Laser Diode Technologies Selection Guide

Pages 414-503

Laser/TEC Drivers Benchtop

Benchtop Laser Diode and TEC Controllers

- High-Performance Benchtop Laser Diode Controllers for 20mA to 65A
- TEC Drivers with 12W to 40W of Cooling Power
- Combination Laser Diode & TEC Controllers

See Pages 414-429

Laser/TEC Drivers Platforms

High Channel Count Laser Diode and TEC Controllers

- 19" Rack Mounted Modular Systems
- PRO8000 Series Features Plug-n-Play Functionality
- TXP5000 Series Features Internet Connectivity

See Pages 430-448

Laser/TEC OEM Drivers

OEM Laser Diode and TEC Controllers

- Board-Level High Performance, Full Feature Laser Diode and TEC Controllers
- Miniature Laser Diode Controllers, Constant Current and Constant Power Models

See Pages 449-457

Laser Mounts

Laser Mounts

- 5.6mm and 9mm Laboratory Style Laser Diode Mount With Built-In TEC Elements
- Butterfly Laser Diode Mounts With Support for External Modulation

See Pages 458-463

Laser Diodes

Laser Diodes

- 5.6mm, 9mm, and VSCEL Laser Diodes Covering the Wavelength Range of 635nm to 2.0µm
- Telecom Rated Laser Diodes

See Pages 464-489

Pigtailed Lasers

Pigtailed Lasers

- 980nm, 1310nm, and 1550nm Fiber Pigtailed Telecom Rated Laser Diodes
- Fiber Pigtailing of Customer Supplied Laser Diodes
- Fiber Pigtailing of Our Stock 5.6mm and 9mm Laser Diodes

See Pages 490-492

Laser Modules

Laser Modules

- Collimated Laser Diodes Assemblies, Including Drive Electronics and Optics
- Laser Alignment Kits Complete With Mount and Power Supply
- 635nm, 780nm, and 808nm Wavelengths

See Pages 493-494

Accessories

Accessories

- Laser Goggles and IR Viewing Cards
- Laser Diode Sockets
- Antistatic Guard Products
- Laser Diode Can Opener
- Temperature Sensors
- TEC Elements

See Pages 495-503

Laser Diode Controller Selection Guide

MODEL #	DRIVE CURRENT	COMPLIANCE VOLTAGE	LD/TEC	CC*	CP*	MODULATION	PACKAGE (UNITS/19" RACK)	CHANNELS /UNIT NO	PAGE
MLC8025-8	5mA / 25mA	4V		✔	✔		19" Chassis	8 / (8) PRO8000	437
MLC8050-8	10mA / 50mA	4V		✔	✔		19" Chassis	8 / (8) PRO8000	437
LDC200CV	20mA	6V		✔	✔	External	Benchtop		419
MLC8100-8	25mA / 100mA	4V		✔	✔		19" Chassis	8 / (8) PRO8000	437
MLC8200-8	50mA / 200mA	4V		✔	✔		19" Chassis	8 / (8) PRO8000	437
LDC201CU	100mA	5V		✔	✔	External	Benchtop		419
LDC8001	100mA	2.5V		✔	✔	External	19" Chassis	1 / (8) PRO8000	435
LD2000R	100mA	3.5V			✔	External	OEM		455
EK2000	100mA	3.5V			✔	External	OEM		455
LDC202C	200mA	10V		✔	✔	External	Benchtop		419
LDC8002	200mA	5V		✔	✔	External	19" Chassis	1 / (8) PRO8000	435
ITC8022	200mA	5V	✔	✔	✔		19" Chassis	1 / (8) PRO8000	441
ITC502	200mA	6V	✔	✔	✔	External	Benchtop		417
ITC5022	200mA	2.5V	✔	✔	✔	Int / Ext	19" Chassis	1 / (16) TXP5000	446
ITC102	200mA	4V	✔	✔	✔	External	OEM		453
IP250-BV	250mA	8V		✔	✔	External	OEM		454
LD1100	250mA	8V			✔		OEM		455
EK1101	250mA	8V			✔		OEM		455
EK1102	250mA	8V			✔		OEM		455
LD1255R	250mA	3.3V		✔		External	OEM		456
LDC205C	500mA	10V		✔	✔	External	Benchtop		419
LDC8005	500mA	5V		✔	✔	External	19" Chassis	1 / (8) PRO8000	435
ITC8052	500mA	5V	✔	✔	✔		19" Chassis	1 / (8) PRO8000	441
ITC5052	500mA	2.5V	✔	✔	✔	Int / Ext	19" Chassis	1 / (16) TXP5000	446
IP500	500mA	3V		✔	✔	External	OEM		454
LDC210C	1A	10V		✔	✔	External	Benchtop		419
LDC8010	1A	5V		✔	✔	External	19" Chassis	1 / (8) PRO8000	435
ITC8102	1A	5V	✔	✔	✔		19" Chassis	1 / (8) PRO8000	441
ITC510	1A	6V	✔	✔	✔	External	Benchtop		417
ITC5102	1A	2.5V	✔	✔	✔	Int / Ext	19" Chassis	1 / (16) TXP5000	446
ITC110	1A	4V	✔	✔	✔	External	OEM		453
LDC340-IEEE	1A/4A	6V		✔	✔	External	Benchtop		423
LDC220C	2A	4V		✔	✔	External	Benchtop		419
LDC8020	2A	5V		✔	✔	External	19" Chassis	1 / (8) PRO8000	435
LD3000R	2.5A	3.3V		✔		External	OEM		456
ITC133	3A	4V	✔	✔	✔	External	OEM		453
LDC240C	4A	5V		✔	✔	External	Benchtop		419
LDC8040	4A	5V		✔	✔	External	19" Chassis	1 / (8) PRO8000	435
LDC8080	8A	5V		✔	✔	External	19" Chassis	1 / (4) PRO8000	435
LDC3065-488	65A	5V		✔	✔	External	Benchtop		425

*CC = Constant Current, CP = Constant Power

Laser Diode Pigtailing

See Page 490

Temperature Controller Selection Guide

				Temperature Sensors								
MODEL #	DRIVE CURRENT	MAX TEC POWER	LD/ TEC	NTC TH	AD590 & 592 LM335	LM35	Pt100	KRYO	TUNE IN	PACKAGE	CHANNELS (19" RACK)	PAGE
TCM1000T	±1A	3W		✔						OEM		457
TTC001	±1A	4W			✔					T-Cube		420
ITC5022	±1.5A	5.25W	✔	✔					✔	19" Chassis	1(16)TXP5000	446
ITC5052	±1.5A	5.25W	✔	✔					✔	19" Chassis	1(16)TXP5000	446
ITC5102	±1.5A	5.25W	✔	✔					✔	19" Chassis	1(16)TXP5000	446
ITC102	±2A	12W	✔	✔	✔			Option	✔	OEM	1	453
ITC110	±2A	12W	✔	✔	✔			Option	✔	OEM	1	453
TED200C	±2A	12W		✔	✔				✔	Benchtop	1	427
ITC502	±2A	16W	✔	✔	✔				✔	Benchtop	1	417
TED8020	±2A	16W		✔	✔		Option	Option	✔	19" Chassis	1 (8) PRO8000	439
ITC8022	±2A	16W	✔	✔	✔					19" Chassis	1 (8) PRO8000	441
ITC8052	±2A	16W	✔	✔	✔					19" Chassis	1 (8) PRO8000	441
ITC8102	±2A	16W	✔	✔	✔					19" Chassis	1 (8) PRO8000	441
ITC133	±3A	18W	✔	✔	✔			Option	✔	OEM	1	453
ITC510	±4A	32W	✔	✔	✔				✔	Benchtop	1	417
TED8040	±4A	32W		✔	✔		Option	Option	✔	19" Chassis	1 (8) PRO8000	439
TED350	±5A	40W		✔	✔	✔	Option		✔	Benchtop	1	429
TED8080	±8A	64W		✔	✔		Option		✔	19" Chassis	1 (4) PRO8000	439

Selection Guide: Benchtop Laser/TEC Drivers

Pages 416-429

Combined Laser Diode and TEC Controller: ITC500 Series

- Same Advanced Features of Separate Laser and TEC Drivers
- ITC502 Offers 200mA of Laser Current and 16W of Power for TEC Control
- ITC510 Offers 1A of Laser Current and 32W of TEC Power
- Optional IEEE-488 Interface Available

See Pages 416-417

Benchtop Laser Diode Current Controllers: LDC200C Series

- Seven Easy-to-Operate Models
- Ideal for Powering Lasers With Drive Current Requirements Up to 4A

See Pages 418-420

4A Benchtop Laser Diode Current Controller: LDC340-IEEE

- Full-Feature Laser Diode Controller
- Precise, Low Noise, Current Source for Higher-Power Lasers
- IEEE-488 Interface Included

See Pages 422-423

65A Laser Diode Current Controller: LDC3065-488

- Operates in Both Constant Current and Constant Power Mode
- 65A of Drive Current
- IEEE-488 Interface Included

See Pages 424-425

TEC Controller – 2A/12W: TED200C

- 2A of TEC Drive Current
- Advanced PID Feedback Loop
- Millikelvin-Level Temperature Stabilization

See Pages 426-427

TEC Controller – 5A/40W of Cooling Power: TED350

- Designed for Larger, Temperature-Stabilizing Thermal Loads
- Advanced PID Circuit
- 40W of Cooling Power
- Optional IEEE-488 Interface Available

See Pages 428-429

Laser Diode and Temperature Controller – ITC500 Series

ITC500 Combination LD and TEC Controller
Laser Diode Current: ±200mA or ±1A
TEC Current: ±2A/16W or ±4A/32W
Optional IEEE-488 Interface

Highlights

- Combination Low-Noise Laser Diode/Temperature Controllers With Stability <0.002°C
- Laser Currents: ±200mA or ±1A
- TEC Current: ±2A/16W or ±4A/32W
- Constant Current and Constant Power Mode
- CDRH US21 & CFR 1040.10 Compliant
- Analog Modulation Input
- Set Temperature Can be Protected Against Accidental Adjustment
- Temperature Window Protection With Automatic Laser Current Deactivation
- Independent P, I, and D Controls
- Optional IEEE-488.2 Interface, With 18-Bit High Resolution Mode
- LabVIEW™ and LabWindows™/CVI Drivers
- CSA Approved and CE Certified

Introduction

The ITC500 Series low-noise laser diode current and TEC controllers offer both current control and temperature control in one unit. These instruments provide a maximum laser drive current range of ±200mA or ±1A, and a TEC drive current of up to ±2A/16W or ±4A/32W. To ensure the excellent noise performance, the ITC500 controllers do not utilize a microprocessor; however, this series retains all the easy-to-use features that are typical of a microprocessor-based user interface.

CONTROLLER USE

Instrument Configuration

A fixed configuration can be set via an 8-pin DIP switch at the rear of the unit. The preset configuration, which can be changed via the front panel during operation, is activated automatically when the unit is turned on.

Monitor Photodiode Adjustments

The monitor photodiode can be operated with a reverse bias voltage to improve the frequency response; this may be required when modulating the laser at high frequencies. The gain of the constant power mode control loop can also be adjusted to accommodate different laser diodes.

Calibrating the Power Display

The photodiode can be calibrated by adjusting the front panel trim potentiometer marked "ADJ PD." This feature allows it to read out the laser power in milliwatts. Please note an optical power meter is required to properly calibrate the power.

External Modulation

The laser diode can be modulated in constant current or constant power mode via an analog modulation input "MOD IN" located on the front panel. The maximum modulation frequency of the laser diode is 500kHz for the ITC502 and 200kHz for the ITC510.

FEATURES

User-Friendly Interface

The front panel is divided into two major sections: the temperature control section on the left and the current source section on the right. These operate independently of each other to enable easy and intuitive use of the instrument.

Extremely Low Noise

The ITC500 exhibits exceptionally low current noise and temperature drift, making this instrument one of the best-performing combination controllers available.

Intuitive Display

Laser current, laser voltage, monitor current, optical power, current limit, and reverse bias voltage for the monitor diode can all be viewed on the 5-digit LED display located on the right side of the instrument. The second LED display, located on the left side, can show the set temperature, actual temperature, TEC current, TEC voltage, TEC current limit, and the set temperature window.

Built-In Laser Diode Protection

The ITC500 has many common protection features, such as electronic short circuit of the laser diode while the output is switched off, soft start, transient suppression in case of mains failure, a suitable mains filter, and shielding of the transformer. In addition, it offers interlock, laser and TEC current limit, over temperature protection, temperature window protection, open circuit detection, and no sensor detection.

OPTIONAL INTERFACE

IEEE-488.2 Interface

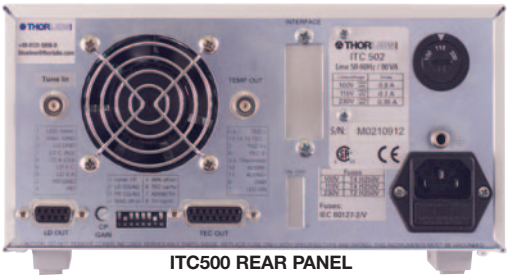
Each combination controller is offered with an optional IEEE-488.2 interface, which facilitates remote control and monitoring. The IEEE interface has the same functionality as the standard serial (RS-232) interface – an LED on the front panel indicates any communications or programming errors. The IEEE interface, however, offers enhanced speed and control capabilities, and can transfer data eight times faster. The RS-232 offers point-to-point control – one computer to one test instrument – but the IEEE interface allows up to 16 instruments to be integrated into one measurement and control system at the same time.

Laser Diode and Temperature Controller – ITC500 Series
Page 2 of 2

Laser Controller Specifications

	ITC502	ITC510
Laser Controller:		
Current Control		
Current Control Range	0 to ±200mA	0 to ±1A
Compliance Voltage	>6V	
Setting Resolution (IEEE-488)	10µA (3µA)	100µA (15µA)
Measurement Resolution (IEEE-488)	10µA (1µA)	100µA (10µA)
Current Accuracy	±100µA	±1mA
Noise Without Ripple (10Hz to 10MHz, RMS, Typical)	<1.5µA	<5 µA
Ripple (50Hz, RMS, Typical)	<1.5µA	<3µA
Transients, Typical	<200µA	<1mA
Drift (24 hrs, @ Constant Amb. Temp, Typ.)	<10µA	<30µA
Temperature Coefficient	<50ppm/ °C	
Power Control		
Control Range of Photocurrent	5µA to 2mA	
Setting Resolution (IEEE-488)	0.1µA (0.03µA)	
Measurement Resolution (IEEE-488)	0.1µA (0.01µA)	
Accuracy (Typical)	±2µA	
Reverse Bias Voltage	0 to 10V	
Current Limit		
Setting Range	0 to 200mA	0 to 1A
Resolution	10µA	100µA
Accuracy	±0.5mA	±2.5mA
Laser Voltage Measurement		
Measurement Principle	4-Wire	
Measurement Range	0 to 10V	
Resolution	1mV	
Accuracy	±20mV	
Analog Modulation		
Input Impedance	10kΩ	
Modulation Coefficient CC	20mA/V ±5%	100mA/V ±5%
3dB-Bandwidth at CC[1]	0 to 500kHz	200kHz
Modulation Coefficient CP	0.2mA/V ±5%	
Control Output for Laser Current		
Output Impedance	10kΩ	
Transmission Coefficient	50V/A ±5%	10V/A ±5%

1) Small signal bandwidth. 2) All data valid at 23 ± 5°C and 45 ± 15% relative humidity .



