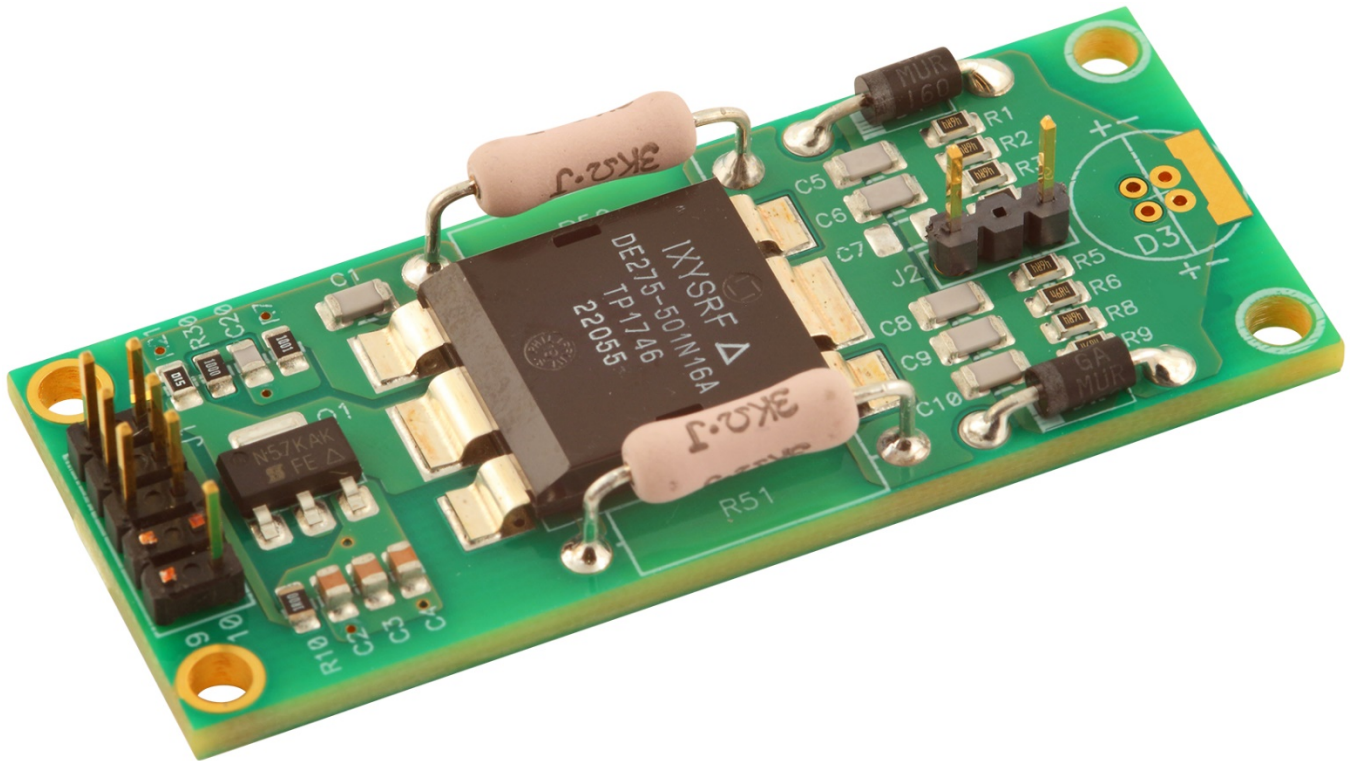




PCO-7111

Laser Diode Driver Module Operation Manual



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Contents

- Contents 3
- Safety 4
- Introduction 5
 - ❖ Description 5
 - ❖ Design Considerations..... 5
 - ❖ Accessories Available 7
- Operation 8
 - ❖ Safety 8
 - ❖ Requirements..... 8
 - ❖ Setup 8
 - ❖ Power Up..... 8
 - ❖ Enable the Module..... 9
 - ❖ Power Down..... 9
- Warranty and Service..... 10
 - ❖ Warranty 10
 - ❖ Factory Service and Support 11

Safety

- Do not install, handle, or remove the PCO-7111 while it is operating.
- Do not use this device in a manner not specified by the manufacturer.
- Allow sufficient space around this device for air circulation.
- Do not use where liquids are present or in corrosive environments.

WARNING

Risk of lethal electric shock. Do not touch the output or laser diode while it is operating. This device produces LETHAL levels of electric current at its output.

DO NOT OPERATE THIS DEVICE UNLESS ANOTHER PERSON, CAPABLE OF RENDERING FIRST AID OR RESUSCITATION, IS PRESENT.

