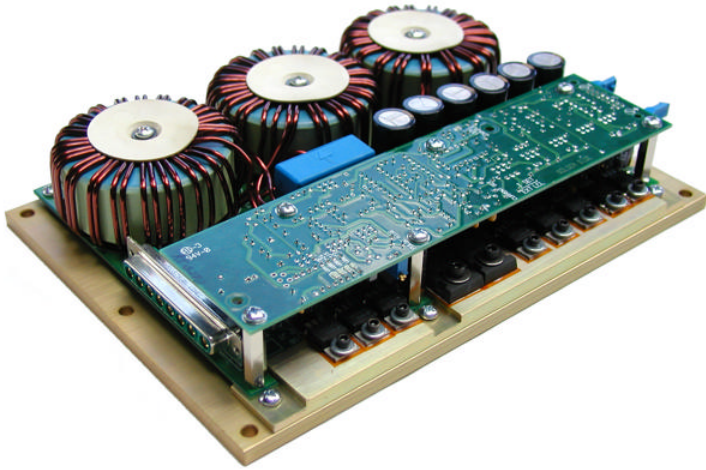


PCO-6140 PULSED/CW LASER DIODE DRIVER MODULE



- Economical OEM Module
- 0A To 60A Output
- 20V Maximum Output Voltage
- 1.2kW Maximum Average Output Power
- User-Adjustable Variable Rise Time
- <250ns To DC Pulse Width
- Repetition Frequency Single-Shot To 250KHz
- Current Monitor Output

The PCO-6140 is a compact, OEM-style high power pulsed current source designed to drive diode lasers, bars and arrays in pulsed, QCW or CW modes. It delivers output current variable to 60A, pulse widths variable from <250ns to DC, and pulse repetition frequencies variable from single-shot to 250KHz at duty cycles up to 100%.

The PCO-6140 features a user-adjustable variable rise time control. This innovative feature allows the user to adjust the rise time within a range of <50ns to >4 μ s by means of a PCB-mounted potentiometer, to optimize the driver's rise time for the user's application.

The PCO-6140 is based on a hysteretic, average current, switch-mode regulator. This type of regulator is a variable frequency, variable pulse width design which maintains current in an energy storage inductor between a minimum and maximum level. The ripple is limited to the minimum and maximum current determined by the hysteretic controller. The regulator is started when the TTL "enable" line is taken high and runs as long as the enable is high. The use of the hysteretic regulator provides a large input range and high efficiency.

A shunting switch shorts the output of the regulator until output current is needed. The pulse is generated by opening the shunt switch for the length of the input pulse. The pulse rise and fall times are then limited only by the stray/parasitic capacitance and inductance of the shunting switch and output leads.

No power is dissipated in the driver until it is enabled. When enabled, at 60A maximum output approximately 80W is continuously dissipated in the driver to maintain the current in the energy storage inductor (see note #1 on next page for more information).

This architecture provides a high performance driver in a small form factor, with high operating efficiency and low stored energy. At 60A output current, the stored energy in the driver is approximately 7 Joules, dramatically lower than the stored energy in comparable linear current sources.

The PCO-6140 requires user-supplied +24VDC support power, a CMOS (+5V) gate signal, and a TTL-level enable/disable signal. The high current output is derived from the +24VDC DC input. The output pulse width and frequency are controlled by the gate signal. The output current amplitude is controlled by a PCB-mount potentiometer. A current monitor output may be viewed with an oscilloscope, providing a straight-forward means to observe the diode current waveform in real-time.

To protect the laser diode and the driver, circuitry is incorporated into the driver that disables the output if the +24VDC support power drops below 18V. Clamp diodes are incorporated into the output network to protect the laser diode against reverse voltage conditions.

The PCO-6140 is mounted on an air-cooled heatspreader, appropriate for mounting to a system bulkhead or mounting plate. (See note #3 on the next page for additional cooling information.)

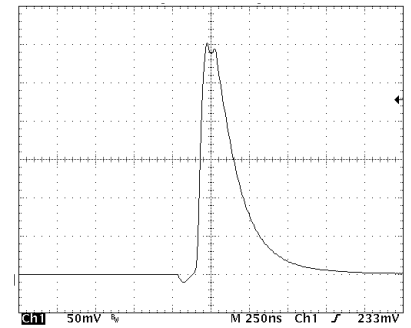
The rugged, compact design and high power capability of the PCO-6140 make it an excellent OEM choice for driving high power laser diodes.