ITC500 REAR PANEL

Temperature Controller Specifications

	ITC502	ITC510
Temperature Controller:		
Control Range of TEC Current	0 to ±2A	0 to ±4A
Compliance Voltage	>8V	
Maximum Output Power	16W	32W
Resolution of TEC Current (IEEE-488)	1mA (0.1mA)	
Accuracy of TEC Current	± 10mA	± 20mA
Resolution of TEC Voltage (IEEE-488)	1mV (0.1mV)	
Accuracy of TEC Voltage	±40mV	
Noise and Ripple Typical	<1mA	<2mA
Temperature Sensors:		
Thermistor		
Control Ranges	10Ω - 19.9kΩ / 100Ω - 199kΩ	
Resolution (IEEE-488)	1Ω (0.3Ω) / 10Ω (3Ω)	
Accuracy	±5Ω / ±50Ω	
Stability (24hrs)	≤0.5Ω / ≤5Ω	
IC Sensors AD590, AD592, or LM335		
Control Ranges[1]	-45°C to +145°C	
Resolution (IEEE-488)	0.01°C (0.003°C)	
Accuracy (Not LM335)	± 0.1°C	
Stability (24hrs)	<0.002°C	

1) Limited by rating of sensors.

ITC500 Series General Data

- **Protection Features:** Soft Start, Interlock, Short Circuit When Off, Laser Current Limit, Over Temperature Protection, TEC Current Limit, Temperature Window Protection, Open Circuit Detection, No Sensor Detection
- **Displayed Laser Parameters:** Laser Current, Monitor Current, Laser Current Limit, Output Power, Laser Voltage, Photodiode Bias Voltage
- **Operating Temperature:** 0 – 40 °C
- **Displayed TEC Parameters:** Actual Temperature, Set Temperature, TEC Current Limit, TEC Current, Temperature Window, TEC Voltage
- **IEEE-488.2 Interface:** 16-Bit Setting and 18-Bit Measurement Resolution
- **Dimensions (W x H x D):** 220 x 110 x 351mm
- **Line Voltage:** 100V, 115V, 230V +15%/-10% @ 50-60Hz

ITEM	$	£	€	RMB	DESCRIPTION
ITC502	$ 1,860.00	£ 1,171.80	€ 1.729,80	¥ 17,763.00	LD and TEC Controller, LD 200mA, TEC 16W
ITC502-IEEE	$ 2,220.00	£ 1,398.60	€ 2.064,60	¥ 21,201.00	LD and TEC Controller, LD 200mA, TEC 16W, IEEE-488
ITC510	$ 1,980.00	£ 1,247.40	€ 1.841,40	¥ 18,909.00	LD and TEC Controller, LD 1A, TEC 32W
ITC510-IEEE	$ 2,340.00	£ 1,474.20	€ 2.176,20	¥ 22,347.00	LD and TEC Controller, LD 1A, TEC 32W, IEEE-488

Benchtop Drivers
Platform Drivers
OEM Drivers
Laser Diode Mounts
Laser Diodes
Pigtailed Lasers
Laser Modules
Accessories

LDC200C Series Benchtop Laser Diode Current Controllers

RoHS COMPLIANT

LDC200C Series
7 Models
20mA to 4A Controllers

Includes Power Cord and Mount Connection Cable (DB9)

Highlights

- 10V Compliance Voltage on LDC202C, LDC205C, and LDC210C for Blue Laser Diodes
- Extremely Low Noise (LDC201CU 0.2µA)
- 5-Digit Display With 10µA Resolution
- Analog Control Input and Output
- Reliable Laser Diode Protection
- Operates With All Polarities of Laser Diode and Photodiode
- Seven Models With Laser Current Ranges From 20mA to 4A

Introduction

The laser diode controllers in the LDC200C series all provide features that ensure outstanding performance. There are seven models with different current ranges, each configured to provide optimal performance for their particular application. Please refer to the Specifications and Selection Guide on the following page, and the Typical Applications Table on page 420 for an overview of the product range.

MODES

With the laser diode controllers of the LDC200C series, laser diodes can be driven in constant current (CC) or constant power (CP) mode. All laser diode and photodiode configuration types are supported. The laser diode is always driven with respect to ground. In comparison to driver designs that require a floating ground, this grounded operation of the laser diode offers advantages regarding noise, transient suppression, and stability.

Constant Current

In CC mode, the current to the laser is held precisely at the prescribed level. This mode is used when the lowest noise and highest response speed is required. Most applications in this mode require stabilizing the temperature as well; see pages 426-429 for our temperature controllers.

Applications

- Easy, Safe, and Low-Noise Operation of Laser Diodes
- Excellent Noise and Ripple Values
- Replacement of Battery-Operated Current Sources
- Low-Current VCSEL Driver
- High-Compliance Blue Laser Applications With LDC202C, LDC205C, or LDC210C

For More Application Ideas, See Page 420

Constant Power

In CP mode, the internal photodiode integrated into most laser diode packages is used to actively stabilize the laser's output power, which is adjusted by a feedback circuit. An adjustment of the full scale photodiode current in CP mode is provided in order to compensate for the differences in the photodiode currents between different laser diodes.

CONTROLLER USE

Intuitive User-Friendly Operation

Independent of the selected operating mode, the 5-digit LED display current, or laser limit, can show the laser current, the photodiode monitor current, or laser current limit. It can also display the optical power (in mW). The power readout can be calibrated to the responsivity of the monitor photodiode by adjusting a front panel trim potentiometer.

Benefits

In many applications, the aforementioned benefits eliminate the need for a separate optical power meter. Available for use at the rear of the unit are: a modulation input for laser current or power, and a control output proportional to the laser current.

PROTECTION FEATURES

Current Limit

A precisely adjustable current limit ensures that the maximum laser current cannot be exceeded. Thorlabs has intentionally provided limited access to this feature to prevent accidental adjustment. An attempt to increase the laser drive current above the pre-set limit will result in a visible and short audible indicator. Even when utilizing the external modulation feature, the current limit set-point cannot be exceeded.

Current Source

If the connection between the current source and laser diode is interrupted, the current source automatically switches off the current output. The open current circuit condition is indicated by the LED "OPEN" and a short acoustic warning. The separate laser ON key switches the laser current on and off. When switched off, an electronic switch within the LDC200C short circuits the laser diode for added protection. After being switched on, a soft start ensures a slow increase of the laser current without voltage peaks. Even in the case of line failure, the laser current remains transient-free. Voltage peaks on the AC line are effectively suppressed by electrical filters, shielding of the transformer, and careful grounding of the chassis.

LDC200C Series – Page 2 of 3

See Page 464 Expanded Selection of Laser Diodes

ITEM	$	£	€	RMB	DESCRIPTION
LDC200CV	$ 998.00	£ 628.70	€ 928,10	¥ 9,530.90	VCSEL Laser Diode Controller 20mA
LDC201CU	$ 998.00	£ 628.70	€ 928,10	¥ 9,530.90	Laser Diode Controller 100mA Ultra Low Noise
LDC202C	$ 950.00	£ 598.50	€ 883,50	¥ 9,072.50	Laser Diode Controller 200mA
LDC205C	$ 950.00	£ 598.50	€ 883,50	¥ 9,072.50	Laser Diode Controller 500mA
LDC210C	$ 998.00	£ 628.70	€ 928,10	¥ 9,530.90	Laser Diode Controller 1A
LDC220C	$ 1,100.00	£ 693.00	€ 1.023,00	¥ 10,505.00	Laser Diode Controller 2A
LDC240C	$ 1,195.00	£ 752.90	€ 1.111,40	¥ 11,412.30	Laser Diode Controller 4A
CAB400	$ 66.00	£ 41.60	€ 61,40	¥ 630.30	LDC200C Series to LD Mount, 9-Pin D-Sub Connector

Laser Diode Controllers Specifications and Selection Guide

Model Number	LDC200CV	LDC201CU	LDC202C	LDC205C	LDC210C	LDC220C	LDC240C
Current Control Control Range (Continuous)	0 to ±20mA	0 to ±100mA	0 to ±200mA	0 to ±500mA	0 to ±1A	0 to ±2A	0 to ±4A
Compliance Voltage	>6V	>5V	>10V	>10V	>10V	>4V	>5V
Resolution	1.0µA	10µA	10µA	100µA	100µA	100µA	100µA
Accuracy (Full Scale)	±20µA	±50µA	±100µA	±0.5mA	±1.0mA	±2.0mA	±4.0mA
Noise Without Ripple (10Hz to 10MHz, rms, Typ.)	<1.0µA	<0.2µA	<1.5µA	< 3µA	<5µA	<15µA	<50µA
Ripple (50/60Hz, rms, Typ.)	<0.5µA	<0.5µA	<1.5µA	< 2µA	<3µA	<5µA	<8µA
Transients (Typical)	<10µA	<10µA	<0.2mA	< 0.5mA	<1mA	<2mA	<4mA
Drift, 24 hours (Typ., 0-10Hz, at Constant ambient temperature)	<1µA	<2µA	<3µA	<10µA	<20µA	<100µA	<200µA
Temperature Coefficient	<50ppm/°C						
Current Limit (ACC Mode) Setting Range (20-Turn Trim Pot)	0 to ≥20mA	0 to ≥100mA	0 to ≥200 mA	0 to ≥500mA	0 to ≥1A	0 to ≥2A	0 to ≥4A
Resolution	1µA	10µA	10µA	100µA	100µA	100µA	100µA
Accuracy	±50µA	±200µA	±500µA	±1.5mA	±2.5mA	±5mA	±10mA
Power Control (APC Mode) Photocurrent Control Range	5µA to 2mA						10µA to 5mA
Photocurrent Resolution	0.1µA						
Photocurrent Accuracy	±2µA						±5µA
Analog Modulation Input Input resistance	10kΩ						
3dB-bandwidth, CC[1]	DC-100kHz	DC-200kHz	DC-250kHz	DC-150kHz	DC-100kHz	DC-50kHz	DC-30kHz
Modulation Coefficient, CC	2mA/V±5%	10mA/V±5%	20mA/V±5%	50mA/V±5%	100mA/V±5%	200mA/V±5%	400mA/V±5%
Modulation Coefficient, CP	0.2 mA/V ±5%						0.5 mA/V ±5%
General Data							
Safety Features	Soft Start, Interlock, Short Circuit When Laser is Off, Laser Current Limit, Open Circuit Detection						
Display	LED, 5 Digits						
Connectors, Back Panel	9-pin D-Sub (F) for Laser, BNC for Modulation, and BNC for Laser Monitor						
Operating Temperature	0 to +40°C						
Line Voltage/Frequency	100V, 115V, 230V, +15%/–10% and 50 to 60Hz						
Warm Up Time	10 Minutes						
Storage Temperature	– 40 to +70°C						
Dimensions	146mm x 66mm x 290mm (W x H x D, Box Only, No Knobs or Feet)						
Weight	<3.1kg						<3.3kg

1) Small signal bandwidth
2) All data valid at 23 ± 5°C and 45 ± 15% relative humidity

All LDC200C Series Controllers are Certified, CSA Approved, and RoHS Compliant

LDC200C Series Application Information – Page 3 of 3

Typical Applications	LDC200CV	LDC201CU	LDC202C	LDC205C	LDC210C	LDC220C	LDC240C
Low Current VCSEL	✔						
Low Power Lasers	✔	✔	✔				
Medium Power Lasers			✔	✔	✔		
Higher Power Lasers					✔	✔	✔
Blue Lasers–High Compliance Voltage			✔	✔	✔		
Low Noise Operation	✔	✔	✔	✔	✔	✔	✔
Ultra Low Noise Operation		✔					

T-CUBE™ apt™ TEC Controller

RoHS COMPLIANT

TTC001

The TTC001 T-Cube TEC Controller is designed for high-precision thermal control of small temperature sensitive components. It is designed to drive an external Peltier effect thermoelectric heater/cooler coupled to a standard thermistor or IC sensor. The highly precise, closed-loop control is suitable for many applications.

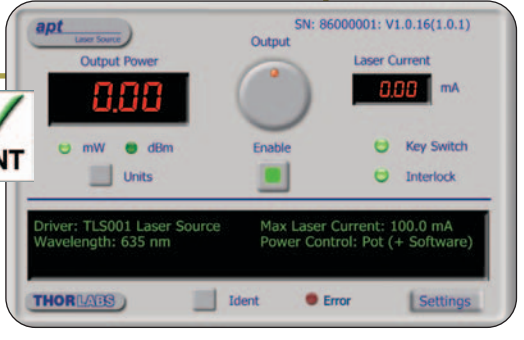
The various parameters, such as temperature set point, current limit, temperature sensor type, and PID parameters, are adjustable from the front panel interface for quick and easy local control. The unit can be interfaced to a PC using a USB cable and all of the parameters can be set using the included software. The unit is equipped with a 5-digit, 7-segment illuminated display. The user-selectable display modes can be set to show actual temperature, set point temperature, TEC current, and TEC current limit. The bipolar output stage allows both cooling and heating with currents up to 1A. The TEC T-Cube is compatible with the LM14S2 and TCLDM9 laser mounts in addition to the Thorlabs' TEC3-2.5 – TH10K combination (TEC element – thermistor respectively). This powerful and versatile unit can also be used to drive inexpensive resistive heaters.

The TTC001 may be mounted directly onto an optical table and operated as a stand-alone unit requiring Thorlabs' compact power supply (TPS101), a 5V 500mA power supply. Alternately, the TEC controller could be connected using our T-Cube Controller Hub (TCH002), which provides power and USB connectivity for up to 6 T-Cube devices. Included with the unit is very user-friendly apt™ software, which allows quick setup and control of the TTC001 and is the same software used to control all of our other T-Cube products. Advanced custom control sequences are also possible using the extensive ActiveX programming environment.

Features

- Highly Compact T-Cube Footprint
- ±1Amp/4W TEC Output
- Microcontroller-Based PID Temperature Control
- 5-Digit LED Display
- Display Modes Include Temperature and TEC Current
- Temperature and Current Limit Set Points
- Compatible With Thermistor, AD590, and AD592 Sensors
- Remote Control via USB
- Local Control via Buttons and Adjustment Pot
- Monitor Output Connection
- Analog Control Input Connection

RoHS COMPLIANT

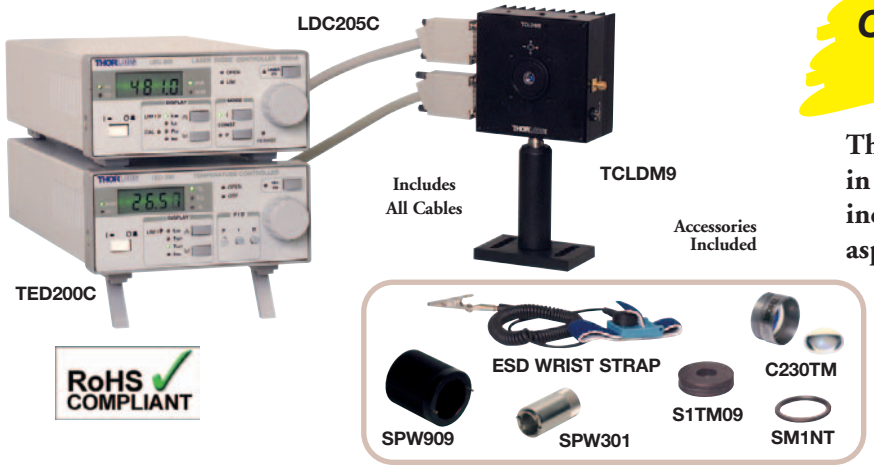


Specifications

- **Current Measurement Range:** 100nA to 10mA
- **TEC Output:** -1A to 1A
- **Compliance Voltage:** 4V
- **Max Output Power:** 4W
- **TEC Connection:** 15-pin D-Sub
- **Thermistor Specs:** 20K/200kΩ
- **IC Sensor Specs:** AD590, AD592
- **Control Input:** 0-5V SMA
- **Power Supply:** 5VDC

ITEM	$	£	€	RMB	DESCRIPTION
TTC001	$ 637.00	£ 401.30	€ 592,40	¥ 6,083.40	T-Cube TEC Controller

Laser/Temperature Control System



RoHS COMPLIANT

Buy the Complete Kit and Save 10%

The complete system is shown in the photograph and includes the diffraction-limited aspheric collimation optic.

