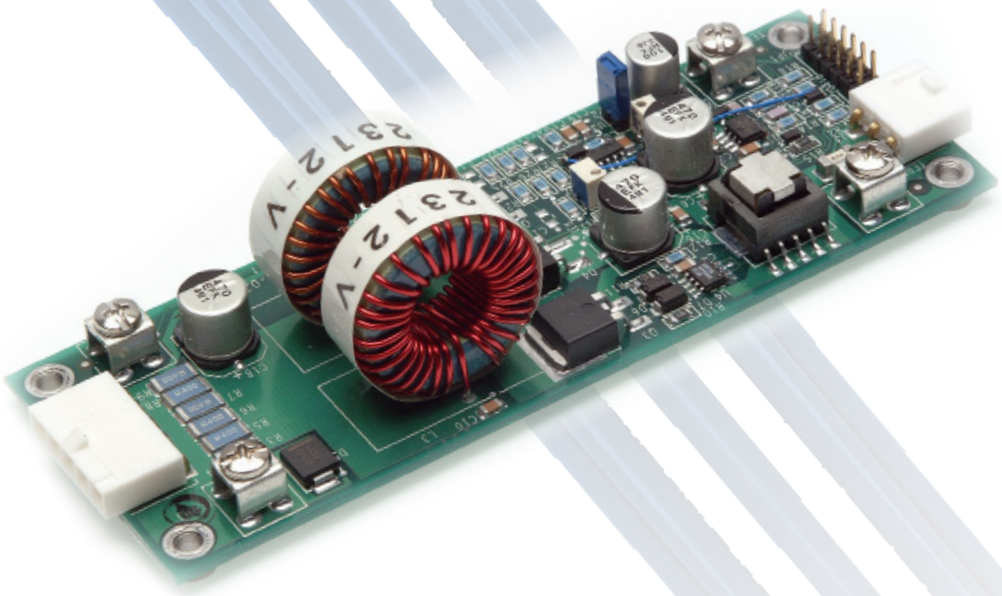
PCO-6511
Operating Instructions



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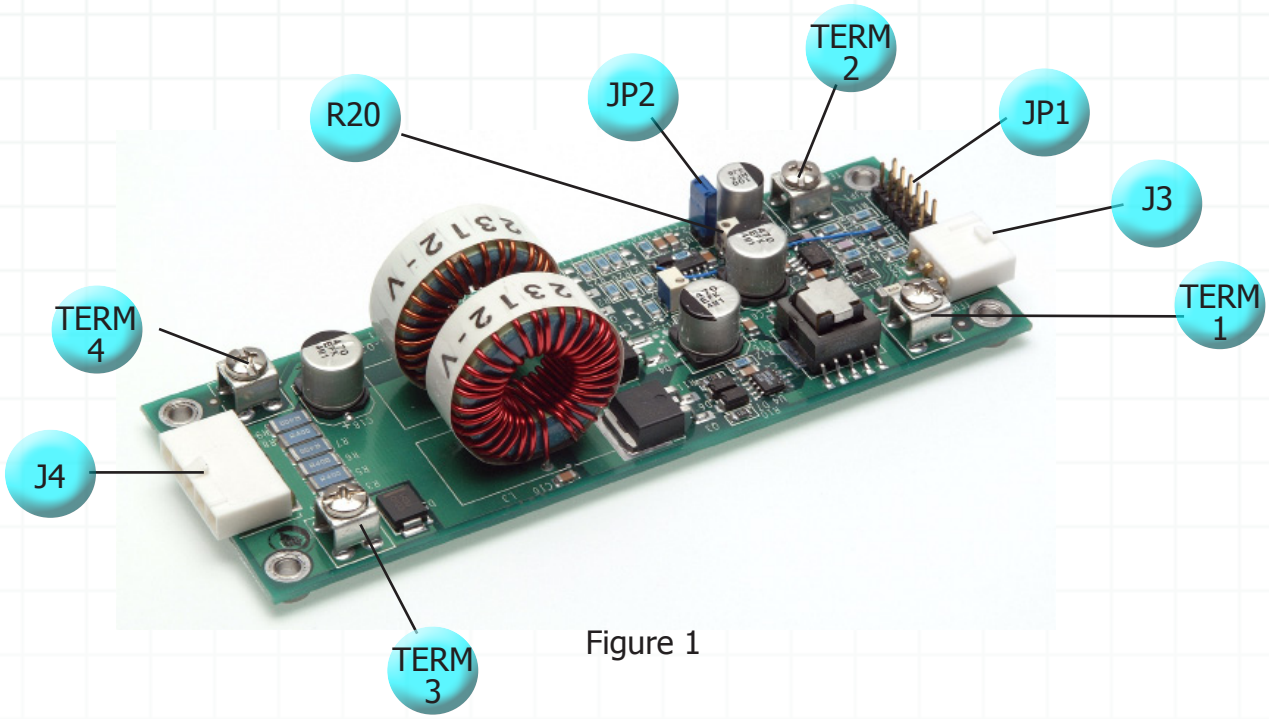

