

# WAVELENGTH ELECTRONICS

## QUANTUM CASCADE LASER DRIVERS, TEMPERATURE CONTROLLERS & LASER DIODE DRIVERS

REMOTE SENSING & CONTROL ◀

MATERIALS PROCESSING ◀

AEROSPACE/MILITARY ◀

COMMUNICATIONS ◀

SEMICONDUCTOR ◀

ENVIRONMENTAL ◀

SPECTROSCOPY ◀

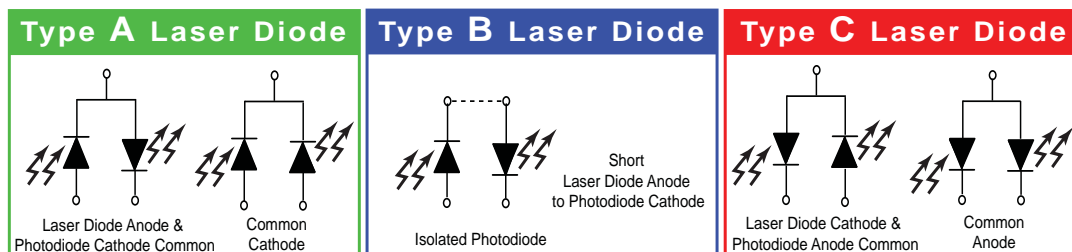
BIOMEDICAL ◀



**PRECISION  
CONTROL**  
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# Quantum Cascade & Laser Diode Drivers & Temperature Controllers

	MODEL NUMBER	PACKAGE STYLE	MAX OUTPUT CURRENT	PAGE	
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# QCL Series Low-Noise Quantum Cascade Laser Drivers

## FEATURES

- Output current of 500 mA, 1 A, 1.5 A, or 2 A
- Low noise: < 0.4  $\mu$ A RMS up to 100 kHz (typical)
- Compliance voltage up to 20 V
- 3 dB bandwidth 2 - 3 MHz; 250 nsec rise time
- Constant Current Mode operation
- Feature-rich for OEM applications
  - » Analog current setpoint input
  - » Onboard Power and Enable switches
  - » TTL-compatible Power & Output Enable
  - » Small Package 6.55" x 5.5" x 2.3"
  - » Safety features protect your QCL investment

**NEW!**



Size: 5.5 x 6.55 x 2.3 in  
(140 x 166 x 59 mm)

## THE LOWEST-NOISE QCL DRIVER

The Low Noise QCL Drivers employ advanced patented<sup>1</sup> circuitry to deliver the lowest current noise density of any commercially available driver. Powering your QCL with this driver will enable better performance—at lower cost, and in less time—than otherwise possible.

This is the right driver for lasers that require a high-precision and ultra-low noise current source: the 500 mA QCL laser driver exhibits noise performance of 0.4  $\mu$ A RMS to 100 kHz, and an average current noise density of 1 nA /  $\sqrt{\text{Hz}}$ .

## 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 these drivers than any other they've used.

High modulation bandwidth and outstanding stability results in sweep-to-sweep repeatability that enables previously unattainable detection sensitivity and accuracy in gas sensing applications.

## DESIGNED FOR OEM INTEGRATION

The robust design and simple operation of our driver allows you to take your revolutionary QCL application from the test bench to market quickly and efficiently, using the same driver throughout the entire process.

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

## SPECIFICATIONS

PARAMETER	MIN	TYP	MAX	UNIT
Driver Supply Voltage, Bipolar	$\pm 22$		$\pm 25$	VDC
Compliance Voltage	11 *	16	20 *	V
Max Output Current	0.5, 1.0, 1.5, 2.0			A
RMS Noise Current	0.4	1	1.3	$\mu$ A RMS
Noise Current Density	1	2	4	nA / $\sqrt{\text{Hz}}$
Long Term Stability, 24 hr	5	10	15	ppm
Temperature Coefficient	5	10	18	ppm / $^{\circ}\text{C}$
Modulation Bandwidth (sinewave)		2	3	MHz
Rise Time / Fall Time	250 / 200			nsec
* Ask for Product Variation PV055 for 20 V compliance or PV048 for the 11 V option.				

## ORDERING INFORMATION

PART NUMBER	DESCRIPTION
QCL500	500 mA QCL Driver
QCL1000	1.0 A QCL Driver
QCL1500	1.5 A QCL Driver
QCL2000	2.0 A QCL Driver
PWRPAK-24V	24 VDC Switching Power Supply (2x Required)
NOISESCAN	Noise Characterization Scan
Other accessories available. See the website or contact a Sales Engineer for complete ordering information.	

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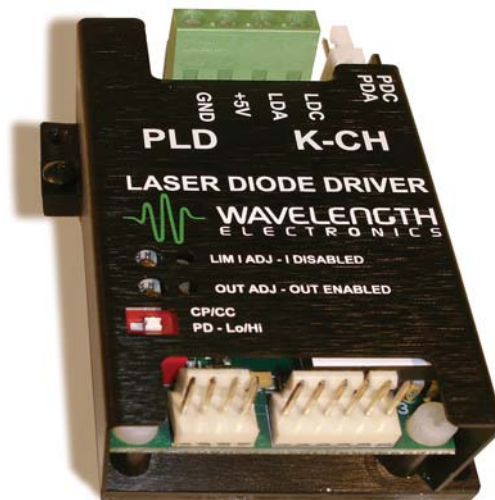


# PLD-CH Series

## Chassis-Mount Laser Diode Drivers

### FEATURES

- Models driving up to 5 A, 10 A, or 12.5 A
- Single 5 V supply operation up to 10 A
- Compliance voltage up to 28 VDC with separate power supply
- Slow-start laser diode protection
- Constant Current or Constant Power mode
- Latching current limit
- Mechanical relay protection
- Remote enable/disable pin
- Onboard setpoint and limit trimpots
- Parallel two units to drive up to 25 A



Size: 2.9 x 2.4 x 1.1 in  
(74 x 60 x 28 mm)

### CHASSIS-MOUNT FLEXIBILITY

The compact PLD-CH Series are our most popular laser diode controllers. The mount-anywhere modular package style and cabled connections gives you the flexibility to place the laser driver at the ideal location within your system chassis.

Using a single 5 VDC power supply you can drive lasers up to 3 V compliance. Lasers with higher compliance voltage—up to 28 V—can be accommodated by using separate supplies for the laser and electronics.

The photodiode feedback input range is selectable in order to maximize control sensitivity, and the outstanding constant-power stability makes this high-power driver ideal for industrial applications where continuous stable laser output power is required.

### SAFETY FEATURES MAKE FOR ROBUST OEM SYSTEMS

Remote control inputs and status monitor outputs streamline design and integration of OEM laser control systems, ensuring your system design is robust to real-world conditions and providing long-term reliability that you can trust.

The latching current limit protects the laser diode by disabling the output when the current limit is reached, and the mechanical output shorting relay provides additional protection against conditions that might damage the laser diode.

This driver is ideal for applications where current stability is critical and space is tight, such as benchtop inspection instruments and medical diagnostic equipment.

