PCX-7420 Data Sheet

PCX-7420
PULSED/CW LASER DIODE DRIVER

Features:

- Output Current up to 21.5 A
- Output Voltage up to 24 V
- Output Power up to 375 W
- Touch screen operation
- RS-232, USB and Ethernet computer interfaces

The PCX-7420 is an air-cooled, high power CW/QCW current source designed to drive diode lasers, bars and arrays. The output current pulse range is adjustable between 1 A and 21.5 A. Pulse widths are adjustable between a minimum of 50 ns to a maximum of 500 ms with rise times less than 25 ns. Internally the pulse repetition frequencies are selectable from 40 to 100,000 Hz, single shot to 1 MHz is supported when externally triggered.

The PCX-7420 offers the capability of providing both QCW (pulsed), and CW (DC) outputs. It can serve as a CW driver at currents from 1 A to 5.8 A, and as a pulsed/QCW driver at currents from 1 A to 21.5 A. Furthermore, the output may be biased to any CW current from 1 A to 5.8 A, then pulsed above this bias current at up to 15.7 A maximum. A new feature allows the bias current to be pulsed and triggered independent of the Main current trigger.

The PCX-7420 may be operated through its intuitive front panel controls. The color QVGA LCD provides immediate visual confirmation of all operating parameters, including bias and pulsed current set points, internal trigger pulse width, internal trigger frequency, and error/fault messages.

For automated applications, complete control of the driver is provided through RS-232, USB and Ethernet computer interfaces. Up to four system configurations may be stored in internal non-volatile memory, providing instant recall of frequently-used configurations.

Connection to the laser diode is made through an innovative rear panel, low impedance stripline cable, designed to preserve the fidelity of high-speed, large amplitude current pulses. The output connector is interlocked, so that the PCX-7420 is disabled when the connector is removed.

The PCX-7420 features advanced circuitry to protect both the diode and driver. At turn on, and at any time the output is not enabled, the PCX-7420's output is electronically shorted to ground, ensuring that no current flows through the diode. Safety features a of the PCX-7420 include a separate laser enable key switch, an output cable safety interlock, and remote interlock.

Specifications

The PCX-7420 laser diode driver will meet or exceed the following specifications. All specifications are measured with a low inductance strip line interconnect cable to the laser diode, with less than 4nH total inductance:

PARAMETER	VALUE
PULSE OUTPUT CURRENT	
$I_{forward}$ Amplitude (Bias + Main)	1 to 21.5 A resolution 1 mA * See Maximum Average Output Power Specification Bias Amplitude 1 A to 5.8 A Main Ampiltude 1 A to 15.7 A
$V_{forward}$	$\leq$ 24 V
Means Of Adjustment	Computer Control and Front Panel Graphical User Interface
Output Polarity	Positive
Pulse Rise Time & Pulse Fall Time (rise time 10% to 90%) (fall time 90% to 10%)	< 25 ns
Maximum Average Output Power	Frequency — Specification — Formula used for calculation [0 … 1) — 250 W — $(Pulsewidth_{MAIN} + Pulsewidth_{BIAS})* (24V * (I_{MAIN} + I_{BIAS}))$ [1 … 125,000) — 375 W — $(Duty\ Cycle_{MAIN} + Duty\ Cycle_{BIAS})* (24V * (I_{MAIN} + I_{BIAS}))$ [125k … 150k) — 350 W — $(Duty\ Cycle_{MAIN} + Duty\ Cycle_{BIAS})* (24V * (I_{MAIN} + I_{BIAS}))$ [150k … 175k) — 325 W — $(Duty\ Cycle_{MAIN} + Duty\ Cycle_{BIAS})* (24V * (I_{MAIN} + I_{BIAS}))$ [175k … 200k) — 300 W — $(Duty\ Cycle_{MAIN} + Duty\ Cycle_{BIAS})* (24V * (I_{MAIN} + I_{BIAS}))$ [200k … 225k) — 275 W — $(Duty\ Cycle_{MAIN} + Duty\ Cycle_{BIAS})* (24V * (I_{MAIN} + I_{BIAS}))$ [225k … 1000k] — 250 W — $(Duty\ Cycle_{MAIN} + Duty\ Cycle_{BIAS})* (24V * (I_{MAIN} + I_{BIAS}))$
Trigger to Output Pulse delay	60 ns (typical)
Output Pulse Ripple/Droop	$\leq$ 1% of output current
Skew From trigger (internal or external) to the output pulse	Pulse to pulse stability $\leq$ 50 ns
INTERNAL TRIGGER	
Frequency Range	[40 Hz … 100,000 Hz]
Frequency Resolution	Frequency — Resolution [40 Hz … 300 Hz) — 1 Hz [300 Hz … 5,000 Hz) — 100 Hz [5,000 Hz … 100,000 Hz] — 1000 Hz
Minimum Pulse Width (bias and main)	Frequency — Pulse width [40 Hz … 300 Hz) — 6,400 nA resolution [300 Hz … 2500 Hz) — 1,600 ns resolution [2500 Hz … 100,000 Hz] — 100 ns resolution
Maximum Pulsewidth (bias and main)	95% duty cycle
Pulse Width Resolution	Frequency — Resolution [40 Hz … 300 Hz) — 6,400 ns [300 Hz … 2500 Hz) — 1,600 ns [2500 Hz … 100,000 Hz] — 25 ns