Our popular LDC205C Laser Diode Controller, TED200C Temperature Controller, and TCLDM9 TEC-cooled laser diode mount are now available in a bundled package, complete with all necessary cables to connect both controllers to the mount, plus all accessories shown above. When purchased together, you will save 10% over the cost of buying each product separately!

This package is a versatile and easy-to-use laser diode operating system. The 500mA LDC205C has been a favorite laser controller of ours for years, offering precise control of a laser diode's power in either a constant current mode or constant power mode. The new "C" version offers a higher compliance voltage. The 12W TED200C has been our mainstay temperature controller, providing current and stability to the two TEC elements incorporated into our TCLDM9 mount.

For more detailed specifications, see pages 418-420 for the LDC205C, page 426 for the TED200C, and page 461 for the TCLDM9, or visit www.thorlabs.com.

A wide selection of 5.6mm and 9mm laser diodes is available starting on page 464. Both sizes are compatible with our TCLDM9 mount.

TED200C Highlights

- ±2A/12W Low Noise TEC Output
- Temperature Stability <0.002°C
- Compatible With All Common Sensors (Thermistor, AD590/AD592/LM335)
- Wide Temperature Range From -45°C to +145°C (IC-sensor) or 10kΩ to 200kΩ (Thermistor)
- Separate Control of the P-, I-, and D-Gains for Perfect Adaptation to the Thermal Load
- 5-Digit Display With a Resolution of 0.01°C (IC-Sensor) or 1Ω (Thermistor)
- Analog Control via the TUNE IN Input

Specifications for LTC100-B

- LDC205C Laser Diode Controller, See Page 418
- TED200C Temperature Controller, See Page 426
- TCLDM9 TEC-Cooled LD Mount, See Page 461
- Includes All Necessary Cables
- Accessories Include: SM1NT, SPW909, S1TM09, SPW301, ESD Wrist Strap, Post, Post Holder, and Base
- C230TM-B, AR Coated 600-1050nm Lens

Specifications for LTC100-C

- LDC205C Laser Diode Controller, See Page 418
- TED200C Temperature Controller, See Page 426
- TCLDM9 TEC-Cooled LD Mount, See Page 461
- Includes All Necessary Cables
- Accessories Include: SM1NT, SPW909, S1TM09, SPW301, ESD Wrist Strap, Post, Post Holder, and Base
- C230TM-C, AR Coated 1050-1600nm Lens

LDC205C Highlights

- Low Noise
- Five-Digit Display With 100µA Resolution
- Analog Control Input and Analog Monitor Output
- Reliable Laser Diode Protection
- Operates With All Polarities of Laser Diode and Photodiode
- Maximum Laser Current: ±500mA
- Compliance Voltage >10V
- Drift (24hrs 0-10Hz typ.) <10µA
- Accuracy ±100µA

Laser Diode Pigtailing

See Page 492

ITEM	$	£	€	RMB	DESCRIPTION
LTC100-B	$ 2,285.00	£ 1,439.60	€ 2.125,10	¥ 21,821.80	LD/Temp. Control System, 600-1050nm AR-Coated Optic
LTC100-C	$ 2,285.00	£ 1,439.60	€ 2.125,10	¥ 21,821.80	LD/Temp. Control System, 1050-1600nm AR-Coated Optic

4A Laser Diode Controller and Optional IEEE-488...Page 1 of 2

Includes Power Cord and Mount Connection Cable (DB9)

LDC340
Switchable Current Range
1A or 4A of Drive Current

Includes All Cables

Introduction

The LDC340 Laser Diode Current Controller has been designed to provide precise, low-noise current for driving high-power laser diodes with injection currents of up to 4A. It is a stand-alone, laboratory-style instrument with an easy-to-use front panel and an optional IEEE 488.2 interface for remote operation. The LDC340 handles all laser diode and monitor diode pin configurations. When the LDC340 is used in combination with the TED350 temperature controller, a temperature window can be set to switch off the laser drive current if the laser temperature falls outside the prescribed upper/lower limits. This feature also prevents accidental powering of lasers without first enabling the temperature controller.

OPERATION

Current Ranges

This controller can be configured to provide either 1A or 4A of drive current. Both ranges provide a highly stable performance and exceptionally low noise. The laser current is precisely set via a 10-turn front panel control knob or via the optional IEEE-488 interface. Depending on the selected current range, one turn of the front panel current "Adjust" corresponds to 0.1A when operating in the 1A range, or 0.4A for the 4A range.

LDC340 Applications

- Precision Current Source for Laser Diodes
- Safe Operation of Up to 4A Laser Current
- Low-Noise/High-Stability Output
- Analog Modulation Up to 50kHz (3dB Points)

User-Friendly Controls

All operating and displaying elements on the front panel are logically grouped together to provide easy and intuitive operation without being confused by multi-function keys. The 5-digit LED display shows all important parameters.

External Analog Modulation

The analog control input "MOD IN" located on the front panel enables the modulation of the laser diode in constant current mode as well as in constant power mode.

For monitoring purposes, an output voltage proportional to the laser current is provided at the ANALOG OUT jack, also located on the front panel.

FEATURES

Monitor Photodiode Dual Input

The LDC340 provides two independent monitor photodiode inputs. The two separate photodiode inputs allow the system to operate as a complete laser diode test station by implementing a second external calibrated photodiode to replace an optical power meter.

The main photodiode is connected through the rear panel DB9 connector.

The second photodiode can be connected to the auxiliary photodiode BNC input with the readings available through the LDC340. The main photodiode input is switchable to allow for different responsivities of the monitor photodiode. In switch position 1, the maximum photodiode current is 2mA; in switch position 2, the maximum is 10mA. Additionally, the main photodiode input allows for applying a bias voltage to the photodiode to improve the linearity. The auxiliary photodiode provides a fixed input current range of 50µA to 2mA.

Monitor Photodiode Calibration

The main photodiode can be calibrated via a front panel trim potentiometer to enable a calibrated front panel display of the laser diode power in milliwatts. Additionally, the potentiometer labeled "CP GAIN" at the rear of the unit may be used to adjust the gain of the constant power mode control loop. This allows the servo circuit that stabilizes the laser power to be adjusted for optimal performance.

Highlights

- Current Ranges for Accurate Control of a Variety of Laser Diodes
- Constant Current and Constant Power Mode
- Supports All Laser Diode Pin Configurations
- Setting of Laser Current and Laser Power With the Output Switched Off (PRESET)
- Analog Modulation Input and Analog Control Output for the Laser Current
- Optional IEEE-488.2 Interface With 18-Bit Hi-Res Mode
- Free Instrument Drivers for LabVIEW™, LabWindows™/CVI
- CSA Approved and CE Certified

4A Laser Diode Controller and Optional IEEE-488...Page 2 of 2

Specifications

- **Laser Diode Current Control:** 0 to ±1A and 0 to ±4A
- **Setting Resolution:** 1mA (-70µA with IEEE-488)
- **Measurement Resolution:** 1mA (15µA with IEEE-488)
- **Laser Diode Current Accuracy:** ±4mA
- **Noise (10Hz-10MHz, RMS), Typ.:** <30µA
- **Ripple (50/60Hz, RMS), Typ.:** <6µA
- **Transients, Typ.:** <4mA
- **Drift (24 hrs, 0-10 Hz), Typical:** <300µA
- **Temperature:** <50ppm/°C
- **Compliance Voltage:** >6V

Laser Diode Power Control

- **Photocurrent Control Range:** 50µA to 2mA and 10mA (2 Ranges)
- **Setting Resolution:** 0.1µA and 1µA (0.03µA and 0.3µA with IEEE-488)
- **Measurement Resolution:** 0.1µA and 1µA (0.01µA and 0.1µA with IEEE-488)
- **Accuracy:** ±2µA and ±20µA
- **Reverse Bias Voltage Photodiode:** 0 to 10V

Laser Diode Current Limit

- **Setting Range:** 0 to ≥4A
- **Resolution:** 1mA
- **Accuracy:** ±10mA

Modulation, Analog Control

- **Input resistance:** 10kΩ
- **Modulation Coefficient, CC:** 400mA/V ±5%
- **Small Signal 3dB-Bandwidth, CC:** DC to 50kHz
- **Modulation Coefficient, CP:**
  0.2mA/V ±5% for 1A Operation
  2mA/V ±5% for 4A Operation

Control Output for Laser Current

- **Load Resistance:** 10kΩ
- **Transmission Coefficient:** 2.5V/A ±5%

Laser Voltage Measurement

- **Measurement Principle:** 4-Wire
- **Range:** 0 to 10V
- **Resolution:** 1mV (100µV With IEEE-488)
- **Accuracy:** ±10mV

Photodiode Current Limit

- **Setting Range:** 0 to ≥2mA and ≥10mA
- **Resolution:** 0.1µA and 1µA
- **Accuracy:** ±20µA and ±200µA

All data valid at 23 ± 5°C and 45 ±15% relative humidity

General Data

- **Protection Features:** Soft Start, Interlock, Short Circuit When Off, Laser Current Limit, Laser Power Limit, Over Temperature Protection, Temperature Window Protection (With TED350), Open Circuit Detection
- **Displayed Laser Parameters:** Laser Current, Monitor Current (Internal and External), Laser Current Limit, Monitor Current Limit, Output Power, Laser Voltage, Photodiode Bias Voltage
- **IEEE-488.2 Interface:** 16-Bit Setting and 18-Bit Measurement Resolution
- **Weight:** <7kg
- **Dimensions (W x H x D):** 220 x 110 x 351mm
- **Line Voltage:** 100V, 115V, 230V +15%/–10%
- **Line Frequency:** 50 to 60Hz
- **Maximum Power Consumption:** 125VA
- **Operating Temperature:** 0 to +40°C
- **Storage Temperature:** -40 to +70°C

The photodiode signal is also used to limit the maximum output power of the laser. When operating in either mode – constant current or constant power – the front panel PMON trim-pot can be set to limit the control loop to a maximum photocurrent of the monitor diode. This ensures that the output power of the laser stays within safe limits. Operating the controller with the IEEE-488 interface improves the resolution of many of the measurement parameters; the affected parameters are indicated in the specification tables.

PROTECTION FEATURES

Adjustable Current Limit

Independent of the operation mode, a precisely adjustable current limit ensures that the maximum allowed laser current cannot be exceeded. This limit is set via a recessed potentiometer on the front panel to prevent accidental adjustment of the current limit. An attempt to increase the laser drive current above the pre-set limit will result in a visible (LED "LIMIT") and short audible indicator, even when using the external modulation feature.

Pre-Set Temperature Window

When used with a TED350, the temperature window protection switches off the laser current if the actual laser temperature leaves the pre-set temperature window. If the connection between current source and laser diode is interrupted, the current source automatically switches off the current output and the "LD OPEN" indicator on the front panel illuminates, signifying an open circuit.

Other

The system power is controlled via a front panel key switch. When switched off, an electronic switch within the LDC340 short circuits the laser diode for added protection. After being switched on, a soft-start circuit ensures a slow increase of the laser current without voltage peaks – even in the case of an AC power interruption, the laser current remains transient free. Voltage peaks on the AC line are effectively suppressed by electrical filters, shielding of the transformer, and careful grounding of the chassis. The LDC340 meets the international requirements regarding laser protection (e.g. CDRH US21 & CFR 1040.10). It also includes a key-operated power switch and an interlock.

ITEM	$	£	€	RMB	DESCRIPTION
LDC340-IEEE	$ 1,990.00	£ 1,253.70	€ 1.850,70	¥ 19,004.50	Bipolar Laser Diode Controller 1A/4 A With IEEE-488.2

High-Power (65A) Laser Diode Controller...Page 1 of 2

LDC3065-488
Includes All Cables

LDC3065-488
Switchable Current Range
30A or 65A of Drive Current

LDC3065 Features

- 65A Drive Constant Current/Constant Power Operation
- Modulation Up to 6kHz (Small Signal Modulations)
- Quasi-CW Mode With Pulse Durations Down to 100µs
- Photodiode or Thermopile Input With Programmable Responsivity
- IEEE-488 Interface and Application Software Included
- LabVIEW™ VIs & LabWindows™ CVI Measurement Studio Included

Introduction

The LDC3065-488 current source for high-power laser diodes, laser arrays, and laser stacks provides the flexibility of two current ranges to enable precise operation of numerous diode lasers. The laser is always driven anode grounded. A maximum CW output current of 65A allows operation of two high-power laser diodes in series, if properly isolated. Proven protection features maximize laser lifetime.

OPERATION

Two Current Ranges

The laser current can be precisely set via a 10-turn front panel control knob or via the IEEE-488 interface. Depending on the selected current range, one turn of the potentiometer corresponds to 3A or 6.5A.

Constant Power Mode With External Photodiode

The LDC3065-488 can be operated in constant current as well as in constant power mode. The optical power can be kept constant via an external monitor diode. It is also possible to control the output power via an external input.

Modulation and QCW Mode

The laser current can be modulated up to 6kHz via the modulation input. With short connection cables, the current can reach rise and fall times below 50µs. For "zero-load experiments," the LDC3065-488 can also be used in quasi-CW (QCW) mode with the pulse durations down to 100µs. The TTL control signal is connected via a BNC jack at the rear of the unit.

PROTECTION FEATURES

Current Limit

A precisely adjustable current limit ensures that the maximum allowed laser current cannot be exceeded, even when utilizing the external modulation feature. We have intentionally provided limited access to this feature to prevent accidental adjustment of the current limit. An attempt to increase the laser drive current above the pre-set limit will result in a visible and audible indicator.

Current Source

If the connection between current source and laser diode is interrupted, the current source automatically switches the current output off and the LD OPEN indicator illuminates, signaling an open circuit fault. The separate key ON switches the laser current on and off. When switched off, an electronic switch within the LDC3065-488 short circuits the laser diode for added protection.

Other

A soft start circuit ensures a slow increase of the laser current without voltage peaks. Even in the case of an AC power interruption, the laser current remains transient-free. Voltage peaks on the AC line are effectively suppressed by electrical filters, by multiple stage regulation, and by careful grounding of the chassis.

The LDC3065 IEEE-488 meets the international requirements regarding laser protection (i.e. CDRH US21 CFR 1040.10). It includes a key-operated power switch, an interlock, and a delay of the output current, in additon to many other features.

An emergency shut-down switch on the front panel of the LDC3065-488 enables the user to switch off the laser quickly.

To monitor the laser current, an analog output is provided.

STANDARD INTERFACE

IEEE-488.2 Interface

The IEEE-488.2 interface provides remote programming and readout, allowing the LDC3065-488 to be used for automatic characterization of high-power diode lasers.

All instrument functions accessible from the front panel are also accessible through the interface bus, and all commands are based on an easy-to-use syntax. Remote HPC application software and LabVIEW™ drivers are included.