### SPECIFICATIONS

PARAMETER	PLD5K	PLD10K	PLD12.5K	UNIT
Driver Supply Voltage	5 to 5.5			VDC
Laser Supply Voltage, High Compliance	4.5 to 30			VDC
Compliance Voltage	3 to 28			V
Max Output Current	5	10	12.5	A
Constant Current Short Term Stability, 1 hr	< 100	< 200	< 200	ppm
Constant Power Stability, 1 hr	< 0.02	< 0.05	< 0.05	%
Temperature Coefficient	< 200			ppm / °C
Modulation Bandwidth (CC, sinewave)	120	80	50	kHz
Rise / Fall Time	4.8 / 9.4	5.9 / 10	8 / 9	µsec

### ORDERING INFORMATION

PART NUMBER	DESCRIPTION
PLD5K-CH	5 A Laser Diode Driver
PLD10K-CH	10 A Laser Diode Driver
PLD12.5K-CH	12.5 A Laser Diode Driver
USBKIT	USB Interface kit, with software



# PLD PCB Series

## PCB-Mount Laser Diode Drivers

### FEATURES

- Models driving from 200 mA to 10 A
- Single 5 V power supply operation
- Compliance voltage up to 28 VDC with separate power supply
- Slow-start laser diode protection
- Constant Current or Constant Power mode
- Latching current limit
- Mechanical relay output protection
- Onboard or remote setpoint and limit controls
- Remote Enable / Disable input
- Integrated heatsink and fan



Size (PLD200): 1.5 x 2.7 x 0.8 in (39 x 67 x 21 mm)  
 (PLD1250/5000/6500): 1.5 x 2.7 x 1.8 in (39 x 67 x 45 mm)  
 (PLD10000): 3.3 x 3.4 x 3.2 in (85 x 85 x 82 mm)

### RELIABILITY YOU CAN TRUST

The PLD Series Laser Diode Drivers deliver the reliability and performance you expect from a Wavelength Electronics laser driver in a compact and easy-to-integrate PCB-mountable package. Tens of thousands of PLD drivers are deployed in laser systems around the world, proving beyond doubt the reliability and stability of our most popular laser diode controllers.

Lasers with forward voltage drop up to 3 V can be driven using a single 5 V power supply. Lasers with a high compliance voltage—up to 28 V—can be accommodated by separating the electronics and laser power supplies.

PLD Series drivers are found in particle counters, manufacturing vision systems, photovoltaic quantum efficiency testers, wavefront scanners, fiber aligners, and laser diode LIV testers.

### DESIGNED FOR EASY INTEGRATION

Onboard controls simplify prototyping and benchtop use, especially when used with the PLDEVAL evaluation circuit board.

Remote control inputs and external monitors allow the PLD controllers to be integrated into an automated control system, ensuring your system design is robust to real-world operating conditions.

The latching current limit protects the laser diode by disabling the output when the current limit is reached, and the mechanical output shorting relay provides additional protection against potentially damaging ESD events.

### SPECIFICATIONS

PARAMETER	PLD200	PLD500	PLD1250	PLD5000	PLD6500	PLD10000	UNIT
Driver Supply Voltage	5 to 5.5						VDC
Laser Supply Voltage, High Comp.	3 to 30						VDC
Compliance Voltage	3 to 28					2.5 to 27	V
Max Output Current	0.2	0.5	1.25	5.0	6.5	10	A
Constant Current Short Term Stability, 1hr	< 100	< 100	< 100	< 200	< 200	< 300	ppm
Constant Power Stability, 1 hr	0.02					0.05	%
Temperature Coefficient	< 200						ppm / °C
Modulation Bandwidth (CC, sinewave)	190	200	200	150	100	90	kHz
Rise / Fall Time	3 / 5	3 / 5	3 / 5	3 / 12	5 / 12	5.3 / 9.5	µsec

### ORDERING INFORMATION

PART NUMBER	DESCRIPTION
PLD200	200 mA Laser Diode Driver
PLD500	500 mA Laser Diode Driver
PLD1250	1.25 A Laser Diode Driver
PLD5000	5.0 A Laser Diode Driver
PLD6500	6.5 A Laser Diode Driver
PLDEVAL	Evaluation PCB for PLD Series < 10 A
PLD10000	10 A Laser Diode Driver
PLD10EV	Evaluation PCB for PLD10000
USBKIT	USB Interface kit, with software

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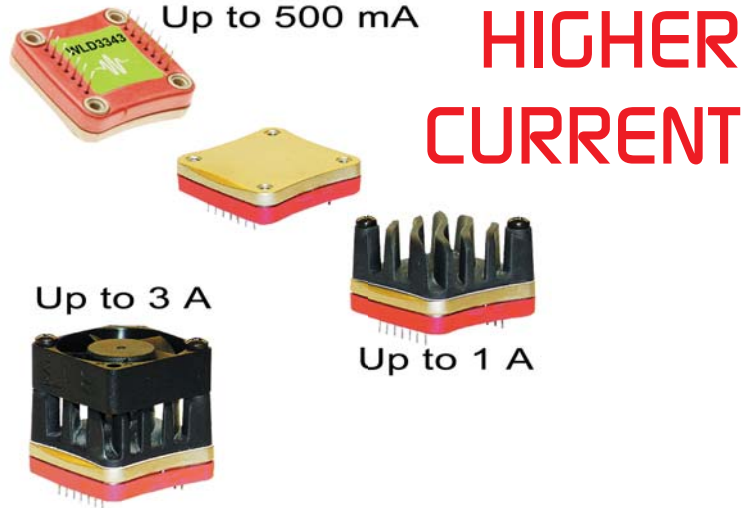


# WLD3343 Series

## Laser Diode Drivers & Eval Board

### FEATURES

- Up to 3 A Output Current
- Slow-start laser diode protection
- TTL-compatible shutdown pin
- Adjustable current limit and current range
- Over-temperature shutdown
- 14-Pin DIP PCB Mount
- Constant Current or Constant Power mode
- Voltage controlled setpoint
- 2 MHz Bandwidth (CC, sinewave)



**HIGHER CURRENT**

### COMPACT LASER DIODE DRIVER

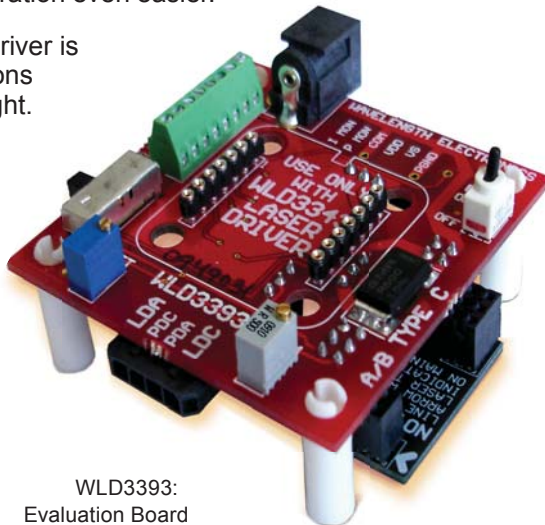
The WLD3343 is a compact DIP-packaged laser diode driver that operates in constant current or constant power mode, and can be modulated up to 2 MHz. No leakage current makes it ideal for low current VCSELs.