Figure 1

Comprehensive Operating Information

The load (laser diode) can be connected to the PCO-6511 via two screw terminals or a 5-pin Molex connector (see the table below). If using the Molex connector, use two twisted wires in parallel for each connection. DO NOT OPERATE WITHOUT A LOAD UNLESS CROWBAR IS ACTIVATED.

Power Output Connections			
Screw Terminals Use 18 ga. stranded wire and #6 18-22 ga. ring lugs (Tyco 32947)		**Molex Connector (J4)** Use Molex 39-01-4050 housing and Molex 5556 female terminals (the specific terminal part number varies with plating, wire gauge, etc.). Pin 3 = no connection.	
Term 3	Output (+)	1	Output (+)
		2	
Term4	Output Return (-)	3	Output Return (-)
		4	

The source (power supply) can be connected to the PCO-6511 via two screw terminals or a 3-pin Molex connector (see the table below).

Power Input Connections			
Screw Terminals Use 18 ga. stranded wire and #6 18-22 ga. ring lugs (Tyco 32947)		**Molex Connector (J3)** Use Molex 39-01-4030 housing and Molex 5556 female terminals (the specific terminal part number varies with plating, wire gauge, etc.). Pin 2 = no connection.	
TERM1	+12 to +16 VDC Input	1	+12 to +16 VDC Input
TERM2	Input Return (-)	3	Input Return (-)

Control signals are connected via a 2x6 female header socket (see table below).

Control Connections (JP1) Use FCI 65043-031LF housing and FCI 48236-000LF contacts		
1	Ground	
2	Reference	Analog Output: +5V±0.1V
3	Ground	
4	External Control	Analog Input: If JP2 is removed, 0V to +4.095V applied to this input sets the output current
5	Ground	
6	Vcc	Analog Output: DC input voltage test point
7	Ground	
8	Shutdown	Digital input: No connect = operate, +5V = off
9	Ground	
10	Current Monitor	Analog Output: +4.06V = 10A
11	Ground	
12	Crowbar	Digital Input: No connect = output crowbarred (shorted to ground), 0V = operate

Jumper JP2 selects the method of adjusting the current output.

Internal/External Adjust Select (JP2)	
In	Selects R20 (Internal adjustment pot)
Out	Selects external voltage input (JP1 pin 4)

Specifications

Specifications	
Amplitude Range	0.5 A to 10 A
Diode Forward Voltage	10 V maximum
Ripple Current	< 50 mA
DC Input Voltage (Vcc)	+12 to +16 VDC
Means of Adjustment	Board-mounted trim potentiometer or external voltage, jumper selectable
+5 V Reference Output Current	5 mA maximum
Optional External Setpoint	0 to 4.095 V (remove JP2 to use external voltage)
Shutdown	0 to +5.5 V
Current Monitor	+4.06 V = 10 A
Crowbar	+18 V maximum (hold low for output)
Mounting Holes	Compatible with #6 hardware
Dimensions	1.4 H x 2.0 W x 5.5 L (inches)
Weight	Approx. 0.3 lbs.
Cooling	Operation above 8 A requires forced air cooling

Note: Laser diode not included. Specifications subject to change without notice.

Theory of Operation

The heart of the PCO-6511 is a step-down (buck) DC/DC converter. A simplified diagram appears in Figure 2.