Rear Panel

High Power (65A) Laser Diode Controller...Page 2 of 2

Specifications

- **Laser Diode Current Control:** 30A and 65A
- **Setting Resolution:** 10mA
- **Measurement Resolution:** 10mA
- **Laser Diode Current Accuracy:** ±100mA
- **Noise (10Hz-10MHz, RMS), typ.:** ±100mA
- **Transients, Typ:** <500mA
- **Drift (30 min, 0-10 Hz), typical:** <20mA
- **Temperature Coefficient:** <50ppm/°C
- **Compliance Voltage:** >5V

Laser Diode Power Control

- **Photocurrent Control Range:** 50µA to 20mA
- **Setting Resolution:** 0.1mA
- **Measurement Resolution:** 0.1mA
- **Accuracy:** ±0.5%

Laser Diode Current Limit

- **Setting Range:** 0 to 65A
- **Resolution:** 10mA
- **Accuracy:** ±300mA

Modulation, Analog Control

- **Input resistance:** 10kΩ
- **Modulation Coefficient, CC:** 6.5A/V
- **3dB-Bandwidth, CC:** DC to 6kHz

Control Output for Laser Current

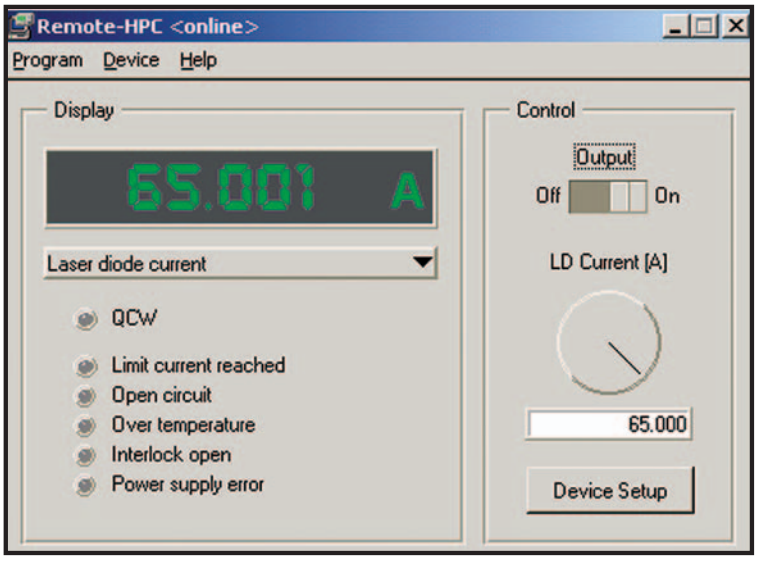
- **Load Resistance:** ≥100kΩ
- **Transmission Coefficient:** 1.5V/A ±5%

Laser Voltage Measurement

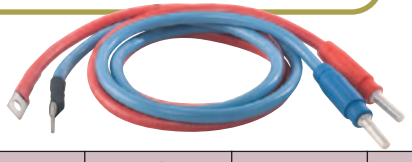
- **Measurement Principle:** 4-Wire
- **Range:** 0 to 5V
- **Resolution:** 1mV
- **Accuracy:** ±10mV

General Data

- **Protection Features:** Soft start, Interlock, Short Circuit when off, Laser Current Limit, Over Temperature Protection, Open Circuit Detection
- **Displayed Laser Parameters:** Laser Current, Monitor Current, Laser Current Limit, Output Power, Laser Voltage, Current Slope
- **IEEE-488.2 Interface:** 16-Bit Setting 18-Bit Measurement Resolution
- **Weight:** <10kg
- **Dimensions (W x H x D):** 220 x 132 x 351mm
- **Line Voltage:** 100–230V ±10%
- **Line Frequency:** 50 – 60Hz
- **Maximum Power Consumption:** 720VA
- **Operating Temperature:** 0 to +40°C
- **Storage Temperature:** -10 to +70°C



Remote HPC is a Windows-based application allowing control of the LDC3065-488 over the IEEE-488 interface. *Remote HPC* is included with each unit, as are a selection of LabVIEW™ drivers.



All Systems Come Complete With Cables

ITEM	$	£	€	RMB	DESCRIPTION
LDC3065-488	$ 3,980.00	£ 2,507.40	€ 3.701,40	¥ 38,009.00	High-Power Laser Diode Driver 65A With IEEE-488.2

Benchtop Drivers
Platform Drivers
OEM Drivers
Laser Diode Mounts
Laser Diodes
Pigtailed Lasers
Laser Modules
Accessories

Temperature Controller, 2A/12W...Page 1 of 2

TED200C

Includes power cord and cable for connection to our mounts with DB9 interface

RoHS COMPLIANT

TED200C
Highly Stable Low Noise ±2A Thermoelectric Temperature Controller

Why temperature control a laser diode?
The characteristics and the efficiency of a laser diode strongly depend on the temperature of the laser chip. For example, in the case of a typical GaAlAs diode, the wavelength increases by about 0.25nm for every 1°C increase in temperature. With a single mode laser diode, this change in wavelength can result in undesirable mode hopping, which results in both frequency and intensity noise. Output power is proportional to laser temperature; therefore, fluctuating temperature can lead to premature failure of the laser if it is running near its maximum power.

Introduction

The TED200C is a precision temperature controller designed to drive thermoelectric cooler (TEC) elements with up to ±2A of current. It is equipped with a PID feedback circuit. This independent control of the P (proportional) gain, the I (integral) offset control, and the D (differential) rate control allows the user to adjust theTED200C to obtain the optimal performance for a wide variety of thermal loads. The temperature set point can be set either by adjusting the large front panel control knob or by inputting a control signal into the analog input connector at the rear of the unit. This feature is useful when setting up a control loop for locking the wavelength of the laser diode by adjusting the temperature of the laser.

Applications

- Stabilization of Laser Diodes for Interferometry and Spectroscopy
- Cooling of Detectors for Noise Reduction
- Temperature Stabilization of Nonlinear Crystals and Industrial Systems

Highlights

- ±2A/12W Low Noise TEC Output
- Temperature Stability ≤0.002 °C
- Can Be Operated With All Common Sensors (thermistor, AD590/AD592/LM335)
- Wide Temperature Range From - 45°C to + 145°C (IC-sensor) or 10Ω to 200 kΩ (thermistor)
- Separate Control of the P, I, and D Gains for Perfect Adaptation to the Thermal Load
- 7-Digit Display With a Resolution of 0.01°C (IC-sensor) or 1Ω (thermistor)
- Analog Control Via the TUNE IN Input
- CSA Approved and CE Certified

FEATURES

Temperature Display/Set Point

The illuminated 7-digit LCD display can show the set temperature, the actual temperature, the heating or cooling current, and the current limit for the TE cooler. The temperature is displayed with a resolution of 0.01°C when used with an AD590 temperature sensor and either 1Ω (when using the 0-20kΩ range) or 10Ω (when using the 0-200kΩ range) when used as a thermistor.

The temperature set point can be designated either by adjusting the large front panel control knob or by inserting a control signal into the analog input connector at the rear of the unit. This feature is useful when setting up a control loop for locking the wavelength of the laser diode by adjusting the temperature of the laser.

TEC Protection

The TED200C is designed for maximum protection of the TEC element. An adjustable TEC output current limit, which can be set anywhere within the controller's range, prevents the controller from overdriving. When the controller is enabled, an LED indicator signals that the driver is activated.

OPERATION

Adaptability to Different Thermal Loads

The TED200C can easily be adapted to different thermal loads. For example, with optimum PID adjustment, the settling time for a temperature change from 30°C to 20°C is less than two seconds for a laser in a butterfly package (mounted in our LM14S2 laser diode mount). The PID controls are located on the front panel for easy access when optimizing the response. The proportional gain optimizes the response time of the feedback loop while the integral gain provides precise zero-offset regulation. The derivative gain optimizes the dynamic response of the feedback loop to account for rapid changes in the thermal load.

Fault Indication

For safe and continuous operation at ambient temperatures up to 40°C, the TED200C is equipped with a cooling fan and over-temperature protection. The system detects incorrect or missing temperature sensors and connection problems between sensor and controller. In these cases, the output gets switched off and an LED

Temperature Controller, 2A/12W...Page 2 of 2

fault indicator is lit. All LED faults are accompanied by a short audible warning signal.

Temperature Monitor Output

For monitoring, the TED200C provides an output voltage signal that is proportional to the actual temperature being measured. The signal is accessed via a BNC connector located on the back panel. This feature allows the long-term recording of the temperature of a device.

RELATED ITEMS

Supported Temperature Sensors

The TED200C temperature controller utilizes common temperature sensors. A rear panel selector switch allows the use of thermistors up to 200kW, or the use of a temperature-sensing IC. Compatible IC types are AD590, AD592, LM135, and LM335.

When a thermistor is selected, the temperature is displayed as the resistance value of the thermistor with a control range from 10W to 200kW.

When an AD590, an AD592, or an LM335 is selected, the temperature is displayed directly in °C, with a resolution of 0.01°C. The temperature control range of the controller is from -40°C to +150°C when any of the IC sensors are used.

Companion Products

The LDC200C family of Laser Diode Controllers are ideal companions for the TED200C. When combined with our laser mounts that contain TEC elements, the TED200C is capable of achieving 1mK stability. This temperature stability when combined with our low noise laser diode controllers, provides the precision needed for demanding applications such as diode laser wavelength tuning and atomic absorption cell spectroscopy. See pages 416 through 425 for our selection of laser drivers, and pages 460 to 461 for our selection of TEC laser mounts. Please call Thorlabs or visit our web site for more information.

CAB420-15 TED200C Interface Cable

All of our benchtop temperature controllers come with the necessary cable for connecting to our laser diode mounts w/DB9 interface. We also have a full line of additional cables or replacement cables from which to choose.

See Page 893

ITEM	$	£	€	RMB	DESCRIPTION
CAB420-15	$ 72.00	£ 45.40	€ 67,00	¥ 687.60	TED200 to LD Mount

Specifications

TEC Output

- **Control Range of TEC Current:** –2A to +2A
- **Compliance Voltage:** >6V
- **Maximum Output Power:** 12W
- **Measurement Resolution TEC Current:** 1mA
- **Measurement Accuracy TEC Current:** ±10mA
- **Noise and Ripple (Typ.):** <1mA

Temperature Sensors Thermistor

- **Control Ranges (Switchable):** 10Ω to 19.99kΩ, 100Ω to 199.9kΩ
- **Resolution:** 1Ω and 10Ω
- **Accuracy:** ±10Ω and 100Ω
- **Stability:** <0.5Ω and 5Ω

IC-Sensors (AD590/AD592, LM135/LM335)

- **Control Range:** -45°C to +145°C[1]
- **Resolution:** 0.01°C
- **Accuracy:** ±0.1°C
- **Stability:** <0.002°C

TEC Current Limit

- **Setting Range:** 0 to ≥2A
- **Resolution:** 1mA
- **Setting Accuracy:** ±20mA

Temperature Control Input

- **Input Resistance:** 10kΩ
- **Control Voltage:** -10 to 10V
- **Transmission Coefficient IC-Sensors:** 20°C/V ±5%
- **Transmission Coefficient Thermistor (±5%) 20kΩ and 200kΩ Range:** 2kΩ/V and 20kΩ/V ±5%

Control Output

- **Load Resistance:** >10kΩ
- **Transmission Coefficient IC Sensors:** 50mV/°C ±5%
- **Transmission Coefficient Thermistor (±5%) 20kΩ and 200kΩ Range:** 500mV/kΩ and 50mV/kΩ

Connectors

- **Sensor, TE Cooler, TEC ON Signal:** 15-pin D-Sub Plug
- **Control Input:** BNC
- **Control Output:** BNC
- **Chassis Ground:** 4mm Banana Jack

General Data

- **Line Voltage (Switchable):** 110V +15%/-10%, 115V +15%/-10 %, 230V +15%/-10 %
- **Line Frequency:** 50-60Hz
- **Maximum Power Consumption:** 60VA
- **Operating Temperature:** 0 to +40°C
- **Storing Temperature:** 40°C to +70°C
- **Warm-Up Time for Rated Accuracy:** 10min
- **Weight:** <3.1kg
- **Dimensions (W x H x D Without Operating Elements):** 146 x 66 x 290mm

1) Range is limited by rating of sensors and by thermal setup

2) All data valid at 23 ±5°C and 45 ±15% relative humidity

Need More Information?

Download a copy of the Operator's Manual at **www.thorlabs.com.** Search for "TED200C."

ITEM	$	£	€	RMB	DESCRIPTION
TED200C	$ 968.00	£ 609.80	€ 900,20	¥ 9,244.40	TEC Controller ±2A/12W

Temperature Controller — 5A/40W

TED350

Includes Power Cord and Cable for Connection to Our Mounts with DB9 Interface

TED350
±5A / 40Watts
Thermoelectric
Temperature Controller

Highlights

- ±5A/40W Low Noise TEC Output
- Temperature Stability ≤0.001°C
- Two Operating Modes: Constant Temperature & Constant TEC Current with Pre-Setting of the Desired TEC Current
- Operates With All Common Sensors: Thermistor, AD590/AD592, LM135/LM335 (Pt100 upon request)
- Set Temperature Protection Against Accidental Adjustment
- Adjustable Current Limit and Temperature Limit
- 4 1/2-digit LED Display of All Important Parameters
- Separate Control of the P-, I-, & D-Gains for Perfect Adaptation to the Thermal Load
- Analog Control of Temperature Set Point via the Input TUNE IN
- Temperature Window Protection Output to Switch Off the Laser (In Combination With LDC340)

Introduction

The TED350 is a precision temperature controller designed to power thermoelectric cooler (TEC) elements with currents up to ±5A. The controller is equipped with a PID feedback circuit. This independent control of the P (proportional) gain, the I (integral) offset control, and the D (differential) rate control allows the user to adjust the TED350 to obtain the optimal performance for a wide variety of thermal loads.

FEATURES

Temperature Display/Set Point

An easy-to-read, 4 1/2-digit LED display is used to monitor the setup and control parameters. The displayed parameters include the set temperature, the actual temperature, the heating or cooling current, as well as the current limit for the TE cooler. Additionally, the TEC voltage and window thresholds can be displayed.

The temperatures are displayed with a resolution of 0.01°C when using the AD590 temperature sensor, or 1Ω when a thermistor is being used.

The temperature set point can be set by using either the front panel control knob, or for applications where the prevention of inadvertent adjustment is required, the TED350 offers a limited access set point that overrides the front panel "Adjust" control.

The T_{set} temperature can also be controlled via an analog input signal. As an example, this feature supports the construction of a control loop for stabilizing the wavelength of the laser diode by utilizing the temperature dependence of the laser wavelength.

TEC Protection

The TED350 is designed for maximum protection of the TEC element. When the controller is enabled, an LED indicator signals that the driver is activated.

An adjustable TEC output current limit, which can be set anywhere within the controller's range, prevents the controller from overdriving the TEC element.

OPERATION

Adaptability to Different Thermal Loads

The PID controls are located on the front panel for easy access when optimizing the response of the TED350 for particular applications. The proportional gain optimizes the response time of the feedback loop, while the integral gain provides precise zero-offset regulation. The derivative gain optimizes the dynamic response of the feedback loop to account for rapid changes in the thermal load.

Temperature Window

When used in conjunction with our LDC340, a temperature window (high and low threshold) can be set on the TED350. When the window is exceeded, the laser diode is protected by shutting down the laser drive current.

Fault Indication

If the system detects incorrect or missing temperature sensors, or connection problems between sensor and controller, the output gets switched off, an LED fault indicator is lit, and a control signal is triggered that can be used to shut down the laser diode.

All LED faults are accompanied by a short audible warning signal. For safe and continuous operation at ambient temperatures of up to 40°C, the TED350 is equipped with a cooling fan and over-temperature protection.

RELATED ITEMS

Temperature Sensors

The TED350 is compatible with a number of common temperature sensors: thermistors up to 200kΩ, integrated circuit (IC) sensors (AD590/AD592, LM135/LM335, and LM35), and Pt100 RTD Sensors (on request).

Temperature Controller — 5A/40W (cont.)

A front panel selector switch facilitates selection of the thermal sensor. When a thermistor is used, the temperature is displayed as the resistance value of the thermistor and ranges from -30°C to over 200°C.

When an IC sensor is used, the temperature is displayed directly in °C with a resolution of 0.01°C. The TED350 also supports the use of a platinum resistive temperature detector, Pt100 RTD (on request). When using this sensor the TED350 converts the highly predictable resistance values directly into °C.

The temperature control range is from -45°C to 145°C when an IC sensor is used, this is limited by the rating of the particular sensor).

TED350 Rear Panel

Precision Temperature Control for basic research, industrial R&D, and high-precision manufacturing.