A number of safety features are built in to protect the laser: adjustable current control range and limit, slow-start, and a TTL-compatible shutdown pin. The over-temperature protection circuit safely switches off the laser if the driver reaches an unsafe operating temperature.

When driving up to 500 mA the WLD3343 does not need a heatsink—the slim metal-backed case is sufficient for self-cooling. For higher current requirements the heatsink and fan are available.

Minimal external electronics are required to operate the WLD3343. An online circuit calculator speeds selection of component values. The WLD3393 evaluation board makes setup and configuration even easier.

This laser diode driver is ideal for applications where space is tight. It is widely used in electro-optic instrumentation, spectrometers, medical diagnostic equipment, range finders, and on research benches.



WLD3393:  
Evaluation Board

Size (WLD3343): 1.3 x 1.3 x 0.3 in (33 x 33 x 8 mm)  
(with heatsink): 1.3 x 1.3 x 0.87 in (33 x 33 x 22 mm)  
(with heatsink & fan): 1.3 x 1.3 x 1.3 in (33 x 33 x 33 mm)

### SPECIFICATIONS

PARAMETER	MIN	TYP	MAX	UNIT
Driver Supply Voltage		4.5 to 12		VDC
Compliance Voltage	3.0		10	V
Max Output Current		2.2	3	A
CC Stability, 1 hr		200		ppm
CP Stability, 1 hr		0.01		%
Constant Current Bandwidth (sinewave)		2		MHz
Rise / Fall Time		460 / 320		nsec
Leakage Current		0		mA

### ORDERING INFORMATION

PART NUMBER	DESCRIPTION
WLD3343	2.2 A Laser Diode Driver
WLD3343-2L	2.2 A Lower Noise Driver
WLD3343-3A	3 A Laser Diode Driver
WLD3343-3L	3 A Lower Noise Driver
WLD3343HB	2.2 A Li-Ion Battery-Compatible Driver
WLD3393	Evaluation PCB for WLD Series
WLD3393 PV28E	Evaluation Board for WLD 3 A Models

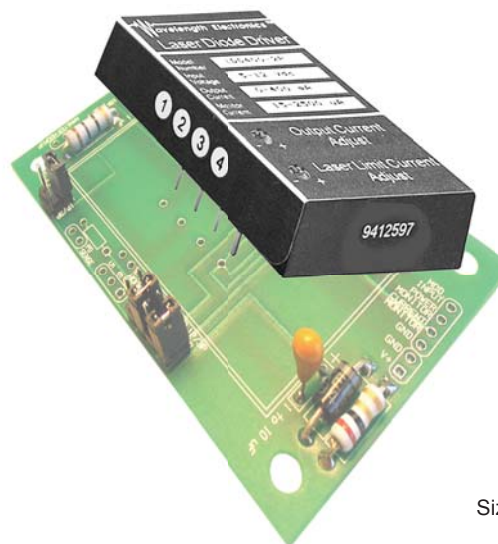


# LDD P Series

## Laser Diode Driver & Eval Board

### FEATURES

- Low Noise — Up to 400 mA drive current
- Single Supply Operation: +5 to +12 V
- Onboard control trimpots
- 8-Pin DIP Package
- Slow Start & Current Limit protection
- Constant Current or Constant Power operation
- 2 MHz Bandwidth (CC, sinewave)
- Buffered measurement outputs



Size: 1.3 x 2.1 x 0.4 in  
(33 x 52 x 11 mm)

### LOW NOISE, HIGH STABILITY

When it is essential to have high performance in your application, these low noise drivers offer excellent current stability in Constant Current mode or <0.02% power stability in Constant Power mode. Precisely control the laser diode or photodiode setpoint current with the onboard output current adjustment trimpot or via a remote voltage to the modulation input. Adjust the limit current trimpot to protect the laser diode from exceeding its maximum current rating even when modulating your laser diode. Measure laser diode and photodiode current from two buffered monitor outputs. An evaluation board and cable are available to speed implementation of the LDD in your application.

Very low leakage current (15  $\mu$ A) makes the LDD ideal for driving most VCSELs using the remote modulation setpoint input. It operates from +5 to +12 V. Just add an external power supply and your laser diode to this simple 8-pin driver.

The LDD Series is excellent for laser spectroscopy, electro-optical systems, and contamination control devices.

### SPECIFICATIONS

PARAMETER	LDD200	LDD400	UNIT
Driver Supply Voltage	5 to 12		VDC
Max Output Current	200	400	mA
Noise (RMS)	< 5		$\mu$ A
CC Stability, 24 hr	< 50		ppm
CP Stability, 1 hr	0.02		%
Temperature Coefficient	< 100		ppm / $^{\circ}$ C
CC Bandwidth (sinewave)	2		MHz
Rise / Fall Time	120 / 120		nsec
Leakage Current	< 15		$\mu$ A

### ORDERING INFORMATION

PART NUMBER	DESCRIPTION
LDD200 1P	200 mA Laser Diode Driver, Type A Lasers, PD 15-2500 $\mu$ A
LDD200 2P	200 mA Laser Diode Driver, Type C Lasers, PD 15-2500 $\mu$ A
LDD200 3P	200 mA Laser Diode Driver, Type A Lasers, PD 5-125 $\mu$ A
LDD400 1P	400 mA Laser Diode Driver, Type A Lasers, PD 15-2500 $\mu$ A
LDD400 2P	400 mA Laser Diode Driver, Type C Lasers, PD 15-2500 $\mu$ A
LDD400 3P	400 mA Laser Diode Driver, Type A Lasers, PD 5-125 $\mu$ A
LDDEVALPCB	Evaluation Board for LDD P Series

A & B type lasers are supported by the LDD 1P & 3P series



C type lasers are supported by the LDD 2P series



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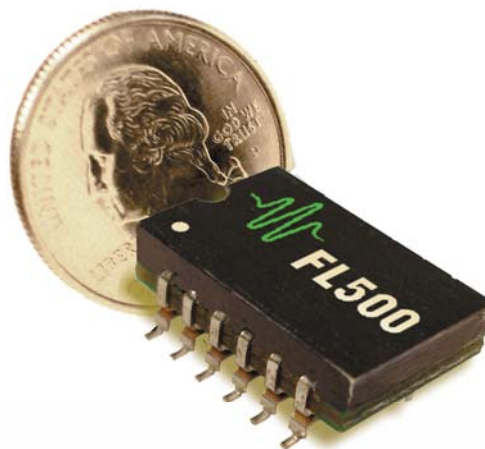
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# FL500 SMT

## Laser Diode Driver & USB Interface Board

### FEATURES

- Low Cost
- Two 250 mA outputs or one 500 mA output
- Single Supply Operation: 3 to 12 V
- 12-pin SMT package, reflow compatible
- Laser slow start, brownout protection
- Voltage controlled setpoint
- TTL-Compatible shutdown pin
- Multiple FL500s can be paralleled to provide higher drive current
- USB compatible evaluation board available



Size (FL500): 0.75 x 0.45 x 0.26 in (19 x 11.5 x 6.5 mm)  
 (FL591FL): 3.0 x 2.6 x 1.0 in (76 x 66 x 25 mm)  
 (FL593FL): 3.0 x 2.5 x 1.1 in (76 x 62 x 28 mm)

### SURFACE MOUNT LASER CONTROL TECHNOLOGY MADE EASY

The FL500 is ideal for driving laser diodes when you are designing your own electronics control system to suit exactly your application requirements. The FL500 is nearly a drop-in laser driver and requires very little external circuitry.

