QCL Laboratory Series

Low-Noise Quantum Cascade Laser Driver Instrument

FEATURES

- Output currents of 500 mA, 1 A, 1.5 A, 2 A
- Low noise: <0.4 µA RMS up to 100 kHz (QCL500-LAB, typical)
- Compliance voltage is adjustable, 10-20 V (Note: the unit will only deliver the voltage that the load requires, up to the compliance voltage limit.)
- Analog modulation up to 2-3 MHz
- Constant Current Mode operation
- Touchscreen with intuitive user interface
- Safety features protect your QCL investment
  - » Adjustable soft-clamp current limit, with Brick-Wall Never-Exceed circuitry
  - » Password protection available to lock out a selectable control set
  - » Key switch, active, and passive interlocks
  - » Brown-out, reverse-voltage, & over-voltage protection
  - » Driver over-temperature protection circuit
  - » Relay shorts output when current is disabled
  - » AC input and patented power supply filtering
  - » 2 second turn-on delay — adjustable
  - » 1.5 msec current ramp

FEATURES

- Feature-rich for research projects
  - » USB and Ethernet interfaces with software included
  - » Auto voltage/current scan function
  - » Data collection using a computer or USB flash drive
  - » Field upgradeable firmware
  - » Sophisticated error handling
  - » Save and recall functions for specific set ups
- Trigger output: TTL pulse to sync with other measurement task from a remote instrument
- 5 V output for alignment LED
- CE compliant, compatible with CDRH laser regulations
- All software and instrument documentation provided on a USB flash drive
- Optional rack mount kit: 2 U height, ½ rack width
- AC input switch selectable from 115/230 ±15% VAC with a 50/60 Hz power-line frequency

406-587-4910
www.teamWavelength.com

WAVELENGTH ELECTRONICS

QCL Laboratory Series

Low-Noise Quantum Cascade Laser Driver Instrument

THE LOWEST-NOISE DRIVER NOW AVAILABLE AS AN INSTRUMENT

These low noise QCL instruments have the lowest current noise density of any commercially available. Powering your QCL with this patented[1] driver gives you narrow linewidth, stable center wavelength, and repeatable scans. This is the right instrument for lasers that require a high-precision and ultra-low noise current source to measure concentrations lower than ever before. The 500 mA QCL driver exhibits noise performance of 0.4 µA RMS to 100 kHz, and an average current noise density of 1 nA / √Hz—the lowest available today.

ULTRA-NARROW QCL LINEWIDTH

In order to maintain their characteristically tight center linewidths and minimize jitter, quantum cascade lasers must be powered by drivers with exceptionally low current noise density. Our customers have reported achieving narrower linewidths with our QCL drivers than any other they've used.

HIGHEST MODULATION BANDWIDTH

The high modulation bandwidth and fast rise-time maintains modulation waveform integrity so you can shape the laser output profile exactly as your application requires.

INTUITIVE USER INTERFACE AND SUPERIOR SOFTWARE CONTROL

With Wavelength's plug and play instrument, you have the ability to quickly set the controls using either the instrument touchscreen or remote control, and then easily monitor the results.

PROTECT YOUR QCL INVESTMENT

All the essential control and monitor functions you expect in a Wavelength product are incorporated into this QCL driver, along with protection circuitry to safeguard your QCL from minor power source faults, over-temperature conditions, and electrical faults.

APPLICATIONS

Due to their unique construction, QCLs operate with high power in the near-IR through terahertz ranges. These wavelengths are particularly suited to detection of molecules significant to humans. Applications for the lower noise QCL driver include: remote detection of explosive materials, medical diagnosis using the breath, non-invasive glucose testing, emissions monitoring, and pharmaceutical process quality control. Additional applications include anesthesia and hospital air quality monitoring, leak detection, and remote imaging.