TC200 General Purpose Heater Controller – Ideal for controlling resistive heating devices, such as our PPLN ovens.

See Page 970

TC200

Specifications

TEC Output
- **Control Range of TEC Current:** –5A to +5A
- **Compliance Voltage:** >8V
- **Maximum Output Power:** 40W
- **Resolution TEC Current:** 1mA
- **Accuracy TEC Current:** ±20mA
- **Resolution TEC Voltage:** 1mV
- **Accuracy TEC Voltage:** ±40mV
- **Noise and Ripple, Typ:** <2mA

TEC Current Limit
- **Setting Range:** 0 to ≥5A
- **Resolution:** 1mA
- **Setting Accuracy:** ±50mA

Temperature Control Input
- **Control Voltage:** –10 to 10V

Thermistor Sensors
- **Control Ranges (Switchable):** 10Ω to 19.99kΩ, 100Ω to 199.9kΩ
- **Resolution:** 1Ω or 10Ω
- **Accuracy:** ±5Ω or ±50Ω
- **Stability:** <0.5Ω or <5Ω

IC-Sensors (AD590/AD592, LM135/LM335, and LM35)
- **Control Range:** –45°C to + 145°C
- **Resolution:** 0.01°C
- **Accuracy:** ±0.1°C
- **Stability:** <0.001°C

Pt100 Sensor in Exchange for LM35 (upon request)
- **Control Range:** –45°C to +145°C
- **Resolution:** 0.01°C
- **Accuracy:** ±1°C
- **Stability:** <0.005°C

Temperature Control Input
- **IC-Sensors Coefficient:** 2°C/V ±5%
- **Thermistor Coefficient:** 20kΩ or 200kΩ
- **Range:** 0.2kΩ/V or 2kΩ/V±5%

Control Output
- **Load Resistance:** >10kΩ
- **IC-Sensors Coefficient:** 50mV/°C
- **Thermistor Coefficient (20kΩ/200kΩ Range):** 500/50mV/kΩ

Temperature-Window Protection
- **Setting Range TWIN:** 0.5°C to 20°C
- **Setting Range:** RWIN 20kΩ and 200kΩ
- **Range:** 50Ω to 2kΩ and 500Ω to 20kΩ

Connectors
- **Sensor, TE Cooler, TEC ON Signal:** 15-pin D-Sub Jack
- **Control Input:** BNC
- **Control Output:** BNC
- **Temperature-Window Protection:** BNC
- **Chassis Ground:** 4mm Banana Jack
- **IEEE-488.2 Interface:** 24-pin IEEE-488 (Optional)

General Data
- **Line Voltage:** 100/115/230V+15%/–10%
- **Line Frequency:** 50 to 60Hz
- **Max. Power Consumption:** 140VA
- **Operating Temperature:** 0°C to + 40°C
- **Storing Temperature:** –40°C to +70°C
- **Warm-Up Time:** 10min
- **Weight:** <7.0kg
- **Dimensions (W x H x D):** 220 x 110 x 351mm

Banana Jack
- **IEEE-488.2 Interface:** 24-pin IEEE-488 (Optional)

Need More Information?

Download a copy of the Operator's Manual at **www.thorlabs.com.** Search for "TED350."

ITEM	$	£	€	RMB	DESCRIPTION
TED350	$ 1,600.00	£ 1,008.00	€ 1.488,00	¥ 15,280.00	Temperature Controller ±5A/40W
TED350-IEEE	$ 1,960.00	£ 1,234.80	€ 1.822,80	¥ 18,718.00	Temperature Controller ±5A/40W, IEEE-488 Interface

RACK SYSTEMS: LASER DIODE/TEC CONTROLLER OVERVIEW

Modular Platform Solutions

Thorlabs offers two families of host frames and a suite of modules to customize your instrumentation needs, from industrial customers who need to drive and monitor multiple devices simultaneously, to customers who prefer to have all of their instrumentation controlled from one convenient location.

The PRO8000 system supports eight modules with both local and remote control. This small benchtop system accepts up to two modules and has been the mainstay for many laser diode manufacturing and test facilities.

Aside from the laser diode controller modules listed below, a host of photodiode amplifiers and WDM and light sources are available for the system. The PRO8000 is available as a benchtop version for two modules or as rack version for eight modules. It is operated either as a stand-alone system without a PC, or remotely controlled via IEEE.

The newer TXP5000 platform offers laser diode control modules, WDM laser sources, tunable lasers, and a variety of polarization measurement and control modules. This TXP5000 system is controlled by a PC via USB, or Ethernet ports by powerful GUIs or a flexible driver.

Module or Platform Laser Diode Current & Temperature Controller

- The LDC8000 Series modules offer drivers for almost any application from 100mA up to 8A. These drivers provide many of the same features and capabilities as our benchtop units.
- The MLC8000 Series modules are high-density laser diode controller modules. Each can power up to eight laser diodes. This family of plug-ins are ideally suited for OEM applications that require high through-put testing and characterization of large volumes of laser diodes.

Laser Diode Temperature Controller Module for PRO8 Platform

- The TED8000 series of temperature controllers provide excellent temperature stabilization of laser diodes as well as other temperature sensitive devices. Typically the temperature stability will be in the ±0.001°C range. Three modules with up to 8A/64W of TEC power are offered.

Combination Laser Diode Current & Temperature Controller Module for PRO8 Platform & TXP500 Platform

- The ITC8000 series modules are designed for applications that require temperature stabilization and laser diode control. The modules offer maximum laser drive currents from 200mA to 1A. All modules offer 2A/16W of TEC power.
- The ITC5000 for the TXP allows space saving simultaneous current and temperature control of a laser diode with a single module. This series offers three current ranges (±200mA, ±500mA, and ±1A) and incorporates a TEC controller that provides up to 1.5A/5.25W. The modules can be modulated internally or externally.

Laser/TEC Drivers-Platform Selection Guide

Pages 431-448


Modular Systems: PRO8

- Operated Independent of PC
- Available for 2 or 8 Plug-In Modules
- Control Features Accessed via Front Panel or IEEE-488 Interface

See Pages 432-433

Laser Current Controller Modules: LDC8000

- Current Range of 100mA to 8A
- Driver to Suit Almost Any Application

See Pages 434-435

Laser Current Controller, 8-Channel Modules: MLC8000

- Powers up to Eight Laser Diodes
- Suited for Applications Requiring High-Throughput Testing and Characterization of Large Laser Diode Volumes
- Control Features Accessed via Front Panel or IEEE-488 Interface

See Pages 436-437

Temperature Control Modules: TED8000

- Excellent Temperature Stabilization of Laser Diodes
- Temperature Stability Typically in the ±0.001°C Range
- Three Models Offered, up to ±8A/64W of TEC Power
- Fully Programmable P, I, and D Shares

See Pages 438-439

Combination Laser Diode/TEC Controller Modules: ITC8000

- Powers up to Eight Lasers and TEC Elements
- Designed for Applications Requiring Temperature Stabilization and Laser Diode Control
- Maximum Laser Driver Current Provides ±2A/16W of TEC Power

See Pages 440-443

Test & Measurement Platform: TXP5000

- Offers Solutions for a Wide Range of Applications
- 4 Bay and 16 Bay Versions Available

See Pages 444-445

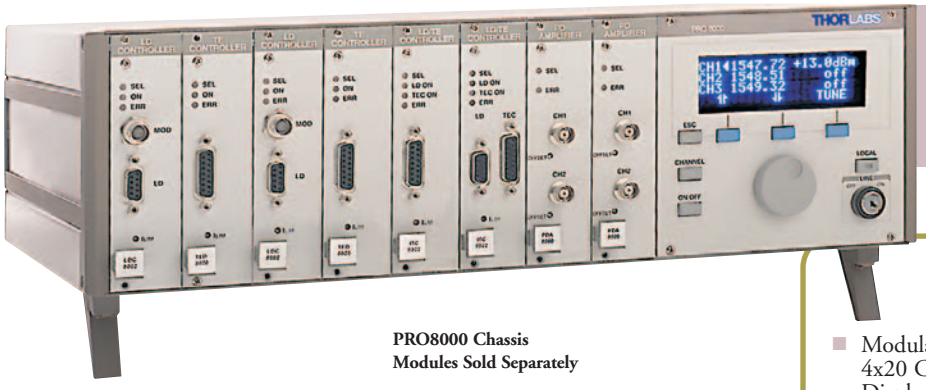
Laser Sources and TEC Controller: ITC5000

- Laser Diode Current Control and Temperature Control in One Card
- Three Models Provide ±200mA, ±500mA, or ±1A of Laser Current

See Pages 445-448

Benchtop Drivers
Platform Drivers
OEM Drivers
Laser Diode Mounts
Laser Diodes
Pigtailed Lasers
Laser Modules
Accessories

PRO8000 Modular Controller Systems



PRO8000 Chassis
Modules Sold Separately

High-Level Macro Functions for Fast Acquisition of P/I Curves.

PRO8 Series Highlights

- Modular Controllers With a Bright 4x20 Character Vacuum-Fluorescence Display
- Universal Platform Interchangeable Modules Include Laser Diode Controllers, TEC Controllers, WDM Sources, Photocurrent Measurement Modules, and Optical Switches
- Current Modules From 100mA to 8A (16-bit), Temperature Modules up to 8A/64W (16-bit), Combination Modules up to 1A Current Plus 2A/16W Temperature
- Control Eight Lasers From One Module: VCSEL, Fabry-Perot, or DFB.
- Combine Eight Modules in One Chassis for 64 Lasers From a Single Chassis
- Burn-In and Test Station
- Macro Functions for Fast Acquisition of P/I Curves
- Fast IEEE-488.2 & RS-232C Interfaces
- Instrument Drivers for LabVIEW™ & LabWindows™/CVI Free of Charge

Introduction

The PRO8 Series is a modular platform that provides a flexible solution to almost all laser diode control requirements. It is available in two versions: a compact benchtop unit for two modules, or 19" rack versions for up to eight modules. Together with an extensive range of modules (i.e. single or multi-channel current and temperature controllers, switches, photocurrent amplifiers, and laser sources), a PR08 system can be configured for almost any application.

The PR08 Series offers solutions to operate anywhere from one to hundreds of laser diodes. For example, a single PRO8000 19" rack with eight modules of our eight channel drivers can drive 64 laser diodes. For a flexible controller system for one or two lasers, the PRO800 is the ideal choice. For the large scale users, we offer single modules that can drive eight laser diodes simultaneously. Populate a PRO8000 with eight of these modules to build a high-density 64 channel laser control system, all in a single 19" chassis.

The standard PRO8000 can supply up to 16A of total driving current for all installed modules; for larger applications, we offer the PRO8000-4, which can supply up to 32A.

User-Friendly Controls

The PRO8000 Series offers a user-friendly, menu-driven platform for full control of all installed modules. To configure the system, simply plug in the modules; each of the plug-ins is then automatically identified by the system. A brightly lit 4x20 fluorescent display allows the user to scroll through and select any of the installed modules. When selected on the display, all control parameters of the individual module are accessible. The controls for a particular module can be set and enabled before scrolling to the next module. All settings are retained in memory and automatically recalled upon powering the mainframe.

Interchangeable Modules

All modules can be driven in the compact PRO800, the standard PRO8000, and the full-size 19" PRO8000-4 units. Aside from the size difference on the PRO800 and the heavy duty power supply of the PRO8000-4, all the chassis utilize the same operating system and protocols. All chassis models can power any of the plug-in modules that are found in this section, as well as our extensive selection of DFB laser modules found on our website.

PRO8000 Compatible Modules

Laser Diode Controllers - Page 434
- 100mA to 8A

Temperature Controllers - Page 438
- 2A to 8A

Combination LD & TEC Controllers - Pages 440-441
- 200mA-1A Laser / 2A TEC

Multi-Channel Laser Diode Controllers - Pages 436-437
- 5mA to 200mA

Optical Switches -Pages 1038-1039
- 1x2, 2x2, 1x4, & 1x8

Photodiode Amplifier - Page 442
- 10nA to 10mA

DFB Laser Sources CWDM/WDM - Pages 558-563
- ITU Precision Sources

Each system is assembled and tested to your specific configuration. Contact our technical support team for expert advice on module compatibility.

Polarization Measurement Tools

See Page 974

PRO8000 Modular Controller Systems (cont.)

All PRO8 series controllers are equipped with IEEE-488.2 and RS-232C interfaces as standard features. Each system is delivered with LabVIEW™ and LabWindows™/CVI drivers to support the individual modules, as well as their integration into a comprehensive test and measurement system.

Easy Operation
All modules are self-identifying and are operated via menu-driven softkeys; the analog values are set with a rotary knob on the front panel.

PRO800 Bench Top Chassis

The smaller PRO800 is the benchtop version of the PRO8 system offering slots for two modules. It is menu-driven, flexible, and supports a multitude of electrical and optical modules. The PRO800 is idea for crowded lab environments and offers the same features as the larger eight-slot unit PRO8000.

This benchtop chassis has all the same features as the larger eight-slot chassis.

All values are displayed by a 4 x20 character alphanumeric vacuum fluorescence display. The functions of the softkeys change in accordance with the activated module. A key-operated power switch protects the PRO8000 series against unauthorized use.

Additional Light Source Modules for the PRO8000 Series:
- DWDM Laser Sources in the S-, C-, and L-Band, See Pages 556-563
- Optical Switch Modules, See Pages 1038-1039

PRO8000 Series Specifications

	PRO800	PRO8000	PRO8000-4
Slots	2	8	8
Maximum Output Current for All Modules	8A	16A	32A
Maximum Power Consumption	220VA	500VA	800VA
Display	Alphanumeric Display with 4 x 20 Characters		
Operation	Menu-Driven		
Setting	Function Keys and Rotary Knob		
Protection Features	Key-Operated Power Switch		
TTL Modulation Frequency Range[1]	DC to 10kHz		
TTL Duty Cycle[1]	Selectable		
TTL Modulation Input	BNC		
TTL Trigger Output	BNC		
IEEE-488.2 Interface	24-pin IEEE Jack (Rear Panel)		
RS-232C Interface	9-pin D-sub Plug (Rear Panel)		
Chassis Ground	4mm Banana (Rear Panel)		
Line Voltage	100V, 115V and 230V AC ± 10%		
Line Frequency	50 to 60Hz		
Operating Temperature	0 to +40°C		
Storage Temperature	-40°C to +70°C		
Relative Humidity	< 80% up to 31°, decreasing to 50% @ 40°C		
Dimensions (Chassis Only)	232 x 147 x 396mm	449 x 147 x 396mm	449 x 177 x 456mm
Weight (Chassis Only)	<9kg	<17kg	<21kg

1 external synchronous current modulation for all cards in the chassis

ITEM	$	£	€	RMB	DESCRIPTION
PRO800	$ 1,798.80	£ 1,133.20	€ 1.672,90	¥ 17,178.50	2-Slot Modular Benchtop Chassis
PRO8000	$ 2,398.80	£ 1,511.20	€ 2.230,90	¥ 22,908.50	8-Slot Modular Rack Chassis
PRO8000-4	$ 3,238.80	£ 2,040.40	€ 3.012,10	¥ 30,930.50	8-Slot High-Power Modular Rack Chassis
PRO8000-R32	$ 62.40	£ 39.30	€ 58,00	¥ 595.90	19" Mounting Kit for PRO8000
PRO8000-R42	$ 86.40	£ 54.40	€ 80,40	¥ 825.10	19" Mounting Kit for PRO8000-4
PRO8000-C	$ 24.00	£ 15.10	€ 22,30	¥ 229.20	PRO8000 Front Cover Plate

Benchtop Drivers
Platform Drivers
OEM Drivers
Laser Diode Mounts
Laser Diodes
Pigtailed Lasers
Laser Modules
Accessories

PRO8000 Laser Controller Modules

8A

4A

2A

1A

500mA

200mA

100mA

Introduction

The modular laser diode current controllers of the LDC8000 series provide optimal performance. All of these current control modules offer extremely low noise and drift, resulting in exceptional laser stability.