The wide supply voltage range—from 3 to 12 VDC—allows it to be operated from portable Li+ battery power systems. Because of its small size and low noise, the FL500 finds wide application in handheld devices and spectroscopy systems.

### REMARKABLY EASY TO INTEGRATE

The FL500 can be configured as two independent 250 mA drivers or a single 500 mA driver. The only external components required are a power supply, an analog voltage signal to control the output setpoint, and the laser. Additional output filters can be added to reduce noise further.

### EASY TO PROTOTYPE

The FL591 and FL593 evaluation boards allow you to configure the FL500 in minutes.

### FL593 USB CONTROL

The FL593 Evaluation Board leverages the features of the FL500 by adding full-speed USB 2.0 control and an intuitive software control panel. We also provide the API in case you wish to develop your own control interface.

Each device is displayed in its own window, complete with real-time control status, data logging, limit and setpoint monitoring, interlock enable notification, and more.

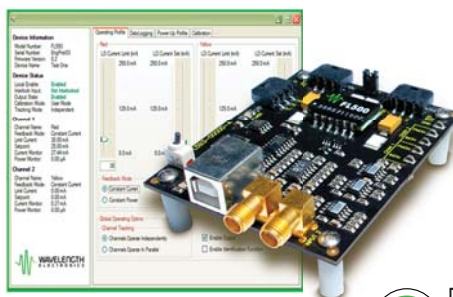
The FL593 is ideal for OEM applications where you want computerized plug-in configuration control.

### FL500 SPECIFICATIONS

PARAMETER	MIN	TYP	MAX	UNIT
Driver Supply Voltage	3 to 12			VDC
Compliance Voltage	$V_{DD} - (0.5 * V_{SET})$			V
Output Current	(2x) 250 or (1x) 500			mA
Constant Current Stability, 1 hr		35	40	ppm
Constant Power Stability, 1 hr	0.019			%
Constant Current Bandwidth (sinewave)	500			kHz
Rise / Fall Time	300 / 300			nsec
Leakage Current	0.3 - 1			mA

### ORDERING INFORMATION

PART NUMBER	DESCRIPTION
FL500	500 mA Laser Diode Driver
FL591FL	Evaluation Board with FL500 loaded
FL593FL	500 mA Laser Diode Driver with USB Control



# LDTc Series Laser Driver & Temp Controller Combo

## FEATURES

- Laser Current: 500 mA, 1 A, or 2.2 A
- Temperature Control up to 2.2 A
- Single supply operation or separate supplies
  - » Laser driver 3 to 12 VDC
  - » Temperature controller 5 to 30 VDC
- Laser diode driver features
  - » Slow start protection
  - » Constant current or constant power
  - » Adjustable laser diode current limit
  - » Remote TTL shutdown/interlock
- Failsafe setpoint default for temperature setpoint
- All cables included



Size (LDTc $\times$ 20): 2.4 x 2.9 x 1.1 in (60 x 74 x 28 mm)  
 (LDTc 2/2 E): 4.8 x 2.7 x 1.14 in (122 x 69 x 29 mm)  
 (LDTc 2/2 O): 4.2 x 2.5 x 1.0 in (107 x 64 x 25 mm)

## INTEGRATED CONTROL MADE SIMPLE

These combination controllers integrate the FL500 or WLD3343 Laser Diode Driver with the ultra stable WTC3243 Temperature Controller. This module delivers the reliability and stability you expect from Wavelength controllers and is ideal in applications where space is critical.

We make these modules easy to use by providing onboard controls for every key parameter needed for complete laser diode and temperature control. The control parameters are also accessible via connectors so you can easily integrate the module into your OEM laser system.

## STABLE AND RELIABLE

The LDTc0520 includes one FL500, driving up to 500 mA of laser diode current, while the LDTc1020 includes two FL500s to drive up to 1 A to the laser diode. The LDTc 2/2 includes the WLD laser driver, up to 2.2 A drive current.

All models include the ultra-stable WTC3243 that provides up to 2.2 A of bipolar current for operating a thermoelectric cooler, or unipolar current for a resistive heater.

## CRITICAL SAFETY FEATURES

Important safety features protect the laser and TEC, and make the entire laser control system more robust to real-world operating conditions: adjustable current limits, slow-start and brown-out protection, and a special failsafe feature that drives the TEC to a safe temperature if the external temperature setpoint signal is lost.

## SPECIFICATIONS

PARAMETER	LDTc 0520	LDTc 1020	LDTc 2/2	UNIT
Laser Driver Supply Voltage	3 to 12		5 to 12	VDC
Compliance Voltage, LD	$V_{DD-FL} - (0.5 \times V_{SET})$		5-10	V
Laser Output Current	0.5	1	2.2	A
Constant Current Stability, 1 hr	35-40		50-75	ppm
Constant Power Stability, 1 hr	0.019		0.01	%
Modulation Bandwidth (CC, sinewave)	0.5		1.6	MHz
Rise / Fall Time	300 / 300		460 / 320	nsec
Leakage Current (Laser Control)	0.3	1	0	mA
Temp Controller Power Supply	5 to 12			VDC
Output Power Supply	5 to 30		5 to 28	VDC
Compliance Voltage, TC	$V_s - 0.5$			V
Temperature Controller Output Current	$\pm 2.2$			A
Temperature Stability, 1 hr (10 k $\Omega$ thermistor @ 25°C)	0.002			°C

## ORDERING INFORMATION

PART NUMBER	DESCRIPTION
LDTc0520	500 mA Laser / $\pm 2.2$ A TEC Controller
LDTc1020	1.0 A Laser / $\pm 2.2$ A TEC Controller
LDTc 2/2 E	2.2 A Laser / $\pm 2.2$ A TEC Controller
LDTc 2/2 O	Open Frame 2.2 A Laser / $\pm 2.2$ A TEC Control
USBKIT	USB Interface kit, with software

Thermistors, cables and power supplies are available. Reference page 19.



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# PTC-CH Series

## Chassis-Mount Temperature Controllers

### FEATURES

- Drive  $\pm 2.5$ ,  $\pm 5$  or  $\pm 10$  A current
- Single Supply Operation from 5 V to 30 V
- Temperature stability of  $0.0012^{\circ}\text{C}$
- Remote or onboard temperature setpoint control; remote or local enable/disable
- Remote limit capability
- Extended PGAIN range
- Selectable sensor bias current & adjustable current limit
- “Smart Integrator” quickly settles to temperature
- Failsafe setpoint default circuit
- 20 A with Master / Slave Setup



Size: 3 x 3 x 1.1 in  
(76 x 76 x 28 mm)

### STABLE EVEN ACROSS AMBIENT

The PTC-CH Series Precision Temperature Controllers are compact, chassis mount modules that provide excellent temperature stability—even across ambient. The linear bipolar output drives TECs, and it can be easily configured for unipolar heater operation. PTC-CH controllers are found in such diverse applications as particle and droplet measurement, manufacturing machine vision systems, biomolecular interaction analysis, and more.