Figure 1. Control Screen

Figure 2. Monitor Screen

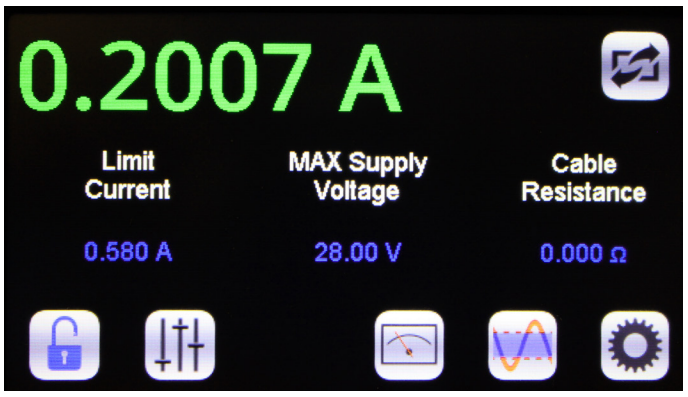

Figure 3. Limit Screen

[1] Covered by U.S. Patents 6,696,887; 6,867,644 and 7,176,755. Licensed from Battelle Memorial Institute.

WAVELENGTH ELECTRONICS

QCL1000-LA401-D

QCL Laboratory Series

Low-Noise Quantum Cascade Laser Driver Instrument

CONTROL THE INSTRUMENT VIA REMOTE COMPUTER

The QCL Laboratory Series instruments can be controlled remotely from a computer using a LABVIEW Virtual Instrument application. Once the software is downloaded and the instrument connected to the computer via a USB or Ethernet cable, all operations can be performed remotely.

ADJUST, ENABLE, AND SCAN FROM THE CONTROL SCREEN

Adjust Setpoint, Limit Current, Supply Voltage, Cable Resistance, Turn On Delay, and complete a VI scan. Enable and disable current to the laser or turn the instrument front panel on and off.

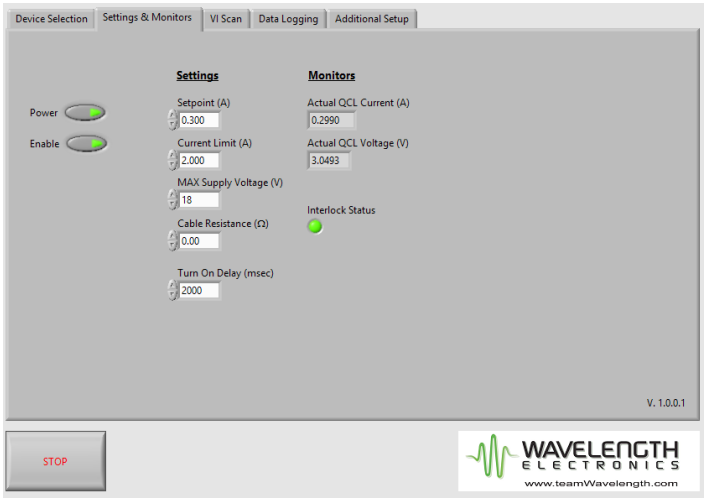

Figure 4. Monitor & Settings screen

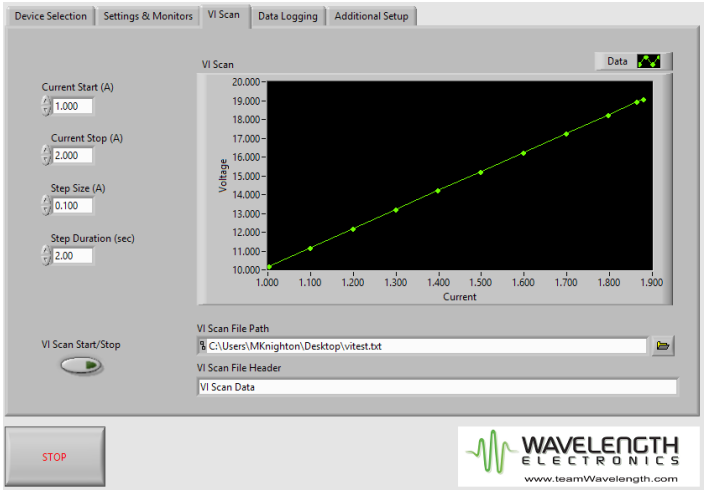

Figure 5. VI Scan screen

In Figure 5, the scan was taken with a resistor test load.

