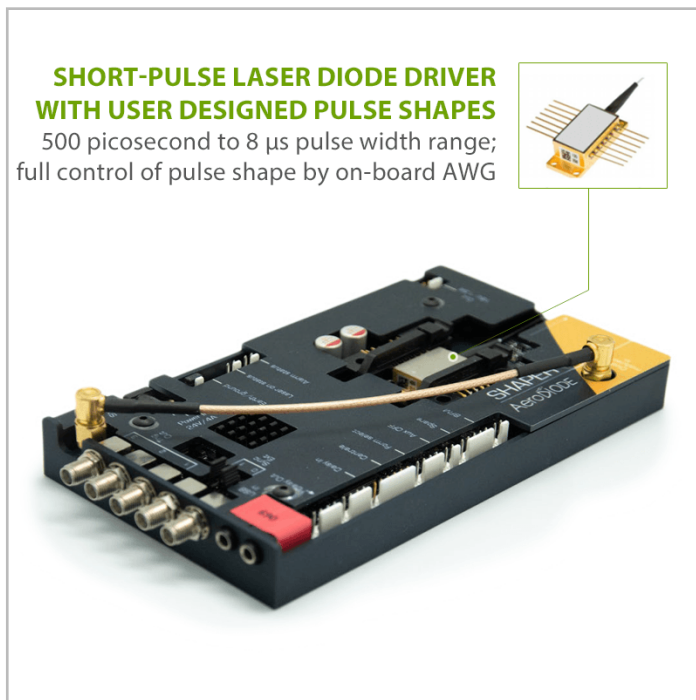




## 1.6 Amp Programmable-Shape Pulsed Laser Diode Driver with TEC Controller and Butterfly Mounting Socket



### **SHAPER-DIRECT / Control and Mount Module**

- o User Designed Pulse Shapes; On-Board Arbitrary Waveform Generator (AWG) for User Customizable Pulse Shapes
- o Pulse Width Range: 500 Picoseconds to 8  $\mu$ sec
- o 0 to 1.6 Amp Pulsed Output Current (up to 3.5 Amp on -EXTERNAL model)
- o 0 to 20 MHz Repetition Rate
- o Includes Laser Diode "Gain-Switch Peak" Suppression Mode
- o Integrated Pre-Configured Butterfly Mounting Socket and Integrated TEC Controller
- o Built-in Pulse AWG, Internal or External Triggering
- o Two Models Available: Direct or External Modulation
- o USB Interface, Intuitive GUI Control Software



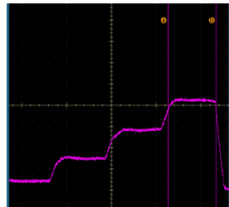
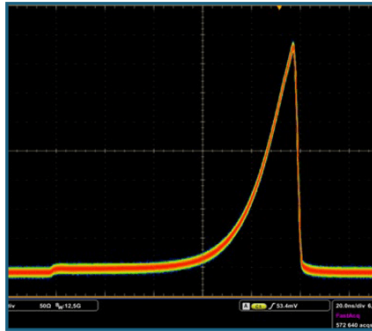
## DESIGN YOUR OWN PULSE SHAPES TO OPTIMIZE YOUR SYSTEMS PERFORMANCE

This latest generation pulsed laser diode driver gives you full control over the shape of the current pulse to your laser diode / AOM / EOM.

These multi-functional units have an integrated AWG (Arbitrary Waveform Generator), pulsed current source, TEC controller and pre-configured butterfly mounting socket. They also include multiple pulse delay generators for signal synchronization.

### USER DESIGNED PULSE SHAPES

example of a user designed pulse shape in a MOPA fiber laser seeder application



example of a 400mA, 100 nanosecond step pulse shape

These unique drivers allow you to completely tailor the pulse shape for your application; these units are capable of generating virtually any pulse shape with a nanosecond pulse duration. You have full control of the pulse shape through the control software and GUI.