### FLEXIBLE AND EASY TO USE

The PTC-CH Series controllers are designed to be integrated into your laser control system. With onboard trimpots for current limit, temperature setpoint, and proportional gain, it's also easy to use the controller on your benchtop, too.

An LED indicates when output current is enabled. An external voltage can be used for remote setpoint operation, and if the setpoint signal is lost the controller automatically reverts to a “safe” temperature setpoint.

### PRACTICAL FEATURES FOR REAL-WORLD CONDITIONS

- The PTC10K-CH can be linked in a Master/Slave configuration with the PTC10K-SL to increase the output current up to 20 amps.
- The PTC-CH Series work well with the PLD-CH laser diode drivers for complete, compact, chassis-mount laser control.
- Sensor bias currents can be configured to maximize feedback sensitivity with a variety of sensors.
- Low temperature coefficient design remains stable across a wide range of ambient conditions.
- The new remote limit capability allows a DAC to set the current limit. Contact factory for this option.

### SPECIFICATIONS

PARAMETER	PTC2.5K	PTC5K	PTC10K	UNIT
Controller Supply Voltage	4.5 to 30			VDC
Compliance Voltage	$V_{DD} - 1.5$	$V_{DD} - 2.2$	$V_{DD} - 4.5$	VDC
Max Output Current	$\pm 2.5$	$\pm 5$	$\pm 10$	A
Temperature Stability, 1 hr (10 k $\Omega$ thermistor @ 25 $^{\circ}\text{C}$ )	< 0.0012			$^{\circ}\text{C}$
Temperature Coefficient	< 100			ppm / $^{\circ}\text{C}$

### ORDERING INFORMATION

PART NUMBER	DESCRIPTION
PTC2.5K-CH	2.5 A Temperature Controller
PTC5K-CH	5.0 A Temperature Controller
PTC10K-CH	10.0 A Temperature Controller
PTC10K-SL	10.0 A Current Booster (use with PTC10K-CH)
USBKIT	USB Interface kit, with software
Thermistors, cables and power supplies are available. Reference page 19.	



**NEW!**

# PTC-PCB Series PCB-Mount Temperature Controller

## FEATURES

- Drive  $\pm 5$  A or  $\pm 10$  A current
- Single Supply Operation from 5 to 30 VDC
- Linear Stability:  $0.0012^{\circ}\text{C}$
- Onboard and remote controllable
  - » Remote or onboard temperature setpoint control
  - » Remote or onboard enable/disable
  - » Adjustable current limit
- “Smart Integrator” quickly settles to temperature even on large thermal loads
- Selectable sensor bias current
- Failsafe setpoint default circuit



Size: 3.9 x 2.2 x 2.3 in  
(98 x 55 x 59 mm)

## PTC SERIES FOR PCB-MOUNT

The PTC-PCB Series are compact, powerful, and stable temperature controllers. The heatsink and cooling fan are built into the PCB-mounted package.

## HIGH PERFORMANCE IN A PLUG-AND-PLAY PACKAGE

These PTC controllers provide the same outstanding features and benefits as the PTC-CH controllers in a PCB-mounted package:

- Load temperature stability of  $0.0012^{\circ}\text{C}$  or better
- Adjustable current limit to protect the TEC from a current over-drive situation
- Adjustable sensor bias current to maximize control sensitivity for your application
- Onboard or remote temperature setpoint control
- Automatically drives to a safe temperature if the remote setpoint signal is lost

## SIMPLE SET UP

The PTC requires few external components to operate, so configuring the controller in your system is simple. The PTCEVAL evaluation board is available to help you configure your prototype system in the shortest time and with least cost.



## SPECIFICATIONS

PARAMETER	PTC5000	PTC10000	UNIT
Controller Supply Voltage	5 to 30		VDC
Compliance Voltage	$V_s - 1.7$	$V_s - 3$	VDC
Max Output Current	$\pm 5$	$\pm 10$	A
Temperature Stability, 1 hr (10 k $\Omega$ thermistor @ $25^{\circ}\text{C}$ )	$< 0.0012$		$^{\circ}\text{C}$
Temperature Coefficient	$< 100$		ppm / $^{\circ}\text{C}$

## ORDERING INFORMATION

PART NUMBER	DESCRIPTION
PTC5000	5.0 A Temperature Controller
PTC10000	10.0 A Temperature Controller
PTCEVAL	Evaluation Board for PTC PCB

Thermistors, cables and power supplies are available. Reference page 19.

406-587-4910

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**WAVELENGTH**  
ELECTRONICS

# WTC Series

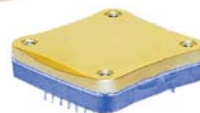
## Ultrastable Temperature Controllers

### FEATURES

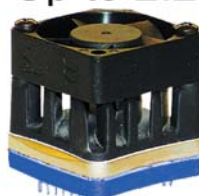
- Drive  $\pm 2.2$  A TEC or RH Current
- Single supply operation: 5 to 30 V
- Ultrastable PI control
- Stability of 0.0009°C
- Separate heat and cool current limits
- Supports thermistors, RTDs, and IC sensors
- Adjustable sensor bias current
- 14-pin DIP PCB mount
- Monitor actual temperature sensor voltage



Up to 500 mA



Up to 2.2 A



Up to 1 A

Size (WTC3243): 1.3 x 1.3 x 0.3 in (33 x 33 x 8 mm)  
 (with heatsink): 1.3 x 1.3 x 0.87 in (33 x 33 x 22 mm)  
 (with heatsink & fan): 1.3 x 1.3 x 1.3 in (33 x 33 x 33 mm)

### STABLE, COMPACT, VERSATILE

The compact WTC3243 Temperature Controller maintains 0.0009°C temperature stability. The robust and reliable WTC3243 is designed into electro-optical systems, airborne instrumentation, spectroscopic monitors, and medical diagnostic equipment. The WTC is particularly suited to applications where temperature is scanned across ambient.

The award-winning package can drive up to 500 mA with no additional heatsinking, and it will drive up to 2.2 A with our specially-designed heatsink and fan combination.

### EASY TO USE

The WTC3243 is easily configured for virtually any type of temperature sensor and the built-in sensor bias current source simplifies use with resistive temperature sensors. The proportional gain and integrator time constant are set by external resistors and can be modified to minimize temperature overshoot and maximize stability. In addition to the comprehensive datasheet, our online circuit calculator tool speeds selection of external components.

For portable laser control applications the modified WTC3243HB operates on 3.6 V Lithium-ion batteries, and integrates perfectly with the WLD3343HB laser driver.

### WTC3293 EVALUATION BOARD

Use the WTC3293 Evaluation Board to simplify operation of the WTC3243 Temperature Controller. The onboard switches, connectors, and trimpots provide fast, simple local control. For added versatility, the screw terminal connectors also allow you to wire the controller for remote operation.