LDC8000 Modules Highlights

- 100mA, 200mA, 500mA, 1A, 2A, 4A, and 8A Modules
- Ultra-Stable Current Control With 16-Bit Resolution
- Extensive Laser Diode Protection Features
- Adjustable Photodiode Bias for Improved Sensor Linearity
- Easily Configured Self-Identifying Modules
- External Modulation of Laser Output

Seven Current Ranges

Seven different current controller modules are available, with maximum output currents ranging from 100mA up to 8A (10A on request). The drive current can be set precisely with 16-bit resolution – one part in 65,000. An analog control input allows all current modules to be operated in either constant current (CC) or constant power (CP) mode. The maximum modulation frequency is dependent on the mode used.

User-Friendly Controls

After installing a new module into a PRO8000 chassis, the front-panel control screen is used to configure the plug-in. The softkeys are used to scroll through the slot location to access the basic settings. The operational settings are easily accessed; displayed mnemonic symbols and simple prompts provide for user-friendly operation. All settings are retained in memory and automatically recalled upon powering the mainframe.

Laser Diode Protection Features

The LDC8000 Series current modules incorporate laser protection features to safeguard sensitive laser diodes. An advanced circuit design ensures that AC power line transients or power outage, as well as RF pickup, cannot affect the laser diode.

For each current module, three independent limits can be set to safeguard the laser. Two of the limits are programmable, which prevent the laser current and the laser power from exceeding the user-defined maximum values.

The third limit is set via a recessed front panel trim-pot that sets a "hardware" current limit and protects against programming errors and accidental adjustment of the front panel knob. Even while externally modulating the laser, it is not possible to exceed the hard or soft limits.

After activating the laser diode, a soft-start function slowly increases the laser current without voltage overshoots.

Even in the case of AC power fluctuation, the laser current remains transient free. Voltage peaks on the AC line are effectively suppressed by electronic filters, shielding of the transformer, and careful grounding of the modules and chassis. The LDC8000 series meets the international requirements regarding laser protection (e.g. CDRH US21, CFR 1040.10). Furthermore, the modules' operation is protected by the PRO8 systems key-operated power switch, its interlock, and delay of the output current, plus many additional features.

LDC8000 Series Protection Features

- Soft Start Slowly Increases Laser Drive Current
- Programmable Limits for Current and Optical Power
- Hardware Current Limit for Protection Against Errors Through Programming, Modulation, and Wrong Settings
- Extensive AC Power Filtering Eliminates Transients
- Temperature Window Protection With TED8000 Card
- Meets Applicable CDRH and CE Regulations

External Modulation of Laser Output

An analog control input enables the modulation of the laser diode in constant current or constant power mode. The maximum modulation frequency depends on the current module used. See the specifications table on the next page.

ITC8000 Combination Laser Diode and TEC Controllers

ILD = ±200mA, ±500mA, and ±1A
ITEC = ±2A/16W

See Page 440

PRO8000 Laser Controller Modules (cont.)

ITEM	$	£	€	RMB	DESCRIPTION
LDC8001	$ 1,078.80	£ 679.60	€ 1.003,30	¥ 10,302.50	PRO8000 LD Control Module, 100mA
LDC8002	$ 1,018.80	£ 641.80	€ 947,50	¥ 9,729.50	PRO8000 LD Control Module, 200mA
LDC8005	$ 1,042.80	£ 657.00	€ 969,80	¥ 9,958.70	PRO8000 LD Control Module, 500mA
LDC8010	$ 1,054.80	£ 664.50	€ 981,00	¥ 10,073.30	PRO8000 LD Control Module, 1A
LDC8020	$ 1,137.60	£ 716.70	€ 1.058,00	¥ 10,864.10	PRO8000 LD Control Module, 2A
LDC8040	$ 1,147.20	£ 722.70	€ 1.066,90	¥ 10,955.80	PRO8000 LD Control Module, 4A
LDC8080	$ 1,191.60	£ 750.70	€ 1.108,20	¥ 11,379.80	PRO8000 LD Control Module, 8A, 2 Slots
CAB400	$ 66.00	£ 41.60	€ 61,40	¥ 630.30	DB9 Cable, LDC8000 Module to LD Mount

Drive up to 64 Lasers From 1 Chassis, See Page 432

Laser Diode Controllers Specifications

	LDC8001	LDC8002	LDC8005	LDC8010	LDC8020	LDC8040	LDC8080
Current Control							
Control Range (Continuous)	0 to ±100mA	0 to ±200mA	0 to ±500mA	0 to ±1A	0 to ±2A	0 to ±4A	0 to ±8A [3]
Compliance Voltage	>2.5V	>5V	>5V	>5V	>5V	>5V	>5V
Resolution	1.5µA	3µA	7.5µA	15µA	30µA	70µA	130µA
Accuracy (Full Scale)	±0.05%	±0.05%	±0.05%	±0.1%	±0.1%	±0.1%	±0.3%
Noise Without Ripple (10Hz to 10MHz, RMS, Typical)	<1µA	<3µA	<5µA	<10µA	<20µA	<50µA	<100µA
Ripple (50/60Hz, RMS, Typical)	<0.8µA	<1µA	<1µA	<1.5µA	<3µA	<4µA	<8µA
Transients (Processor, Typical)	<10µA	<15µA	<30µA	<50µA	<80µA	<120µA	<200µA
Transients (Other, Typical)	<100µA	<200µA	<500µA	<1mA	<2mA	<4mA	<8mA
Drift 30min/24hr (Typ, 0-10Hz, at Constant Ambient Temp)	<0.5µA/<1.5µA	<0.5µA/<1.5µA	<2µA/<4µA	<5µA/<20µA	<15µA/<100µA	<25µA/<150µA	<100µA/<200µA
Temperature Coefficient	<50ppm/°C						
Power Control							
Control Range of Photocurrent	10µA to 5mA (Other Ranges Available on Request)						
Reverse Bias Voltage	5V (Can be Switched Off)						
Resolution	100nA						
Accuracy (Full Scale)	±0.05%						
Current Limit							
Setting Range (20-Turn Trim Pot)	0 to ≥100mA	0 to ≥200mA	0 to ≥500mA	0 to ≥1A	0 to ≥2A	0 to ≥4A	0 to ≥8A
Resolution	3µA	6µA	15µA	30µA	60µA	130µA	250µA
Accuracy	±100µA	±200µA	±500µA	±2mA	±4mA	±8mA	±50mA
Power Limit							
Photocurrent Range	0 to 5mA						
Resolution	1.25µA						
Accuracy	±50µA						
Laser Voltage Measurement							
Measurement Principle	4-Wire (Improves Accuracy by Compensating for Cable Resistance)						
Measurement Range	0 to 5V						
Resolution	0.2mV						
Accuracy	±5mV						
Analog Modulation Input							
Input Resistance	10kΩ						
3dB-Bandwidth, CC [1]	DC to 2.5kHz	DC to 200kHz	DC to 100kHz	DC to 50kHz	DC to 30kHz	DC to 20kHz	DC to 10kHz
Modulation Coefficient, CC	10mA/V ± 5%	20mA/V ± 5%	50mA/V ± 5%	100mA/V ± 5%	200mA/V ± 5%	400mA/V ± 5%	800mA/V ± 5%
Modulation Coefficient, CP	0.5mA/V ±5%						
Rise and Fall Time, Typical [2]	<100µs	<2µs	<4µs	<5µs	<6µs	<9µs	<15µs
General Data							
Card Width	1 Slot						2 Slots
Connector	9-Pin D-Sub (f)						15-Pin HDD-Sub (f)
Weight	< 300g		< 500g				< 750g
Operating Temperature	0 to +40°C						
Storage Temperature	-40 to +70°C						

1) Small signal bandwidth 2) External TTL Modulation synchronous for all current cards 3) 10A Available upon request

All data valid at 23 ± 5°C and 45 ±15% relative humidity

Benchtop Drivers
Platform Drivers
OEM Drivers
Laser Diode Mounts
Laser Diodes
Pigtailed Lasers
Laser Modules
Accessories

PRO8000 High-Density Laser Controllers – MLC8000 Series

Introduction

The MLC8000 Series laser diode controllers have been field proven in demanding applications for many years. They are designed to control up to eight lasers from a single module. When fully populated, a PRO8000 chassis can simultaneously power up to 64 laser diodes.

Designed to support high-density laser diode test and burn-in, this series provides eight different maximum drive current ranges. The PRO8000 chassis can support up to a total of 16A of laser diode drive current (i.e. the sum of the output drive currents from all the installed cards) and therefore can easily support the demands of driving 64 lasers at 200mA each.

MLC8000 Modules Highlights

- Drives Eight Lasers From a Single Module and 64 Lasers From a Single MLC Chassis
- 5mA, 10mA, 25mA, 50mA, 100mA, and 200mA Ranges
- Ultra-Stable Current Control With 12-Bit Resolution
- Extensive Laser Diode Protection Features
- Improved Sensor Linearity
- Easily Configured Self-Identifying Modules

Intuitive User-Friendly Controls

Each module provides eight independent outputs, all operating within the same set parameters (current range, current limit, and constant current or constant power operating mode). The laser drive current for each output, however, can be individually set. The various modules of the MLC8000 series can be used interchangeably, along with other PRO8 modules, in any of the three chassis to implement a large variety of systems.

After installing a new module into a PRO8 chassis, the front-panel control screen is used to configure the plug-in. The softkeys are used to scroll through the slot locations to access the settings for the individual modules. The operational parameters are easily accessed using mnemonic symbols and simple prompts. All settings are retained in memory and automatically recalled upon powering on the mainframe.

The polarity of the laser diodes, either anode or cathode ground, is factory fixed. The eight outputs are switched on together, but the current control or power control is independent for each channel.

Laser Diode Protection

The MLC8000 Series modules incorporate proven laser protection features to safeguard sensitive laser diodes. These features include a hardware current limit, a soft-start circuit, and an interrupt sensing circuit that shuts down the laser upon detecting a break in the electrical connection to the laser diode. Additionally, extensive precautions have been taken to protect the laser diodes during AC power fluctuation or outages.

The current limit is accessed only via a front-panel trim-pot to prevent the risk of accidental adjustment. All eight output channel current limits are identical for an individual card.

After activating the laser power, a soft-start function slowly increases the laser current, preventing overshoots.

Even in the case of an AC power fluctuation, the laser current remains transient-free. Voltage peaks on the AC line are effectively suppressed by electronic filters, shielding of the transformer, and careful grounding of the modules and chassis.

The MLC8000 Series meets the international requirements regarding laser protection (e.g. CDRH US21 CFR 1040.10). Furthermore, the modules' operation is protected by the PRO8 systems' key-operated power switch, its interlock, and delay of the output current, in addition to many other features.

System Applications

The MLC8000 Series is an ideal choice for burn-in applications due to its high-density (64 lasers/PRO8000 chassis) drive capability coupled with the user-friendly advanced control features.

For technical support and advice about specific system configurations, please contact any of the Thorlabs offices listed on the back cover of this catalog.

Easy User Interface

Each plug-in is automatically identified upon plugging in the module. A brightly lit 4x20 character fluorescent display allows the user to select any of the installed modules. When selected, the control parameters can be changed quickly.

Laser Diode Grounding

The MLC8000 controllers are divided into two groups: one for grounded laser cathodes and one for grounded anodes. Each supports both PD polarities. Under all conditions, the laser diode is driven with respect to ground, ensuring maximum protection for the laser diode.

PRO8000-High Density Laser Controllers—MLC8000 Series (cont).

Burn-In Station: Pictured System Powers 512 Lasers

The MLC8000 Series modules are designed to simultaneously supply drive current to eight laser diodes. Therefore, up to 64 laser diodes can be operated by one PRO8000 chassis.

An automated test station for hundreds of laser diodes can be set up by connecting many PRO8000 systems via the IEEE-488 interface. High-level software macros speed the process of developing automated burn-in and final test routines.

LDC Series Interface Cable

LDC8001 to LDC8040 modules with 9-pin D-Sub connectors can be connected directly to Thorlabs' laser diode mounts with DB9 interface using a shielded CAB400 cable (not included with module). For additional or replacement cables, we have a full line from which to choose.

CAB400

See Page 893

Laser Diode Controllers Specifications

	MLC8025-8	MLC8050-8	MLC8100-8	MLC8200-8
Current Control (Two Ranges): Control Ranges Switchable (8 Channels Per Module)	0 to 5mA and 0 to 25mA	0 to 10mA and 0 to 50mA	0 to 25mA and 0 to 100mA	0 to 50mA and 0 to 200mA
Laser Diode Polarity	Fixed, Either Anode Ground (AG) or Cathode Ground (CG)			
Compliance Voltage	>4V			
Accuracy	±15µA / ±75µA	±30µA / ±150µA	±75µA / ±300µA	±150µA / ±600µA
Resolution	1.2µA / 6µA	2.5µA /12µA	6µA / 25µA	12µA / 50µA
Noise Without Ripple (10Hz to 10MHz), Typ.	< 0.5µA / < 0.5µA		0.5µA / < 1µA	< 0.5µA /< 1.5µA
Ripple (50/60Hz, RMS), Typical	< 0.5µA / < 0.5µA		< 0.5µA / < 1µA	
Transients (Other, Typical)	< 25µA	< 50µA	< 100µA	< 200µA
Drift (30min, 0 to 10Hz), Typical	< 0.3µA / < 1µA	< 0.5µA /< 1.5µA	< 1µA /< 3µA	< 1.5µA / < 5µA
Temperature Coefficient	< 50ppm/°C			
Power Control				
Control Range of Photocurrent	5µA to 2mA			
Accuracy	±6µA			
Resolution Photocurrent	0.5µA			
Reverse Bias Voltage	0V / 5V (Wireable)			
Current limit Setting Range (20-Turn Pot)	0 to 5mA / 0 to 25mA	0 to 10mA / 0 to 50mA	0 to 25mA / 0 to 100mA	0 to 50mA / 0 to 200mA
Resolution	1.2µA /6µA	2.5µA /12µA	6µA /25µA	12µA /50µA
Accuracy	±50µA/±125µA	±100µA /±250µA	±0.25mA /±0.5mA	±0.5mA /±1mA
General data Connector	44-Pin HD D-Sub (F) (For Laser Diode, Photodiode, and General Interlocks, etc.)			
Card Width	1 Slot			
Weight	<500g			
Operating Temperature	0 to +40°C			
Storage Temperature	–40 to +70°C			

All data valid at 23 ± 5°C and 45 ± 15% relative humidity
AG: Laser Anode Grounded
CG: Laser Cathode Grounded

ITEM	$	£	€	RMB	DESCRIPTION
MLC8025-8AG	$ 1,198.80	£ 755.20	€ 1.114,90	¥ 11,448.50	PRO8000 Multi-Channel LD Controller, 25mA, AG
MLC8025-8CG	$ 1,198.80	£ 755.20	€ 1.114,90	¥ 11,448.50	PRO8000 Multi-Channel LD Controller, 25mA, CG
MLC8050-8AG	$ 1,198.80	£ 755.20	€ 1.114,90	¥ 11,448.50	PRO8000 Multi-Channel LD Controller, 50mA, AG
MLC8050-8CG	$ 1,198.80	£ 755.20	€ 1.114,90	¥ 11,448.50	PRO8000 Multi-Channel LD Controller, 50mA, CG
MLC8100-8AG	$ 1,198.80	£ 755.20	€ 1.114,90	¥ 11,448.50	PRO8000 Multi-Channel LD Controller, 100mA, AG
MLC8100-8CG	$ 1,198.80	£ 755.20	€ 1.114,90	¥ 11,448.50	PRO8000 Multi-Channel LD Controller, 100mA, CG
MLC8200-8AG	$ 1,198.80	£ 755.20	€ 1.114,90	¥ 11,448.50	PRO8000 Multi-Channel LD Controller, 200mA, AG
MLC8200-8CG	$ 1,198.80	£ 755.20	€ 1.114,90	¥ 11,448.50	PRO8000 Multi-Channel LD Controller, 200mA, CG

Benchtop Drivers
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PRO8000 Temperature Control Modules

Introduction
A range of thermoelectric temperature control modules is available from ±2A/16W to ±8A/64W, with 16-bit resolution. The TED8000 Series modules for the PRO8 platform provide excellent temperature stabilization, typically ±0.001°C when using an AD590 thermal sensor, for optimal laser operation and other applications requiring precise thermal control. This facilitates highly stable operation of temperature-sensitive components, such as optical nonlinear birefringent crystal experiments.

