE LIGHT SOURCE, DO NOT CONNECT LED SOURCE TO REMOTE CONTROL DEVICE IF MEASURED VOLTAGE IS &gt;0.5V! CONTACT QPHOTONICS FOR TECHNICAL SUPPORT.</b>
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#### **4.3 To switch light source off, please:**

- Switch off remote control signal and disconnect cables
- Turn “LED control switches” into “OFF” position.
- Wait 10-25 seconds to allow LED diode chip cooling down.
- Turn “Main” switch on the back panel into “OFF” position
- Disconnect mains cable from the source.

#### 4.4 Troubleshooting

##### **In case the LED source emits low power or doesn't operate:**

- Clean the fiber connectors.
- Check electrical connections between source and wall plug socket.
- Check if “source control switches are in “MAX” or “REG” position.
- For all other problems contact QPhotonics.

<b>WARNING</b>	<b>To avoid electrical shock, do not attempt open the module.</b>
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#### **5 Tips on how to keep source stability and output power high**

In general, power emitted by LED diodes is reducing with increase of ambient temperature. Do not operate LED source if ambient temperature is outside device operating range. Here some other tips

1. Use only FC/PC connectors to extend the length of an output laser pigtail. Clean connectors before every connection. Do not bend or twist the output fiber pigtails.
2. Try to reduce number of optical connections. Clean optical connectors, using special cleaning tools before every connection. Keep optical connections plugged into your setup all the time, if possible. Use dust cover to protect optical connector when device or extension patch-cords are not in use.
3. Don't bend the optical fiber. Small diameter (<10 cm) bends might affect output power. Keep fiber pigtail straight and adjust its position in space to achieve maximum output power.
4. Do not touch optical connectors with bare hands.
5. Fix position of the fiber in your setup, when maximum power achieved.
6. Make sure that the air-flow ventilation on the module is not obstructed.

The LED source is designed to sustain significant value of the back-reflected light.

## 6 Maintenance Instructions

### 6.1 Fiber pigtail/patch-cord check.

It is recommended to periodically test the quality of the fiber pigtail and patch cords, using back-reflection meter. The level of back-reflected signal must be in the range of -15-18 dB.

### 6.2 Cleaning the fiber pigtail (FC/PC)

<b>WARNING</b>	<b>To avoid LED source damage, do not perform cleaning of FC/PC receptacles.</b>
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To clean the optical connectors, please use IPA and fiber connector cleaner. Do NOT use acetone or any other solvents.

### 6.3 Storage

To maintain optimum operating reliability, do not store the LED source in locations where the temperature falls below 0°C or rises above +60°C. Avoid storing module in environmental conditions that can result in internal condensation. Ensure that these temperature and humidity requirements are also met whenever the source is shipped.

### 6.4 LIMITED WARRANTY

QPhotonics warrants that the products it manufactures and sells will be free from defects and materials and workmanship for a period of thirty days from the date of shipment. If any such product proves defective during the applicable warranty period, QPhotonics, at its option, either will repair the defective product without charge for parts and labor or will provide a replacement in exchange for the defective product. In order to obtain service under this warranty, the customer must notify QPhotonics of the defect before the expiration of the warranty period and make suitable arrangements for the performance of service. In all cases the customer will be responsible for packaging and shipping the defective product back to the service center specified by QPhotonics, with shipping charges prepaid. QPhotonics shall pay for the return of the product to the customer if the shipment is in the USA, otherwise the customer shall be responsible for all shipping charges, insurance, duties and taxes, if the product is returned to any other location.

This warranty shall not apply to any defect, failure or damage caused by improper use of, or failure to observe, proper operating procedures per the product specification or operator's manual, or improper or inadequate maintenance and care. QPhotonics shall not be obligated to furnish service under this warranty 1) to repair damage resulting

from attempts by personnel other than QPhotonics' representatives to repair or service the product; 2) to repair damage resulting from improper use or connection to incompatible equipment; 3) to repair damage resulting from operation outside of the operating or environmental specifications of the product.

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**QPHOTONICS AND PURCHASER EXPRESSLY AGREE THAT THE SALE HEREUNDER IS FOR RESEARCH USE ONLY AND NOT FOR CONSUMER USES AS DEFINED BY THE MAGNUSON-MOSS WARRANTY ACT OR SIMILAR STATE CONSUMER WARRANTY STATUTE.**

#### **6.5 Return shipments to QPhotonics, LLC.**

Please contact QPhotonics to obtain return authorization prior to shipping any modules back to us. The owner's name, and address, the model number and serial number of the module, return authorization number, and an itemized statement of defects must be included with the device returned for repair.

Pack the item in original transportation container and suitable protective box to prevent damage to the delicate instrument. Seal the shipping container securely and clearly mark FRAGILE on its surface.

#### **Contact information: QPhotonics, LLC**

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