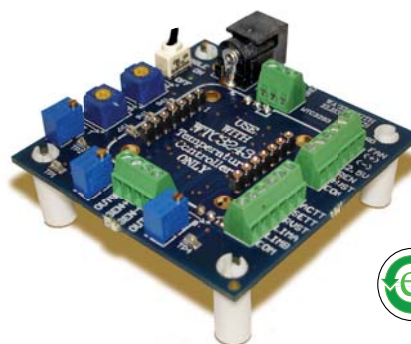
### SPECIFICATIONS

PARAMETER	MIN	TYP	MAX	UNIT
Controller Supply Voltage		4.5 to 30		VDC
Load Supply Voltage		3 to 30		VDC
Compliance Voltage	$V_s - 0.6$		$V_s - 0.1$	V
Max Output Current		$\pm 2.2$		A
Temperature Stability, 1 hr, (10 k $\Omega$ thermistor @ 25°C)		0.0009		°C

### ORDERING INFORMATION

PART NUMBER	DESCRIPTION
WTC3243	2.2 A Temperature Controller
WTC3243HB	2.2 A Li-Ion Battery-Compatible Temperature Controller
WTC3293	Evaluation Board for WTC3243
WEV300	Thermal Management Kit, no Fan
WEV301	Thermal Management Kit, 5 V Fan
WEV302	Thermal Management Kit, 12 V Fan

Thermistors, cables and power supplies are available. Reference page 19.



# WHY5640 Temperature Controller

## FEATURES

- Low Cost
- Master/Slave multiple units for more current
- Drive up to  $\pm 2.2$  A load current
- Single supply operation: 5 to 26 VDC
- Linear PI control
- Heat and cool current limits
- 14-pin DIP PCB mount

## GENERAL PURPOSE TEMPERATURE CONTROLLER

The WHY5640 is a general purpose analog controller driving up to  $\pm 2.2$  amps for use with thermoelectric or resistive heater applications.

The WHY5640 uses an active resistor bridge circuit that operates directly with thermistors or RTD temperature sensors. A single resistor or trimpot sets the temperature setpoint, and with additional circuitry an external voltage signal can be used.

Multiple WHY5640 units can be tied together to drive higher output currents. Independent heat and cool current limits are set by single resistors. A single resistor sets proportional gain and a resistor/capacitor in series sets the integrator time constant.

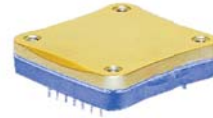
The WTC3243 is sometimes a better choice for particular applications. This table highlights the differences between the two units. If you have additional questions, or need help deciding which is ideal for you, contact a Sales Engineer.

### QUICK COMPARE

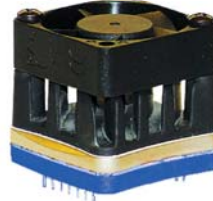
WTC3243	WHY5640
Built-in remote setpoint capability	Additional circuitry required for remote setpoint control
Supports thermistors, RTD, AD590, LM335	Supports resistive sensors; other sensors require additional circuitry
Single-unit operation only	Multiple units can be tied together for higher output current
Minimal external electronics	Requires more external electronic components than the WTC3243



Up to 500 mA



Up to 2.2 A



Up to 1 A

Size(WHY5640): 1.3 x 1.3 x 0.3 in (33 x 33 x 8 mm)  
(with heatsink): 1.3 x 1.3 x 0.87 in (33 x 33 x 22 mm)  
(with heatsink & fan): 1.3 x 1.3 x 1.3 in (33 x 33 x 33 mm)

### SPECIFICATIONS

PARAMETER	MIN	TYP	MAX	UNIT
Controller Supply Voltage		5 to 24		VDC
Load Supply Voltage ( $V_s$ )		5 to 28		VDC
Compliance Voltage	$V_s - 1.6$	$V_s - 1$	$V_s - 0.5$	V
Max Output Current		$\pm 2.2$		A
Temperature Stability, 1 hr (10 k $\Omega$ thermistor @ 25°C)	0.001	0.005	0.01	°C

### ORDERING INFORMATION

PART NUMBER	DESCRIPTION
WHY5640	2.2 A General Purpose Temperature Controller
WHY5690	Evaluation Board for WHY5640
WEV300	Thermal Management Kit, no Fan
WEV301	Thermal Management Kit, 5 V Fan
WEV302	Thermal Management Kit, 12 V Fan

Thermistors, cables and power supplies are available. Reference page 19.



WHY5690:  
Evaluation Board



406-587-4910

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# HTC Low Profile Chassis-Mount Temperature Controllers

## FEATURES

- Drive  $\pm 1.5$  A or  $\pm 3$  A to a TEC or heater
- Single Supply Operation 5 to 30 VDC
- Ultrastable PI Control
- Linear Stability:  $0.0009^{\circ}\text{C}$
- Heat and cool current limits
- 20-pin SIP PCB mount
- Adjustable sensor bias current
- Monitor Actual and Setpoint Temperature
- Supports thermistors, RTDs, and IC sensors



Size: 2.7 x 1.6 x 0.34 in  
(41 x 67 x 9 mm)

## LOW PROFILE

The advanced and reliable circuitry of the HTC Series achieves  $0.0009^{\circ}\text{C}$  temperature stability. The slim profile package is ideal for designs with space constraints, and can either be circuit board-mounted or fixed to a chassis heatsink and connected via cable.

External discreet components are used to set the limit current, proportional gain, integrator time constant, and sensor bias current. The output current can be controlled by adding a trimpot, or by a voltage signal on the analog input pin. Setpoint and actual temperature can be monitored with a digital voltmeter via buffered monitor outputs.

The HTCEVALPCB evaluation board simplifies prototyping, and can be integrated directly into some OEM applications. Wavelength also provides a direct-mount heatsink sized for the HTC controllers.

The HTC has proven reliable in such diverse fields as medical, defense, communications and manufacturing.

The HTC can be operated with up to 30 VDC power supply voltage; contact the factory for information on simple product variations.



HTCEVALPCB:  
Evaluation Board  
(includes heatsink, not shown)

## SPECIFICATIONS

PARAMETER	MIN	TYP	MAX	UNIT
Power Supply Voltage ( $V_+$ )	5 to 30			VDC
Compliance Voltage	(V - 1.33) to (V - 0.13) depending on output current			V
Max Output Current HTC1500 HTC3000	$\pm 1.5$ $\pm 3$			A
Temperature Stability, 1 hr, (10 k $\Omega$ thermistor @ $25^{\circ}\text{C}$ )	0.0009			$^{\circ}\text{C}$

## ORDERING INFORMATION

PART NUMBER	DESCRIPTION
HTC1500	1.5 A Temperature Controller, for 0.031" PCB
HTC1500-62	1.5 A Temperature Controller, for 0.062" PCB
HTC3000	3 A Temperature Controller, for 0.031" PCB
HTC3000-62	3 A Temperature Controller, for 0.062" PCB
HTCEVALPCB	Evaluation Board for HTC Series, 0.062" PCB includes heatsink
HTCHTSK	Heatsink for HTC Series

Thermistors, cables and power supplies are available. Reference page 19.



**NEW!**

# RHM5K-CH Unipolar Temperature Controller

## FEATURES

- Compact, 5 A unipolar drive current
- Single supply operation 5 to 30 VDC
- > 27 V compliance with 30 V input
- < 0.002°C stability
- Adjustable output voltage limit
- Supports thermistors, IC sensors, or RTDs
- PID control
- Temperature setpoint, proportional gain, and limit voltage are user adjustable
- Easy operation for resistive heater or TECs

## PRECISION UNIPOLAR TEMPERATURE CONTROLLER

The RHM5K-CH Temperature Controller is for applications that require a unidirectional current to either heat or cool a load at off-ambient temperatures. The RHM is very compact, drives up to 5 amps, and controls with a high degree of stability.