Separate adjustment of the P, I, and D settings of the PID servo loop enable optimal settling times for different thermal loads.

The temperature controllers in the TED8000 series operate within our PRO8 series mainframe and are ideal companions to our LDC8000 laser diode current controller modules shown on page 434.

High Power/Channel Count Laser Systems
With up to 64W of cooling power, the TED8080 is well matched to our LDC8080 laser diode control module, which provides 8A laser drive current (see page 434). Laser diodes typically operate at approximately 2-3V forward bias voltage.

TED8000 Series Temperature Control

	TED8020	TED8040	TED8080
Type of Controller	PID With Adjustable Share		
PID-Share	12-Bit Control Range		
Card Width	1 Slot	1 Slot	2 Slots
Connector	15-Pin D-Sub (F)		
Weight	<500g	<600g	<700g
Operating Temperature	0 to +40°C		
Storage Temperature	–40 to +70°C		

Operation at 8A results in an overestimated thermal load of 16-24W, assuming 0% lasing efficiency and that all the electrical energy is converted to thermal energy.

When using our eight-channel laser controller (MLC8000 series), the TED8080 is an ideal choice to temperature stabilize a large number of lasers mounted on a common cooling plate.

Protection Features
Damage to the TE cooler is prevented by setting an adjustable TEC current limit. This can either be set via a recessed potentiometer on the module front panel (hardware limit), via the front panel softkeys, or via one of the standard interfaces (software limit).

When used with our laser diode current controllers, the temperature window protection safety feature can be enabled; if the laser temperature departs from the preset temperature window, the laser current will be switched off immediately. The temperature modules of the TED8000 series meet extremely high standards regarding precision and drift performance and provide a low noise, bipolar output, enabling extremely stable wavelength control and safe thermal load management.

Choice of Temperature Sensors
The temperature modules of the TED8000 series can be operated with thermistors, AD590/AD592 IC sensors, and LM335 transducers. When operated with a thermistor, the thermistor calibration constant can be set so that all applicable settings and displays can be done directly in degrees celsius, rather than in ohms.

With the modules of the TED8000PT series, a Pt100 temperature sensing element can be operated, replacing the IC sensor.

For extremely low temperature applications, such as the operation of lead-salt lasers, a cryogenic option is offered for all models. As a Pt1000 sensor is used for operating temperatures in the range of 20 to 310K, the controller is modified to control a heating element.

PID Control System Functionality
The P, I, and D settings of the temperature control loop can be set via menu-driven softkeys or one of the remote interfaces. Optimized adjustment ensures fast laser temperature settling times and long-term temperature stability of better than 1mK.

A PID control system combines three different control strategies into one feedback loop. The PID refers to how the error signal (difference between the actual temperature and the set current) is processed prior to being fed back to the driving element responsible for changing the system. The purely proportional controller simply scales the error signal by some number prior to feeding it back to the drive element.

Use the PRO800 chassis with one of our LDC8000 and TED8000 Series modules to set up a space-saving laser current and temperature controller. Also see page 440 for the ITC8000 Combination Series or page 416 for benchtop devices.

PRO8000 Temperature Control Modules (cont.)

The relation between the controller parameter (i.e. the TEC current) and the feedback signal (i.e. the temperature difference) is a fixed one. A reasonable value for a small temperature controller would be 1A/°C. If the set value for the temperature is 10°C, for example, and 1A is needed to reach this with the laser switched off, then the control loop will settle to about 11°C. If the laser is then switched on and the current required rises to 2A, the loop will settle to 12°C. Any change in load or ambient conditions will change the laser temperature.

An integrating controller integrates the input signal over time, therefore increasing the output current until the error at the input (i.e. temperature difference) is zero. In theory, this means infinite gain at DC and an infinite accuracy. (However, in reality the accuracy is limited by offset and drift of the components.)

The response to changing conditions is slow because the gain of an integrating regulator is poor at higher frequencies. A P-I regulator is reasonable, with the I share for high accuracy and the P share for a better response to changing conditions.

A differential controller, typically not found alone, is useful for adjusting the response of the servo loop in proportion to the rate of change of the error signal. When combined with the PI to form a full PID system, it provides a highly adaptable servo loop that offers both a fast settling time as well as an extremely small offset error.

TED8000 Specifications

	TED8020	TED8040	TED8080
Control Range	-2A to +2A	-4A to +4A	-8A to +8A
Compliance Voltage		>8V	
Maximum Output Power	16W	32W	64W
Measurement Resolution I_{TEC}	0.07mA	0.15mA	0.3mA
Measurement Accuracy I_{TEC}	±10mA	±20mA	±50mA
Measurement Resolution U_{TEC}		0.3mV	
Measurement Accuracy U_{TEC}		± 20mV	
Noise and Ripple (Typical)	<1mA	<2mA	<4mA
Temperature Sensors: Thermistor (TED80X0 & TED80X0PT)			
Control Range		5Ω to 20kΩ Switchable 50Ω to 200kΩ	
Calibration		Exponential Form, Steinhart-Hart	
Resolution		0.3Ω/3Ω	
Accuracy		±2.5Ω/±25Ω	
Stability (Typical)		<0.5Ω/<5Ω	
Temperature Sensor: IC-Sensors (AD590/AD592/LM335) (TED80X0)			
Control Range		–12.375°C to +90°C	
Calibration		2-Point Linearization	
Resolution		0.0015°C	
Accuracy		±0.1°C	
Stability (Typical)		<0.001°C	
Temperature Sensor Pt100 Platinum: Optional Feature (PT) for TED80X0			
Control Range		-12.375°C to +90°C	
Resolution		0.0015°C	
Accuracy		±0.3°C	
Stability (Typical)		< 0.005°C	
Temperature Sensor Pt1000 KRYO: Optional Feature (KRYO) for TED8020			
Control Range		20 to 310K	
Resolution		(20 to 155K) 2mK	
Accuracy		(20 to 155K) ±2K	
Stability (Typical)		(20 to 155K) 0.005K	
TEC Current Limit			
Setting Range (20-Turn Pot)	0 to ≥2A	0 to ≥4A	0 to ≥8A
Resolution D/A converter	0.5mA	1mA	2mA
Accuracy	±20mA	±40mA	±80mA

All data valid at 23 ± 5°C and 45 ±15% relative humidity

Optical Isolators

See Page 671

CAB420-15 TED Series Interface Cable

All modules in the TED8000 Series, except PT or KRYO options, can be connected directly to Thorlabs' laser diode mounts with a DB9 interface using a shielded CAB420-15 cable (not included with module). For additional or replacement cables, we have a full line from which to choose.

ITEM	$	£	€	RMB	DESCRIPTION
CAB420-15	$ 72.00	£ 45.40	€ 67,00	¥ 687.60	DB9(F) to DB15(M) Cable

See Pages 893

ITEM	$	£	€	RMB	DESCRIPTION
TED8020	$ 598.80	£ 377.20	€ 556,90	¥ 5,718.50	PRO8000 TEC Controller, 16W
TED8040	$ 598.80	£ 377.20	€ 556,90	¥ 5,718.50	PRO8000 TEC Controller, 32W
TED8080	$ 718.00	£ 452.30	€ 667,70	¥ 6,856.90	PRO8000 TEC Controller, 64W
TED8020PT	$ 598.80	£ 377.20	€ 556,90	¥ 5,718.50	PRO8000 TEC Controller, 16W, Pt100
TED8040PT	$ 598.80	£ 377.20	€ 556,90	¥ 5,718.50	PRO8000 TEC Controller, 32W, Pt100
TED8080PT	$ 718.00	£ 452.30	€ 667,70	¥ 6,856.90	PRO8000 TEC Controller, 64W, Pt100 2 slots
TED8020KRYO	$ 816.00	£ 514.10	€ 758,90	¥ 7,792.80	PRO8000 TEC Controller, 16W, Pt1000 (KRYO)

Combination Control Modules – ITC8000 Series

ITC8000 Combination Laser Diode & TEC Controllers
3 Models
ILD = ±200mA to ±1A
ITEC = ±2A/16W

Introduction

The ITC8000 series for the PRO8000 platform incorporates a laser current controller and a TEC temperature controller in one space-saving module. Three models are available offering laser drive current ranges of 0 to ±200mA, 0 to ±500mA, and 0 to ±1A. All three incorporate a TEC controller that provides up to ±2A/16W.

Each module comes in two versions: the ITC8000, with a 9-pin connector for laser current output and a 15-pin connector for TEC current output; or the ITC8000DS15, with a common 15-pin connector for both laser and TEC current output.

All of the ITC8000 modules offer the same exceptional performance as our separate laser controller and temperature controller modules. All laser diode and photodiode pin configurations are supported.

Extremely Low Noise

The ITC8000 Series modules feature exceptionally low laser current noise (from 2-10µA depending on the model, see table on next page) and outstanding temperature stability of better than <0.001°C when an AD590 temperature sensor is used. The performance of the ITC8000 modules is independent of the operation mode (constant current or constant power).

User-Friendly Controls

After installing a new module into a PRO8000 chassis, the module can be configured via the front-panel softkey controls or via one of the remote computer interfaces. The softkeys on the PRO8000 are used to scroll through the slot locations to access all the module settings. Alternatively, the IEEE-488.2 interface also provides convenient access to the controller settings. Once set, all the settings are retained in memory and automatically recalled upon powering up the mainframe.

Laser Diode Protection Features

The modules incorporate proven laser diode protection features. Besides common protection functions such as current limits, laser current soft start, and interrupt protection, an advanced circuit design ensures that AC power line transients, power outages, and RF pickup cannot affect the laser diode.

Additionally, a temperature window can be set that will shut the laser down in the event the high or low thresholds of the window are exceeded.

The ITC8000 Series meets the international requirements regarding laser protection (i.e. CDRHUS21 CFR 1040.10). Furthermore, the modules' operation is protected by the PRO8000 systems key-operated power switch, its interlock, and delay of the output current, in addition to many other features.

Calibrating the Power Display

The display of the laser power can be easily calibrated with respect to the laser's monitor-photodiode current to provide a readout directly in milliwatts. This is accomplished by adjusting the "CALPD" calibration constant that is accessed via the front-panel softkeys or the computer interface. Please note that an optical power meter is required.

Setting the Temperature Control Loop

The P (gain), D, and I settings of the PID control loop can each be set independently to optimize the temperature response of the system to different thermal loads.

ITC8000 Series Interface Cables

Thorlabs offers three cables that can be used to connect the ITC8000 combination modules to our laser diode mounts with DB9 interface: the CAB400 for all DB9 outputs of the LDC controllers; the CAB420-15 for all DB15 TEC controller outputs; and the CAB430 for all ITC8000DS15 modules. These cables are not included with the modules. For additional or replacement cables, we have a full line from which to choose with same-day delivery.

ITEM	$	£	€	RMB	DESCRIPTION
CAB400	$ 66.00	£ 41.60	€ 61,40	¥ 630.30	DB9(M) to DB9(M) Cable
CAB420-15	$ 72.00	£ 45.40	€ 67,00	¥ 687.60	DB9(F) to DB15(M) Cable
CAB430	$ 120.00	£ 75.60	€ 111,60	¥ 1,146.00	DB9(M) & DB9(F) to DB15(M) Cable

See Page 893

Specifications

	ITC8022	ITC8052	ITC8102
Laser Controller: Current Control			
Control Range of Injection Current	0 to ±200mA	0 to ±500mA	0 to ±1A
Compliance Voltage		>5V	
Resolution	3µA	7.5µA	15µA
Accuracy (Full Scale)		±0.05%	±0.1%
Noise Without Ripple (10Hz to 10MHz, RMS, Typ.)	<2µA	<5µA	<10µA
Ripple (50Hz, RMS, Typ.)		<1µA	<1.5µA
Transients (Processor, Typ.)	<15µA	<30µA	<50µA
Transients (Other, Typ.)	<200µA	<500µA	<1mA
Drift (24hrs, at Constant Ambient Temperature, Typ.)	<3µA	<10µA	<25µA
Temperature Coefficient		<50ppm/°C	
Laser Controller: Power Control			
Control Range of Photocurrent		10µA to 2mA	
Reverse Bias Voltage		0 to 10V (Adjustable)	
Resolution Photocurrent		30nA	
Accuracy (Typ.)		±0.1%	
Laser Controller: Current Limit			
Setting Range	0 to ≥200mA	0 to ≥500mA	0 to ≥1A
Resolution	6µA	15µA	30µA
Accuracy	±200µA	±500µA	±2mA
Laser Voltage Measurement			
Measurement Principle		4-wire (Improves Accuracy by Compensating for Cable Resistance)	
Measurement Range		0 to 10V	
Resolution		0.3mV	
Accuracy		±5mV	
Temperature Controller: Output			
Control Range of TEC Current		–2A to +2A	
Compliance Voltage		>8V	
Maximum Output Power		16W	
Measurement Resolution of TEC Current		0.07mA	
Measurement Resolution of TEC Voltage		0.3mV	
Noise and Ripple Typical		<1mA	
Temperature Controller: Current Limit			
Setting Range (20-Turn Pot)		0 to ≥2A	
Resolution		0.5mA	
Setting Accuracy		±20mA	
Temperature Controller: Sensor Data			
Thermistor:			
Control Range		200Ω to 40kΩ (10kΩ Nominal Resistance @ 25°C)	
Resolution		0.7Ω	
Accuracy		±10Ω	
Stability		<1Ω	
AD590, AD592, and LM335:			
Control Range		–12.375°C to +90°C	
Resolution		0.0015°C	
Accuracy		±0.1°C	
Temperature Stability (Typical)		<0.001°C	
General Data			
LD/TEC-Connector		9-Pin (LD)/15-Pin (TEC) D-Sub (ITC8000); Common 15-Pin D-Sub (ITC8000DS15)	

*All data valid at 23 ± 5°C and 45 ± 15% relative humidity

ITEM	$	£	€	RMB	DESCRIPTION
ITC8022	$ 1,680.00	£ 1,058.40	€ 1.562,40	¥ 16,044.00	PRO8000 LD & TEC Controller, 200mA/16W, 9-pin/15-pin D-Sub Connector
ITC8022DS15	$ 1,680.00	£ 1,058.40	€ 1.562,40	¥ 16,044.00	PRO8000 LD & TEC Controller, 200mA/16W, 15-pin D-Sub Connector
ITC8052	$ 1,800.00	£ 1,134.00	€ 1.674,00	¥ 17,190.00	PRO8000 LD & TEC Controller, 500mA/16W, 9-pin/15-pin D-Sub Connector
ITC8052DS15	$ 1,800.00	£ 1,134.00	€ 1.674,00	¥ 17,190.00	PRO8000 LD & TEC Controller, 500mA/16W, 15-pin D-Sub Connector
ITC8102	$ 2,040.00	£ 1,285.20	€ 1.897,20	¥ 19,482.00	PRO8000 LD & TEC Controller, 1000mA/16W, 9-pin/15-pin D-Sub Connector
ITC8102DS15	$ 2,040.00	£ 1,285.20	€ 1.897,20	¥ 19,482.00	PRO8000 LD & TEC Controller, 1000mA/16W, 15-pin D-Sub Connector

Benchtop Drivers
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Pigtailed Lasers
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PRO8000 Photocurrent Measurement Module – PDA8000 Series

PDA8000 Single- and Dual-Channel Photocurrent Modules

Features

- Single- or Dual-Channel Modules
- High-Precision Measurements: 16-Bit Resolution
- 7 Measurement Ranges From 10nA to 10mA
- Precise Optical Power Measurements With High Resolution and Large Dynamic Range Using Calibrated Photodoides
- Manually or Remotely Controlled

Introduction

The PDA8000 photocurrent measurement module is an ideal companion for our other PRO8000 series plug-in modules. It provides precise photocurrent measurements from a few pA to 10mA. An oversampled 16-bit A/D converter is used to ensure a measurement resolution of ±0.025% of the full-scale reading. These features, combined with the built-in, low-noise photodiode bias make this instrument an ideal photodiode current amplifier.