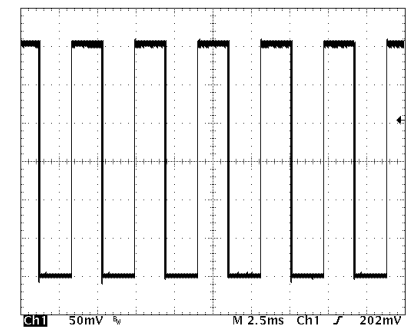
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Specifications

PARAMETER	VALUE
PULSE OUTPUT CURRENT	
Amplitude Range	0A to 60A
Means Of Adjustment	Trimpot mounted on PCB, or external 0-5V or 0-10V Analog Voltage Program, jumper-selectable
Output Polarity	Positive
Pulse Rise Time	Variable from <50ns to >4μs (10%-90%) , user-adjustable through trimpot mounted on PCB
Pulse Width	<250ns to DC
Pulse Recurrence Frequency Range	Single Shot to 250KHz
Maximum Duty Cycle	100%
Output Pulse Ripple	~600mA (<1% at 60A output)
Jitter	<3ns First Sigma
Efficiency	>65% at 50% duty cycle, 60A output ⁽¹⁾
Output Connector	High Current DSUB, PCB-Mounted
DIODE FORWARD VOLTAGE	
Amplitude	20V maximum
GATE INPUT	
Type	Positive Edge Trigger
Gate Input	+5V CMOS
CURRENT MONITOR OUTPUT	
Current Monitor	200A/1V terminated into 50Ω, ±3% of the actual current
Current Monitor Connector	SMB, PCB-Mounted
CONTROL FUNCTIONS	
Output Enable/Disable	TTL Input, High = Enabled
GENERAL	
Input Power	+24VDC unregulated ⁽¹⁾
Operating Temperature	0C to 40C
Cooling	Air cooled ⁽²⁾
Dimensions (H X W X D)	6.25" x 8.9" x 1.75" (15.88cm x 22.6cm x 4.45cm)
SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE	

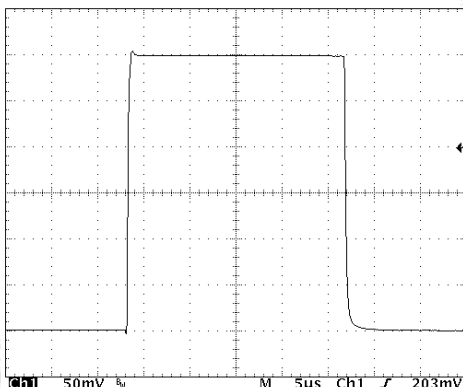


<50ns Rise Time, <400ns Fall Time, <250ns Pulse Width, 60A Output (250ns/Div horizontal scale, 10A/Div vertical scale)

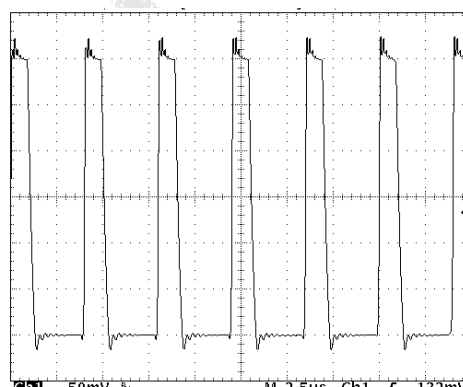


50% Duty Cycle, 2ms Pulse Width, 60A Output (2.5ms/Div horizontal scale, 10A/Div vertical scale)

- The idle power consumption (power consumed when the driver is enabled but not pulsing) varies non-linearly with output current, and can be approximated by the formula $P_{IDLE} = I^2 \times 0.023$ where I is the output current setpoint. When pulsing, the switching losses (P_{SW}) are about 30W. Therefore the 24VDC power requirements can be approximated by the formula $P_{SW} + [I_{OUT} V_{OUT} + I_{OUT}^2 (0.030)] DC + P_{IDLE} (1-DC)$ where V_{OUT} is the diode forward voltage and DC is the duty cycle. For example, at 40A output current, 10V diode voltage and 30% duty cycle, the power consumption is $30W + [40A \times 10V + 40A^2 \times 0.03].3 + [40A^2 \times 0.023](1-.3) = 190W$. The +24VDC support power should be sized to provide this average power.
- The driver is mounted on an air-cooled aluminum heat spreader 1/4" (0.635cm) thick. The heat spreader temperature should not exceed 45°C. Forced-air and/or mounting the heat spreader to a larger heat sink or cold plate may be required in applications in which the heat spreader temperature exceeds 45°C.



Typical Output Waveform 25μs Pulse Width, 60A Output (5μs/Div horizontal scale, 10A/Div vertical scale)



250KHz Frequency, 60A Output (2.5μs/Div horizontal scale, 10A/Div vertical scale)

Ordering Information

Model number PCO-6140 is mounted on a 1/4" (0.635cm) aluminum heat spreader, and includes a mating I/O connector and sockets, and a 1-meter output stripline cable assembly.

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