The Shaper-Direct model is designed to drive a laser diode directly with user-defined pulse shapes.

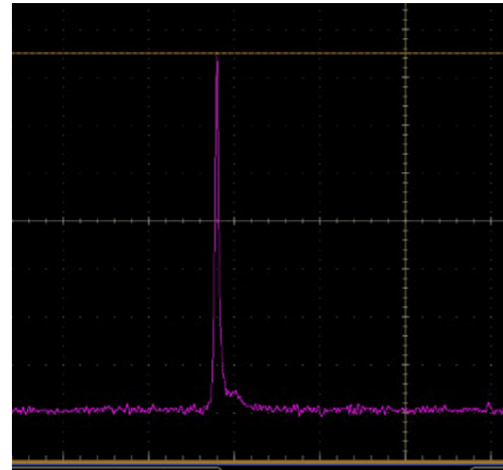
The Shaper-External is designed to externally modulate the laser diode with a square wave only, while the user-defined pulse shape is applied to the AOM / EOM.

## PULSE GENERATION ~ USE AS A STAND-ALONE PULSER OR WITH YOUR AOM / EOM

These pulsed laser diode drivers are designed to operate in a stand-alone mode using internal modulation, or with an AOM/EOM using external modulation. They offer a pulse shaping range from 500 picoseconds to 8 microseconds in either internal or external modulation mode. Other features include 3 outputs to allow the user to synchronize multiple devices and a 16 bit processor to provide high current set-point resolution. Also, a "Gain Switch Peak" suppression mode is included to suppress the picosecond gain switched peak which is inherent to laser diodes in short pulsing environments.

### 80 PICOSECOND GAIN-SWITCH PULSE

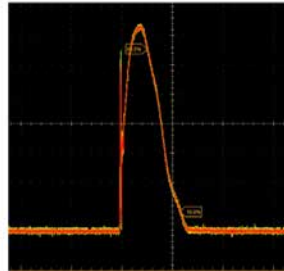
\*gain-switch performance is highly dependent on the laser diode



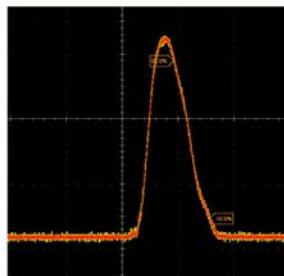


### GAIN SWITCH PEAK SUPPRESSION FUNCTION

1.5 nanosecond pulse with typical gain switch peak on leading edge of the pulse



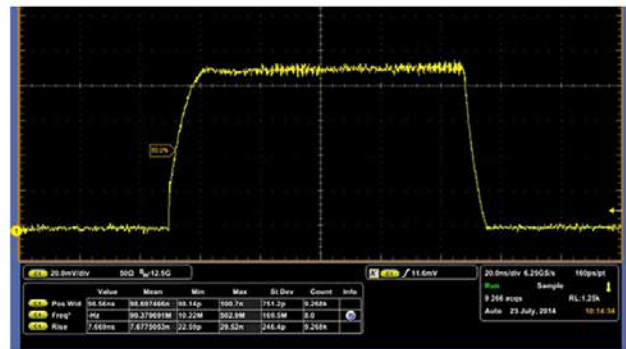
1.5 nanosecond pulse after activating the "gain-switch peak suppression" function



### IMPEDANCE MATCHING IMPROVES LASER DIODE PULSE PERFORMANCE

When the impedance from the pulsed current source PCB is not properly matched to the butterfly package pins, significant pulse degradation can occur. This is often seen as distortion of the laser output pulses and/or overshoot of the pulses. The SHAPER is designed to reduce and/or eliminate this pulse degradation by matching the nominal impedance of the butterfly packaged laser diode with the