SAFE AND PROPER OPERATION OF THIS DEVICE IS THE RESPONSIBILITY OF THE USER.

Directed Energy, Inc. (DEI) provides information on its products and associated hazards, but it assumes no responsibility for the after-sale operation and safety practices.

Introduction

❖ Description

The PCO-7111 is a pulsed laser diode driver in a compact OEM module. It is designed to provide extremely fast, high-current pulses to drive laser diodes in rangefinder, LIDAR, atmospheric communication, and other applications requiring high-current nanosecond pulses.

Mounting pads are provided to mount the laser diode directly to the driver. The four-hole mounting pattern accepts TO-18, TO-5, TO-52, 5.6 mm, and 9 mm packages.

There are two solder pads at the end of the board that facilitate mounting laser diode packages on-axis to the driver. Alternately, the diode can be connected remotely from the driver using low-impedance stripline cable between the mounting pads and the leads of the laser diode.

The PCO-7111 output current is set by the amplitude of the voltage at the high voltage input. The frequency is set by trigger pulses applied to the gate input.

A current monitor is provided as a straightforward means to observe the diode current waveform in real time with an oscilloscope.

❖ Design Considerations

Many stray elements and components can affect PCO-7111 performance. One of the most important is stray inductance, which includes the output current loop's circuit elements and the physical inductance of that loop. The magnitude of this inductance has a great effect on pulse width and peak output current. The PCO-7111 design minimizes the stray inductance of the circuit components to approximately 2 nH. However, the laser diode that it drives, and the means by which the diode is connected to the PCO-7111, also contribute to stray inductance. The user can minimize this additional inductance by choosing appropriate diode packages and interconnections between the diode and driver.

J1 Control Connector

The Control Cable is part number PCA-9190.

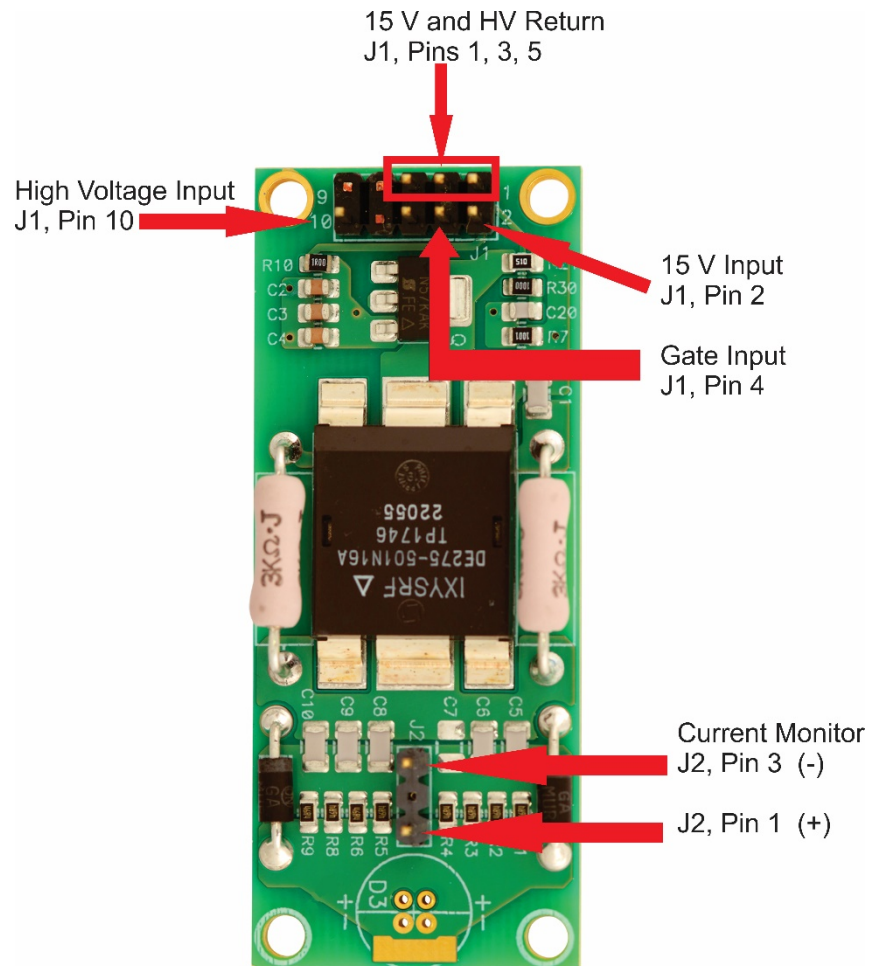
Connector J1 has the following pin connections for controlling the PCO-7111:

- Pin 1, 3, and 5: Common Return
- Pin 2: +15 V DC Input
- Pin 4: Gate input, 50 Ω impedance
- Pin 10: High Voltage input

J2 Current Monitor

These are the pin connections for the current monitor:

- Pin 1: Current Monitor (+) output
- Pin 3: Current Monitor (-) output



❖ Accessories Available

Control Cable Assembly (PCA-9190)

The included Control Cable connects J1 input for the Gate, High Voltage, and +15 V.