406-587-4910
www.teamWavelength.com

WAVELENGTH ELECTRONICS

QCL Laboratory Series

Low-Noise Quantum Cascade Laser Driver Instrument

QCL DRIVER SPECIFICATIONS

DRIVER OUTPUT CURRENT	MIN	TYP	MAX	UNIT	NOTE
Output Current	0.5, 1.0, 1.5, 2.0			A	
RMS Noise Current	0.4	1	1.3	µA RMS	QCL1000 at 500 mA output, 100 kHz test bandwidth
Noise Current Density	1	2	4	nA / √Hz	QCL1000 at 500 mA output, 10 Ω test load
Stability	5	10	15	ppm	25ºC ambient
Temperature Coefficient	5	10	18	ppm / ºC	
Compliance Voltage	10		20	V	Internal Supply Voltage can be adjusted from the front panel.
Modulation Bandwidth		2	3	MHz	sinewave
Rise/Fall Time	250 / 200			nsec	to full scale
Slew rate		30		V / µsec	
Depth of Modulation		90		%	at 500 kHz
Slow Start Ramp		1.5		msec	to setpoint

POWER SUPPLY REQUIREMENTS	VALUE	NOTE
AC Power Supply and Line Frequency	100-120 / 220-240 VAC, 2 A, 50-60 Hz	Switch selectable: 100-120 V and 220-240 V, appropriate power cord supplied
Fuse for 220-240 V	0.63 A, 250 V, fast blow	5 x 20 mm, Part #0217.630MXP, Littelfuse
Fuse for 100-120 V	1.25 A, 250 V, fast blow	5 x 20 mm, Part #02351.25HXP, Littelfuse

ABSOLUTE MAXIMUM RATINGS	VALUE	UNIT	NOTE
Case Operating Temperature	-40 to 50	ºC	
Weight	11.4 (~8)	lbs (kg)	
Size	3.47 x 8.86 x 17.72	inches	

WHAT'S INCLUDED

- QCL Instrument
- Power Cable, type appropriate for final location
- USB Flash Drive, includes all necessary software and instrument documentation
- Keys for the Keyswitch
- Interlock Kit with interlock connectors

COMPUTER REQUIREMENTS FOR REMOTE CONTROL OPERATION ONLY

Hardware

- 1 GHz or faster 32-bit (x86) OR 64-bit (x64) processor
- 1 GB RAM 32-bit or 2 GB RAM 64-bit
- 16 GB available hard disk space for 32-bit or 20 GB for 64-bit
- DirectX 9 graphics device with WDDM 1.0 or higher driver

Software

- Windows 8, 7 SP1, or Vista SP2 Operating System

ORDERING INFORMATION

QCL500 LAB	500 mA QCL Instrument
QCL1000 LAB	1.0 A QCL Instrument
QCL1500 LAB	1.5 A QCL Instrument
QCL2000 LAB	2.0 A QCL Instrument
NOISESCAN	Noise Characterization Scan
QCL TL LOW	Resistive Test Load for QCL500 or QCL1000
QCL TL 1500	Resistive Test Load for QCL1500
QCL TL 2000	Resistive Test Load for QCL2000
RCKMT-LAB SNGL	19" Single Unit Rack Mount Kit
RCKMT-LAB DUAL	19" Dual Unit Rack Mount Kit
INTLK REPL KIT	Interlock Replacement Kit with BNC terminator and modified D-SUB connector to override interlocks

Free, effective, and responsive technical support is available.

Sales@teamWavelength.com
406-587-4910

LASER TYPES QCL SUPPORTED

CE Pb RoHS Compliant

WAVELENGTH ELECTRONICS

QCL1000-LA401-D