### CCS IMPEDANCE MATCHING PROVIDES CLEAN PULSE PERFORMANCE



### INTEGRATED ADVANCED LASER DIODE PROTECTION FEATURES

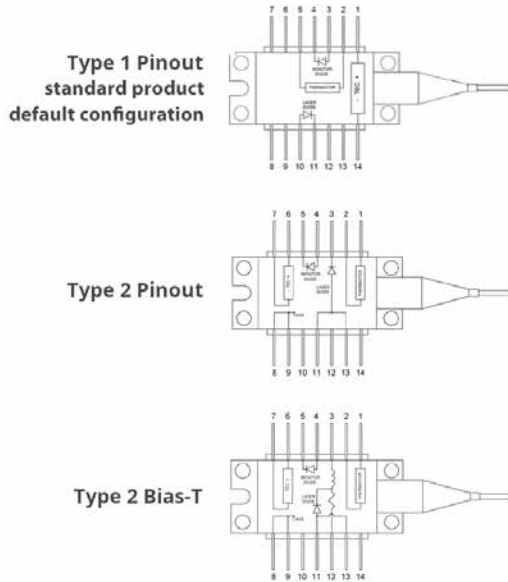
The integrated laser diode protection circuits protect your device under test at all times. A user set current limit and user set temperature limit clamp both the bias current and the operating temperature to prevent damage to the laser. A soft-start current ramp to the user defined current set-point protects the laser from the possibility of thermal shock or current surges. Also, the integration of the mounting socket directly with the current source eliminates the need for cables and connectors from the current path. This greatly reduces the likelihood of ESD damage to the laser which can occur from plugging and unplugging cables. Set-point and limits are set using a simple one screen graphical user interface which is opened when you connect your PC to the USB interface. The GUI control software is included with the purchase price and offers users simple set-up and control.

pulse transmission line. Current sources inherently have a high output impedance and laser diodes have very low impedance. The most important requirement of proper impedance matching is matching the impedance of the load to the impedance of the transmission line. The inductance of laser diodes ranges from a few nanohenries to tens of nanohenries. From inductance theory,  $di/dt$  is the rate of change in current over a specific period in amperes per second. The voltage increases with the inductance and with the rate of the change of the current. Energy stored in the inductor's magnetic fields during the pulse has to be released when the pulse ends. This creates a voltage, which in turn creates a new current, which in turn creates a new magnetic field on the transmission path. This creates a "loop" which manifests as "ringing" on the pulse waveform and on other distortions to the pulse shape. The SHAPER current output transmission path has been carefully designed to match the current source impedance to the butterfly packaged laser diode.



## PIN CONFIGURATIONS

The SHAPER-DIRECT can be ordered for any butterfly package pin configuration. The standard default model is for Type-2 pin configuration.

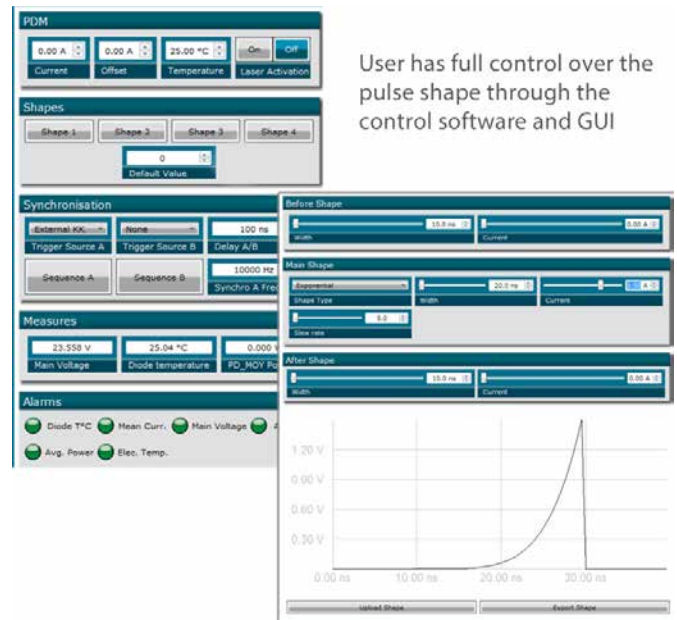


## GRAPHICAL USER INTERFACE INCLUDED

Configuration and operation of the controller is streamlined and simplified by providing control over the critical operating parameters of the controller: peak pulse current, pulse width, frequency, triggering, and other driver parameters are available.