## PLUG-AND-PLAY

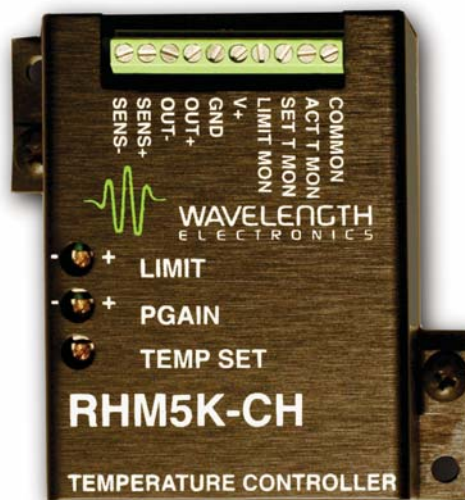
Nearly any kind of temperature sensor can be used with the RHM controller, and onboard 12-turn trimpots control temperature setpoint, proportional gain, and output voltage limit.

A 10-pin terminal strip provides easy access to the DC supply, sensor, heater or TEC, and monitor connections. The minimal number of external connections means you can configure and run the RHM in a matter of minutes.

## WIDE RANGE OF APPLICATIONS

The RHM5K-CH is suited for applications where either heating or cooling—but not both—is required.

Made for applications where temperature stability is critical and space is tight, such as heated optics (non-condensing), CCDs, preheated liquids and chamber stabilization.



Size: 2.1 x 2.1 x 0.8 in  
(55 x 55 x 20 mm)

## SPECIFICATIONS

PARAMETER	MIN	TYP	MAX	UNIT
Power Supply Voltage		4.5 to 30		VDC
Compliance Voltage	V - 3		V - 2.5	V
Max Output Current		5		A
Temperature Stability, 1 hr (10 kΩ thermistor @ 25°C)	0.0005		0.002	°C
Temperature Coefficient		20		ppm / °C

## ORDERING INFORMATION

PART NUMBER	DESCRIPTION
RHM5K-CH	5 A Unipolar Temperature Controller
WCB108	4-pin Cable, unterminated
WCB109	6-pin Cable, unterminated

Thermistors, cables and power supplies are available. Reference page 19.



# PID1500

## Temperature Controller

### FEATURES

- Plug-and-Play packaging
- Drive  $\pm 1.5$  A output current
- Single supply operation: 5 to 12 VDC
- All controls and heatsink integrated
- Heat and cool current limits
- Linear Stability:  $0.003^{\circ}\text{C}$
- 14-pin SIP PCB mount
- Evaluation board also available to streamline prototyping and benchtop operations



Size: 2.7 x 1.5 x 1.1 in  
(67 x 38 x 27 mm)

### COMPACT PCB-MOUNT TEMPERATURE CONTROLLER

The robust circuitry of the PID1500 drives up to 1.5 amps and achieves  $0.003^{\circ}\text{C}$  temperature stability. An evaluation board simplifies prototyping.

The PID1500 Temperature Controller is easily configured for any design. Virtually any type of temperature sensor can be used with the PID1500 and a built-in switchable sensor bias current source simplifies use with resistive temperature sensors. Use the onboard trimpot to adjust the setpoint, or use the analog input pin for remote control.

Use the onboard trimpot to set the maximum output current to the load or set it with a resistor between pins 1 & 2. A switch between those two pins acts as a remote enable / disable. Two monitor pins provide access to the temperature setpoint voltage and the actual sensor voltage.

The PID1500 has proven reliable in such diverse fields as spectroscopy, defense, and medical research.

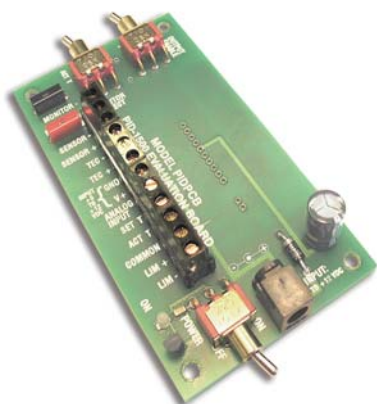
### SPECIFICATIONS

PARAMETER	MIN	TYP	MAX	UNIT
Power Supply Voltage		5 to 12		VDC
Compliance Voltage	$V_s - 1.5$		$V_s - 1$	V
Max Output Current		$\pm 1.5$		A
Temperature Stability, 1 hr (10 k $\Omega$ thermistor @ $25^{\circ}\text{C}$ )		< 0.003		$^{\circ}\text{C}$

### ORDERING INFORMATION

PART NUMBER	DESCRIPTION
PID1500	1.5 A Temperature Controller
PIDEVALPCB	Evaluation Board for the PID1500

Thermistors, cables and power supplies are available. Reference page 19.



PIDEVALPCB:  
Evaluation Board



# LFI3751 Autotune Temperature Control Instrument

## FEATURES

- Drive  $\pm 5$  A TEC or heater current
- Addressable RS-232 interface or USB
- USB-controllable
- Free BenchLink software
- Temperature stability of  $0.001^{\circ}\text{C}$
- PID Autotune
- Heat and cool current limits
- High and low temperature limits
- Remote analog setpoint input



## LFI3751 ANALOG INSTRUMENT

The LFI3751 with Autotune PID is a high performance temperature control instrument specifically designed for sensitive applications. The Autotune function automatically optimizes the P-I-D control loop to most thermal loads, reducing overshoot and improving temperature stability with the push of a button. To calibrate your thermistor, enter three data points of Resistance vs. Temperature. The LFI3751 calculates the Steinhart-Hart coefficients. View temperature or resistance on the four-digit display. Also view thermoelectric current and voltage and the limit current setting. All adjustments are made via the front panel Digi-pot.

## LFI3751 DIGITAL INSTRUMENT

All the features of the Analog instrument plus:

- Digital PID improves stability with RTDs by as much as a factor of five
- Improves Overshoot Suppression
- 50% Faster Settling Times

This option provides better setpoint resolution and stability with low resolution sensors such as RTDs. This option also offers improved overshoot suppression, 50% faster settling times, and faster calibration.