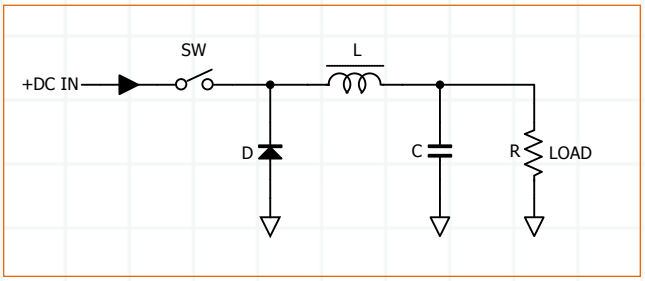

Figure 2

A buck converter consists of a switch (actually a power MOSFET), a diode, an inductor, and an output filter capacitor.

When the switch is closed, current starts to flow from the input source, through the inductor, and into the filter capacitor and load. The inductor's magnetic field increases, storing energy. Its voltage drop opposes, or "bucks", the input voltage, giving the circuit its name. The diode is reverse-biased and does not conduct

When the switch is opened, the inductor opposes the change in current by reversing the polarity of its voltage drop. It releases its energy by supplying current to the filter cap and the load through the diode, which is now forward-biased.

The switch is opened and closed at a constant frequency. The duty cycle (ratio of ON time to OFF time) sets the ratio of the output voltage to the input voltage. A control circuit varies the duty cycle to accommodate varying input and load conditions.

The input/output current ratio is the inverse of the input/output voltage ratio. If losses are disregarded, the input power in watts equals the output power in watts.

At this point the circuit is that of a step-down constant-voltage power supply

Refer to Figure 3. A laser diode replaces the load resistor in Figure 1, and a CVR (Current Viewing Resistor) is now in series with the load. The voltage drop across the CVR is proportional to the current flowing in it, and that voltage is fed back to a control circuit. The control circuit influences the switch so that the output current is held constant. The circuit now represents a constant-current supply.

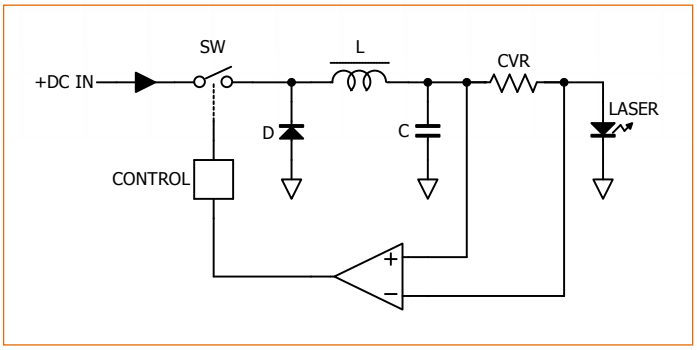

Figure 3

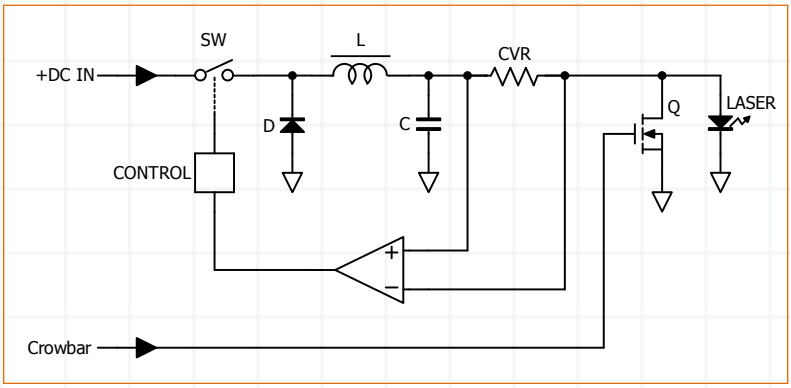

Figure 4

Refer to Figure 4. A safety feature referred to as a "crowbar" circuit is added in the form of a power MOSFET, Q, in parallel with the load. When turned on, Q shorts the output to ground, removing power from the laser diode. The Crowbar input is pin 12 of header connector JP1 and has a 10KΩ pullup resistor to the DC input voltage. This input must be connected to ground for the output to be enabled.