EXTERNAL TRIGGER (Input Signal) Separate main and bias input signals	
Pulse Recurrence Frequency Range	≤ 1,000,000 Hz
Minimum Bias and Main Pulsewidth	50 ns
Maximum Pulsewidth (Bias and Main)	100% duty cycle. * See Maximum Average Output Power Specification
Connector	Ω BNC
Termination	50 Ω / 10 kΩ
Input Voltage Levels	0 to 5V High = Output to Load. Low = No Output to Load Positive Level Trigger, 50 ns or greater pulsewidth.
OUTPUT SIGNALS	
SYNC Output ***See Note 1 Located on front of instrument	BNC 50 Ω output impedance. 0 to 5 V
IMON Output Located on rear of instrument	BNC 0 to 774 mV into 50 ohm load. (Corresponds to 0 to 21.5 A output) 1 A Output Current = 36 mV (+/- 1.5%) on IMON output
Pulsed Output Cable Located on rear of instrument	Cable Assembly DEI Part Number 6100-0063. DB37 pin Female. Pin 1 to 16 = Out +, Pin 20 to 35 Out -. All other pins no connect. End user should create a 2 layer low inductance PCB to interface to the female DB37 on the output cable.
SAFETY CONTROLS	
Front Key Switch	This switch enables/disables the output of the system.
Rear Enable signal Located on rear of instrument	BNC connector Normal operation : Shorted Shield to Center Conductor Fault Condition : Shield not connected to center conductor (open)
COMPUTER CONTROL	
RS232	Baudrates supported: 115200, 57600, 38400, 19200, 9600 8 data bits. 1 stop bit. No Parity. No hardware handshaking.
USB	Baudrates supported: 115200, 57600, 38400, 19200, 9600 8 data bits. 1 stop bit. No Parity. No hardware handshaking.
Ethernet	Socket communication supported with DHCP or Static IP addesses.
GENERAL	
Operating Ambient Temperature	15° C to 35° C
Cooling	Air cooled. (Air flow from the front to the rear of the unit.)
Weight	21.6 pounds (~ 9.8 kg)
Dimensions (H X W X D)	3.5 inches x 11.5 inches x 21.6 inches
AC POWER REQUIREMENTS	
AC Voltage Range	85 ~ 264VAC
AC Frequency Range	47 ~ 63 Hz
AC Inrush Current (typical)	35A/115VAC 70A/230VAC
Connector Type	NEMA C-14

Information subject to change

NOTE 1: SYNC Output signal follows the internal or external trigger by about 5 to 15 ns. This signal coincides with the signals that start the output pulse. The SYNC Output changes from 0 V to 5 V as soon as the output stage starts to drive the output. Once the system turns off the output, the SYNC Output signal changes from 5 V back to 0 V. This signal can be used to run multiple systems in parallel by calibrating the external trigger pulses to account for variation in timing within the instrument.

For sales information or technical questions contact your local IXYS representative or IXYS Colorado directly at:
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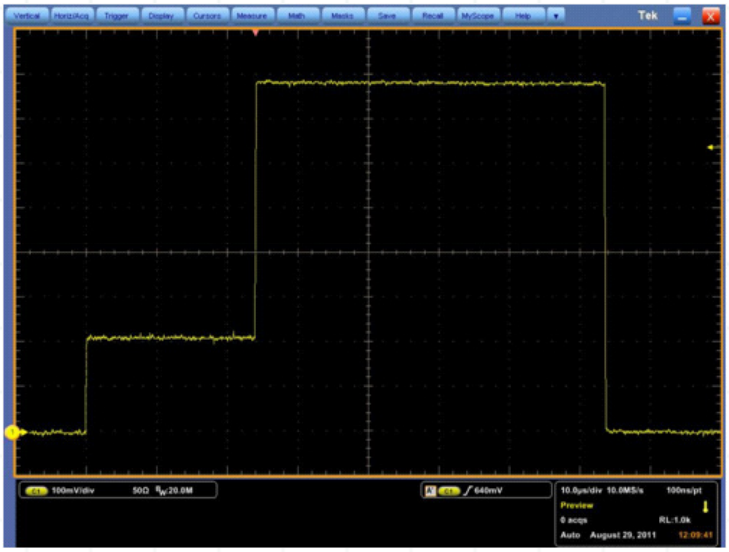
Scope shots of output:

Internal Trigger: 1 kHz, 25 μs bias & 50 μs pulsewidth, 6 A Bias, 16 A Main



External Trigger: 1 MHz, 50 ns pulsewidth, 22 A Output (6 A Bias, 16 A Main)