The GUI also provides control over laser diode temperature, and includes operational safety limits to help protect the laser diode from damage.

In addition to providing real-time control over the laser diode, the GUI displays real-time operating status of the controller and laser diode operating parameters



User has full control over the pulse shape through the control software and GUI



## SHAPER-DIRECT / Control and Mount Module Performance Specifications

### INTERNALLY GENERATED PULSES

#### PULSED CURRENT AND PULSE SHAPING SPECIFICATIONS

- Peak Current Range: 0 Amps - 1.6 Amps
- User Adjustable Pulse Width Range: 500 psec ~ 8  $\mu$ sec
- Repetition Rate Range: 0 ~ 20 MHz
- Pulse Shaping Timing Resolution (max): 500 psec
- Pulse Shaping Current Resolution: 30  $\mu$ A
- Current Set-Point Resolution: 16 bit ADC

#### PULSE DELAY GENERATOR OUTPUTS FOR ELECTRICAL SYNCHRONIZATION

- Number of Outputs: 3
- Synchronization Signals Duration: 0 -  $10^9$  nsec
- Synchronization Signals Resolution: 1 nsec
- Output Voltage: 0 - 3.3 Volts (50 Ohm)

#### SPECIFICATIONS FOR OPTIONAL SHAPER-EXTERNAL MODEL AOM / EOM PULSED CURRENT AND PULSE SHAPING SPECIFICATIONS

- External Pulse Peak Acceptable Current Range: 0 - 3.5 Amps
- AOM / EOM Acceptable Pulse Width Range: 1 nsec - CW
- AOM / EOM Pulse Shaping Timing Resolution: < 500 psec
- Output Voltage (Factory Configured): 1 Volt (50 Ohm) / 5 V (High-Z)
- External Pulse Timing Resolution (Delay/Pulse-Width): < 1 nsec





## SHAPER-DIRECT / Control and Mount Module Performance Specifications

### TEMPERATURE CONTROLLER & BUTTERFLY MOUNT

- TEC Current Range: +/- 1.5 Amps
- TEC Voltage Range: 3.8 Volts
- TEC Controller Compatible with NTC Thermistor Sensors
- Zero Insertion Force Mounting Socket for 14-Pin Butterfly Packages
- Standard Product Configured to Type 1 Package Pin Configuration (Type 2 Available on Request)

### USER INTERFACE

- USB with Control Software GUI
- DLL Library for C programming and Hexadecimal Protocol
- Analog (0-3.3V) Remote Signal Peak Power Adjustment
- UART

### POWER SUPPLY AND DIMENSIONS

- Power Supply Included
- 162 mm (L) x 92 mm (W) x 20 mm (H)



Offered by  
**LASER LAB SOURCE**



LASER  
DIODE  
CONTROLLERS



## PRODUCT SALES AND SERVICE:

Unlimited phone and email support is provided for products purchased through Laser Lab Source. Orders for this product are fulfilled by Laser Lab Source in North America and select international regions. It is manufactured by AeroDIODE, Talence, France.

## PRODUCT WARRANTY:

This product is sold with a full one-year warranty. It is warranted to be free from defects in material and/or workmanship for a period of one year from the date of shipment. The warranty does not cover damage to the to the product due to mishandling or use of the product outside of its specified maximum ratings.



Laser Lab Source, Inc  
1820 W. Lincoln Street  
Bozeman, MT 59715  
[contact@LaserDiodeSource.com](mailto:contact@LaserDiodeSource.com)  
[contact@LaserDiodeControl.com](mailto:contact@LaserDiodeControl.com)  
800-877-5065

AeroDIODE

Rue François Mitterrand Institut d'Optique d'Aquitaine  
33400 Talence  
FRANCE