## SPECIFICATIONS

PARAMETER	VALUE	UNIT
Power Supply Voltage	115 / 230 $\pm$ 15%	VAC
Compliance Voltage	8	V
Output Current	$\pm 5$	A
Temperature Stability, 1 hr (10 k $\Omega$ thermistor @ 25 $^{\circ}\text{C}$ )	< 0.001	$^{\circ}\text{C}$

## ORDERING INFORMATION

PART NUMBER	DESCRIPTION
LFI3751 ANALOG	5 A Analog Temperature Control Instrument
LFI3751 DIGITAL	5 A Digital Temperature Control Instrument
WCB103	Output Cable
WCB404	Cable, USB to RS-232 Adapter
WCB104	Cable, DB9F / DB9F
WCB401	Cable, RS-232, 6-ft, DB25-9 pin
WCB402	Cable, RS-232, 6-ft, DB25-25 pin
WCB403	Cable, RS-232, 2-ft, DB25-25 pin

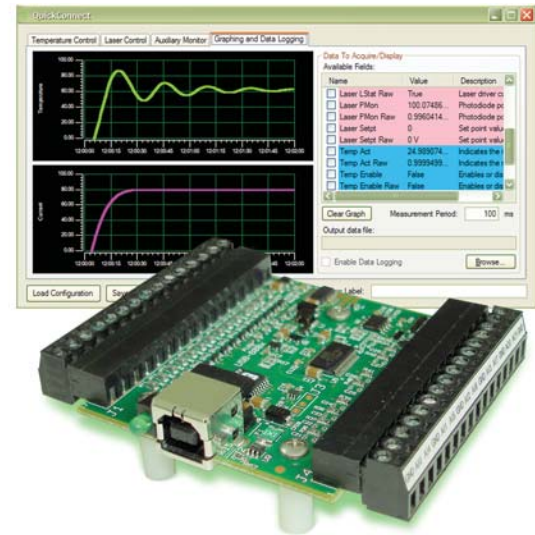
Thermistors, cables and power supplies are available. Reference page 19.



# USBKIT with QuickConnect™ Software Interface

## FEATURES

- USB 2.0 full-speed compatible Interface allows you to remotely control one Wavelength Electronics laser diode driver and one temperature controller
- QuickConnect™ software included
- Software-configurable safety limits
- Graph and log data in real-time
- Save and recall multiple instrument setups
- Auxilliary differential 14-bit A/D input
- Connect multiple USBKITs to one PC
- USB cable included
- Software customization available



## COMPUTERIZE THE WAVELENGTH ADVANTAGE

Expand the capabilities of your Wavelength controllers with the USBKIT and QuickConnect™ software. The USBKIT provides convenient computer control of most Wavelength chassis mount controllers and evaluation boards at a surprisingly low price.

The software provides an intuitive virtual control panel that allows you to leverage the low-noise, high-stability laser diode and temperature control capabilities of Wavelength's components to save time and money.

## BIG FEATURES IN A SMALL PACKAGE

- Multifunction I/O card includes D/As for remote setpoint control, and auxiliary A/Ds for monitoring actual temperature or current.
- Control one laser diode driver, one temperature controller, and configure the two to operate together and take advantage of the built-in laser safety features.
- Multiple USBKITs can be attached to the same computer, allowing for control of complex systems.
- Setup configurations can be saved for repeating experiments or manufacturing testing routines.
- The QuickConnect™ software includes on-screen wiring diagrams, making set-up a snap.
- Two strip charts graph laser and temperature data as a function of time. Selected data can be continuously logged.

## PLUG-IN CONVENIENCE FOR OEMS

OEMs can build the USBKIT into your laser system and enjoy the convenience of closed-cover system calibration.

## SPECIFICATIONS

USBKIT SPECIFICATIONS		VALUE				
A/D Resolution		13 or 14 bits				
D/A Resolution		12 bits				
Power Supply Voltage		USB Bus powered				
USB Interface		USB 2.0 Full-Speed				
Size		3.2 x 2.8 x 1.2 in				
QuickConnect™ SPECIFICATIONS						
Memory Requirement		256 MB				
.NET Framework		2.0 or higher				
Operating System		Windows 2000, XP, Vista, Windows 7 32-bit, English Versions				
USBKIT Features by Product	Remote Setpoint	Remote Enable	Actual Monitor 1	Actual Monitor 2	Limit Monitor	Limit Status
PTC-CH Family	X	X	X Sensor Temp			
PLD-CH Family	X	X	X Photodiode Current	X Laser Diode Current	X	X
PLDEVALPCB	X	X	X Photodiode Current	X Laser Diode Current	X	X
PLD10EV	X	X	X Photodiode Current	X Laser Diode Current	X	X

Other Wavelength products can be interfaced to the USBKIT. Contact the factory for details.

## ORDERING INFORMATION

PART NUMBER	DESCRIPTION
USBKIT	USB Interface for Laser Diode Drivers and Temperature Controllers



# Accessories

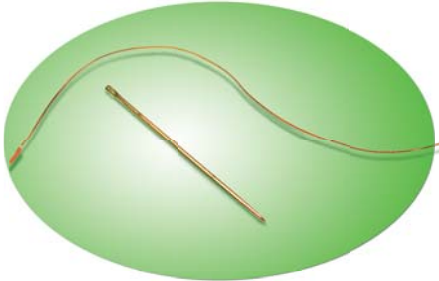
## Thermistors, Eval Boards, Power Supplies

### SPEED UP PROTOTYPING

At Wavelength Electronics we help high-tech OEMs and researchers to be successful by simplifying advanced laser diode and thermal control. One way we can do that is to provide a range of accessories to streamline your prototyping tasks.

On-line design tools further assist the design process by automating critical parameter calculations. Visit <http://www.teamwavelength.com/support/tools.asp> to get started. Detailed datasheets, App & Tech notes provide additional information.

### THERMISTORS



The TCS10K5 10 k $\Omega$  thermistor is a 1% cylindrical head option. 0.5 mm by 3 mm with 3-inch Teflon-coated leads.

The remaining thermistors are 1% bead head options — 5, 10, 20, 50 and 100 k $\Omega$ . 2 mm by 3 mm long with 3-inch Teflon-coated leads.

### EVALUATION BOARDS



### POWER SUPPLIES



These low profile AC/DC switching supplies provide 1% Noise & Ripple, short circuit protection, 1-3% line regulation (depending upon model), 0.04% temperature coefficient, and up to 85% efficiency.

### CABLING



### HEATSINKS & THERMAL MANAGEMENT



The Multi-Product Heat Sinks support many Wavelength Electronics products with excellent thermal conductivity during product evaluation. Also available in a High Power option for products with drive currents up to 10 A. Mounting hardware and thermal paste are included. Product specific heatsinks are also available.

### ONLINE DESIGN TOOLS

The **Safe Operating Area Calculators (SOA Calculators)** are used to ensure a thermally robust, reliable system using your input voltage, load size, and ambient temperature.

The **WTC3243 Circuit Calculator** calculates gain resistor values based on thermoelectric or resistive heater currents, PI loop configuration based on load type, and sensor gain and bias current.

The **WLD3343 Circuit Calculator** calculates the limit resistor, PD sense resistor, and LD sense resistor values based on laser diode current limit and operating mode.



# BEHIND THE SCENES AT WAVELENGTH ELECTRONICS



With twenty years experience designing and manufacturing laser electronics, we know what our customers need and expect from their OEM partners:

- Prompt, courteous, and knowledgeable customer service. That's what we deliver. We receive feedback like *"You set the customer service bar very high and I only wish our other vendors could follow your lead."*
- Our products meet or exceed published specifications. No surprises.
- On-time delivery in order to keep your research and production costs under control and on schedule. Our "Need-By Date" shipping performance is at 100% for 2011, and that's the norm for us.
- We help save you time and money. Since little things add up to big savings we stock cables, power supplies, and evaluation boards to make prototyping easier. We manufacture in the US, so once you're in production, we can make custom product enhancements at the factory to streamline your manufacturing processes.

**EXPERIENCE THE WAVELENGTH ELECTRONICS DIFFERENCE.**

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