Current Monitor Cable Assembly (PCA-9140)

An optional Current Monitor Cable allows the user to monitor the output current pulses with an oscilloscope. The current-to-voltage ratio is 20:1 (20 A to 1 V).

Output Cable Assembly (1820-0030)

An optional micro-stripline Output Cable allows the user to connect the PCO-7111 to a remote laser diode with minimum added inductance.

Operation

❖ Safety

Follow the safety guidelines. DO NOT PROCEED WITHOUT UNDERSTANDING AND OBSERVING THESE GUIDELINES.

❖ Requirements

Verify that the PCO-7111:

- Is connected with the proper cables and the correct impedance set
- Has its output connected to a load or output device of the proper polarity

❖ Setup

1. Verify the PCO-7111 is OFF when connecting or disconnecting the laser diode or load.
2. Make the laser diode connection with the correct polarity. If necessary, review the output connector silkscreen for polarity specifications.
3. Connect J1 input as follows:
 - a. +15 V DC power supply to J1 pin 2
 - b. Gate source to J1 pin 4
 - i. Set the external trigger source to 50 Ω impedance and a frequency below the maximum specified for the PCO-7111 model under test.
 - c. High-voltage power supply to J1 pin 10
 - i. Set the high voltage to the required amount. Do not exceed the maximum high voltage input value. For models 40-5 and 50-10, the maximum is 195 V DC. For model 100-10, the maximum is 450 V DC.
 - d. Common Return to J1 pin 1, 3, 5
4. Connect an oscilloscope to the current monitor if desired.
 - a. Current Monitor (+) to J2 pin 1
 - b. Current Monitor (-) to J2 pin 3
 - c. 50 Ω termination impedance
 - d. 20 A/V typical ratio

❖ Power Up

1. Verify the external trigger is disabled.
2. Verify the high voltage is disabled.
3. Turn on the +15 V DC power source.

❖ Enable the Module

1. Set the output current by varying the high voltage input at J1 pin10. The minimum and maximum output current depends on the model.
2. Enable the external high voltage source.
3. Set the external trigger for the desired frequency, being careful to not exceed the maximum frequency specified for your model.
4. Enable the external trigger source.
5. Verify the output is correct with the Current Monitor and an oscilloscope.

❖ Power Down

1. Disable the external trigger source.
2. Disable the high voltage source.
3. Turn the +15 V DC power source OFF.

Warranty and Service

❖ Warranty

Directed Energy, Inc. (DEI) warrants equipment it manufactures to be free from defects in materials and factory workmanship under conditions of normal use, and agrees to repair or replace any standard product that fails to perform as specified within ninety days (90) after date of shipment to the original owner. OEM, modified, and custom products are warranted, as stated above, for ninety (90) days from date of shipment to original owner. This Warranty shall not apply to any product that has been:

- I. Repaired, worked on, or altered by persons unauthorized by DEI in such a manner as to injure, in DEI's sole judgment, the performance, stability, or reliability of the product;
- II. Subjected the product to misuse, neglect, or accident; or
- III. Connected, installed, adjusted, or used otherwise than in accordance with instructions furnished by DEI.

DEI reserves the right to make any changes in the design or construction of its products at any time, without incurring any obligation to make any change whatever in units previously delivered.

DEI's sole obligation, and buyer's sole remedies, under this agreement shall be limited to a refund of the purchase price, or at DEI's sole discretion, to the repair or replacement of products in kind that prove, to DEI's satisfaction, to be defective, when returned to the DEI factory, transportation prepaid by the buyer, within the warranty period. DEI shall in no way be liable for damages consequential or incidental to defects in its products, for failure of delivery in whole or in part, for injuries resulting from its use, or for any other cause.

Returns must be preauthorized and accompanied by a DEI return authorization number.

The foregoing states the entire warranty extended by DEI, and is given and accepted in lieu of 1) any and all other warranties, expressed or implied, including but not limited to the implied warranties of merchantability and fitness for any particular purpose and 2) any obligation, liability, right, claim or remedy in contract or tort.

❖ Factory Service and Support

For more information about your instrument or for an operation problem, please contact the factory:

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