Optical Power Read-Out

With calibrated photodiodes the PDA8000 modules facilitate direct read-out of optical power. Through the input screen of the PRO8000 chassis, a photodiode responsivity value can be entered. This actually allows the direct entry of standard calibration data provided by photodiode manufacturers when a calibrated diode is purchased.

Computer Control IEEE-488.2

As with all PRO8000 modules, all of the commands can be accessed via the IEEE-488 interface. This includes access to the calibration factor, the photodiode bias voltage, all of the measurement control parameters, and the measurement results.

PDA8000 Measurement Range

Measurement Range	Resolution	Accuracy
10mA	0.1µA	±0.025% Full Scale
1mA	10nA	±0.025% Full Scale
100µA	1nA	±0.025% Full Scale
10µA	0.1nA	±0.025% Full Scale
1µA	10pA	±0.025% Full Scale
100nA	1pA	±0.25% Full Scale
10nA	0.1pA	±0.8% Full Scale

Modules for Optical Power Measurement

The PDA8000 is designed as a plug-in module for the PRO8000 platform, and is recognized by the chassis when powered. All of the control functions of the photocurrent amplifier can be used in manual or remote modes.

The single- or dual-channel photocurrent measurement modules in the series enable high-precision measurement of photocurrents with 16-bit resolution. There are seven measurement ranges from which to select: for the most sensitive 10nA full scale setting, the resolution is 0.1pA; and for the largest full-scale range of 10mA, the resolution is 0.1µA.

For a calibrated photodiode, the photocurrent module can be used as a precise optical power meter with high resolution and a large dynamic range.

Specifications

- **Measurement Resolution:** ±0.001% of Full Scale
- **Photodiode Polarity:** Freely Selectable
- **Setting Range of Bias Voltage:** 0.1V to 10V
- **Setting Range of Sensitivity for Power Display:** Freely Programmable
- **Input Resistance:** Virtual Ground
- **Temperature Coefficient:** ≤50ppm/°C

General Data

- One Single and One Dual Channel Module
- **Photodiode Connectors:**
  PDA8000-1 1xBNC
  PDA8000-2 2xBNC
- **Module Width:** 1 Slot

All data valid at 23 ± 5°C and 45 ± 15% relative humidity

PRO800 With PDA8000-2 and ITC8022 Modules

ITEM	$	£	€	RMB	DESCRIPTION
PDA8000-1	$ 900.00	£ 567.00	€ 837,00	¥ 8,595.00	Photocurrent Measurement Module, 1-Channel
PDA8000-2	$ 1,020.00	£ 642.60	€ 948,60	¥ 9,741.00	Photocurrent Measurement Module, 2-Channels

PRO8000 Laser Source and Optical Switch Modules

LS8000 WDM8000 and CWDM8000 DFB Laser Source Modules

Introduction

The PRO8000 system offers an extensive range of DFB laser source modules for the DWDM and the CWDM domain, covering the 1470-1620nm wavelength range on the 50GHz ITU grid. They provide 10mW or 20mW output*, plus power tuning >6dB (typ. 10dB), and wavelength tuning over ±0.85nm. These light source modules have been designed for excellent stability in power and wavelength for reliable measurement results, as required in test setups to characterize Bit Error Rate (BER) link performance and EDFA parameters. The modules feature internal modulation capabilities for flexible coherence control, especially the triangular modulation format for efficient suppression of stimulated Brillouin scattering in fibers. Ask our Tech Support representatives for customized LS8000 sources.

* Depending on laser diode availability

PRO8000 Laser Module Highlights

- CW DFB Laser Source
- L-, C-, and S-Band on 50GHz ITU Grid*
- 10mW and 20mW Optical Power*
- Excellent Wavelength & Power Stability (±2pm, ±0.01dB for 24h)
- Wavelength Tuning (±0.85nm)
- Power Tuning (Typ. 10dB)
- Versatile Coherence Control (To Avoid Stimulated Brillouin Scattering in Fiber Spans)

* Depending on laser diode availability

For Technical Details, Specifications, the ITU Grid, and Pricing, Go to Pages 556-565

Application Idea

Incorporate laser source and optical switch modules, along with PDA8000 photodiode amplifier, for a versatile and modular test system.

Optical Switch Modules

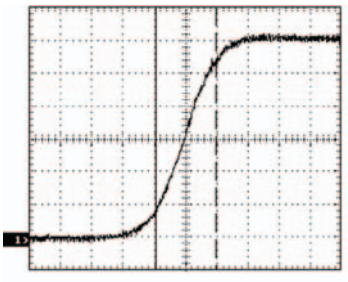
Introduction

The OSW8000 optical switch modules provide additional building-blocks when configuring automated optical test networks. Four different bidirectional switching models are available, providing highly flexible routing of optical paths.

See Pages 1038-1039 for Pricing and Specifications.

Switch Module Highlights

- Very Fast Response Time, 0.5ms Typical, 1ms Max
- Low Insertion Loss
- Excellent Repeatability of ±0.01dB
- MEMS Technology for Long Life (10^9 Cycles)
- Four Modules: 1x2, 1x4, 1x8, and 2x2
- Up to Eight Switch Modules per PRO8000 Mainframe
- Free LabVIEW™ and LabWindows™/CVI Drivers
- Efficient Test Signal Routing in Branching Test Beds



Rise time measurement of the MEMS-based optical switch measured between the 10% and 90% points is 480µs.

Test and Measurement Platform – TXP5000 Series

Introduction

The TXP5000 Series offers more than just a modular platform. It is designed for maximum flexibility and efficiency to provide application-specific solutions. It is optimized for larger and complex systems in industrial environments without compromising performance and reliability. The architecture and the broad range of modules of the TXP5000 series cover applications from many optical disciplines like polarization measurement and control, laser diode current control, optical signal generation, and monitoring.

TXP5016 Chassis
Modules Sold Separately
Laptop Not Included

Benchtop and Rack Version

The TXP system is available in two versions: TXP5004, the 4-slot, USB-controlled benchtop unit, which is optimized for R&D test and measurement applications in lab environments; and the TXP5016, the 16-slot, Ethernet-controlled rack unit optimized for scalable test and controlling applications for the industrial community. An additional USB controlled adapter, TXP5001AD, for a single module offers low-cost application of single modules for evaluation (see next page for details).

The family of plug and play modules for a broad range of photonic applications include integrated laser drivers and TEC controllers, DWDM DFB laser sources, tunable lasers, and advanced polarimetry control and measurement devices. All modules are interchangeable and can be integrated with LabVIEW™ and LabWindows™/CVI control.

The TXP5000 series offers a scalable and cost-effective test and measurement system with a very efficient architecture. The modular components are optimized for the desired functionality, and better economy processors and memory capacity are centralized into the mainframe. These components are only integrated into the modules when required (e.g. modules with real time applications). Modules with simple functions, such as laser diode control, share the mainframe.

General Specifications

Chassis

- **TXP5004:** 4 Slot with USB Control
- **TXP5016:** 16 Slot with Ethernet Control
- **TXP5001AD:** Single Module Adapter With Desktop Power Supply and USB Control (See Page 445)

Available Modules

- **ITC5000:** Combination Laser Diode Current & TEC Temperature Control (See Page 446)
- **LS5000:** Optical Sources From 1470-1620nm (See Page 564)
- **IPM5300:** High-Speed Inline Polarimeter (See Page 980)
- **DPC5500:** Inline Deterministic Polarization Controller (See Page 979)
- **ECL5000D:** Continuously Tunable External Cavity Diode Laser (See Page 541).
- **PAX5710/5720:** Rotating λ/4 Wave Plate Polarimeter for VIS and NIR (See Page 976)

Typical Applications

Test and measurement houses will find the compact TXP5016 invaluable, with its full range of modules for device qualification, test and burn-in. In the manufacturing environment, the TXP is a great system for production testing of optical equipment. The large-scale integration and Ethernet control easily allow remote testing throughout your network. Different modules may also be set up into different user groups within the network to customize testing among an array of users.

User-Friendly Controls

The TXP5000 system utilizes USB and TCP/IP protocol for communication, which offers easy connection to PCs and integration into networks. The TXP5004 benchtop is controlled by a connected PC via USB, whereas the TXP5016 rack unit offers direct connection to Ethernet networks by an embedded server just like any other "peer." The system is easily configured through the TXP Explorer, a control tool similar to Windows™ Explorer, that comes with all TXP5000 systems. The TXP Explorer makes local or remote administering very easy. Since the TXP Explorer is completely network-based, it enables worldwide access to the system.

Modularity, Interchangeability, & Flexibility

TXP5004

The TXP5016 Series chassis is a 3U-high enclosure and provides 16 slots. It is very cost efficient when integrated into large test and measurement systems, such as life test or burn-in systems, due to its compact module design. This makes the TXP5000 series an ideal candidate for cleanroom applications where space is very expensive.

The "hot swap" feature of the TXP5000 system allows any module to be replaced while the system is on, without interrupting any others in the same mainframe that are in process application.

Arbitrary module assemblies can be pooled together into individual systems by specialized software modules, allowing them to perform new and more complex tasks through a single interface or GUI. This facilitates the ever-changing requirements and the reuse of existing hardware for customized and more specialized applications. A customer who already owns the necessary cards needs only the software module to run that application. The internet-embedded architecture allows new or upgraded GUIs, software tools, and firmware to be easily downloaded and installed into the system.

Security Interlock

The TXP chassis provide global interlocks to secure setups involving the TXP against external events, such as opening of lab doors or pushing of emergency switches. The reaction of the TXP depends on the type of card inserted. Besides the global interlock, some TXP cards have an individual interlock line.

Test and Measurement Platform – TXP5000 Series (cont.)

TXP5000 Series Chassis Specifications

	TXP5016	TXP5004	TXP5001AD*
Maximum Power Consumption	400VA	150VA	75VA
Number of Slots	16 Slots	4 Slots	1 Slot
Operation	GUI on Remote PC		
Remote Interface	Ethernet 10BaseT	USB 2.0	USB 2.0
Remote Drivers	LabVIEW™, LabWindows/CVI™, and C++		
Chassis Ground	4mm Banana		4.8mm Fast-On
Line Voltage	100 to 240V AC ±10%		
Line Frequency	50 to 60 Hz ± 5%		
Operating Temperature	0 to +40°C		
Storage Temperature	–40 to +70°C		
Dimensions	449 x 148 x 435mm	168 x 148 x 315mm	124 x 23 x 112mm
Weight (w/o Modules)	7kg	3kg	0.2kg

*Please see order information at the bottom of the page.

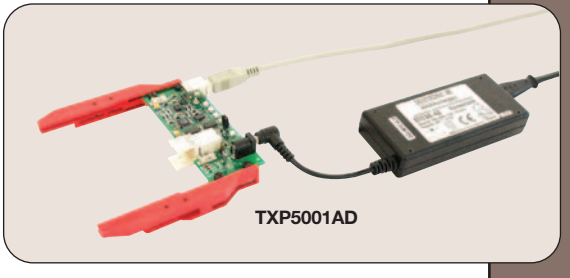
Two Chassis Models: 4 Slot and 16 Slot System

ITEM	$	£	€	RMB	DESCRIPTION
TXP5004	$ 1,198.80	£ 755.20	€ 1.114,90	¥ 11,448.50	TXP Test and Measurement, 4 Slot With USB Control
TXP5016	$ 3,480.00	£ 2,192.40	€ 3.236,40	¥ 33,234.00	TXP Test and Measurement, 16 Slot with Ethernet Control

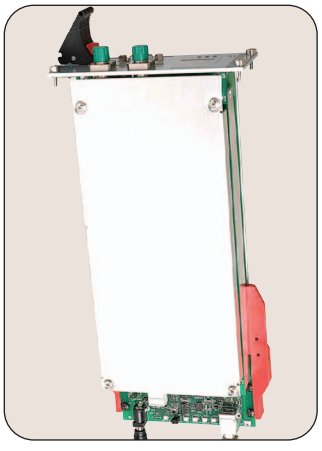
Each system is assembled and tested for specific configurations. Contact our technical support team for expert advice on the right choice of modules.

Single Module Interface – TXP5001AD

- Power/Control Any TXP Series Module
- Ideal for Test Bench Operation of a Single Module
- USB Interface for Direct PC Connection and Control
- Also Available as an OEM Integration Tool for TXP5000 Technology
- Complete With External Power Supply



TXP5001AD



The TXP5001AD is a low-cost adapter for any TXP5000 Series module. It provides a USB interface and allows a single module to be operated without any additional equipment except a PC. The adapter comes with the TXP5000 software installation package including LabVIEW™ and LabWindows/CVI™ drivers. The connection to the user PC is accomplished via the included USB cable. The adapter offers the easiest and most cost-effective way to start using the modules of the TXP5000 series, such as laser diode controllers, optical signal sources/controllers, and polarimetric controllers and analyzers. A 48V power supply is included that operates from 100-240VAC, 50-60Hz.

TXP5001AD shown here with a TXP5000 Module (not included). See the following pages for details on TXP laser controllers, TEC controllers, and laser sources.

Single Module Test Bench Adapter

ITEM	$	£	€	RMB	DESCRIPTION
TXP5001AD	$ 270.00	£ 170.10	€ 251,10	¥ 2,578.50	TXP Test and Measurement, 1 Module Adapter With USB

Benchtop Drivers
Platform Drivers
OEM Drivers
Laser Diode Mounts
Laser Diodes
Pigtailed Lasers
Laser Modules
Accessories

Combination Laser/TEC Controller – ITC5000 Series

ITC5000 Combination Laser Controller/TEC Controller

Introduction

The ITC5000 series consists of current and temperature controller modules for the TXP5000 series. They allow space saving simultaneous current and temperature control of a laser diode using a single module. The ITC5000 series offers three current ranges (±200mA, ±500mA, and ±1A) that support all laser diode and photodiode polarities. These modules can be modulated externally or internally. All three models incorporate a TEC controller that provides up to ±1.5A/5.25W.

Besides common protection functions such as interlock and soft start, an advanced circuit design ensures that transient spikes cannot affect the laser current.

The temperature controller, identical for all modules, is designed to keep the laser temperature constant for highly stable power and wavelength operation. Separate adjustment of the P, I, and D shares of the temperature servo loop allow optimizing temperature settling times. An additional temperature window protection circuit switches the laser current off if the laser temperature leaves a preset temperature window.

The ITC5000 models offer exceptional noise and stability performance. All laser diode and photodiode pin configurations are supported.

Extremely Low Noise

The combination controller modules of the ITC5000 series all feature exceptionally low laser current noise (from 2µA to 20µA depending on the model, see table next page), and exceptional temperature stability of better than 0.002°C, at 20°C. The performance of the ITC5000 Series is independent of the operation mode – constant current (CC) or constant power (CP).

User-Friendly Controls

After installing a new module into any TXP5000 chassis, the modules can be configured via remote computer interface. All settings can be stored on the computer for recalling after the next time it is powered on. The P, D, and I settings of the PID control loop can each be set independently to optimize the temperature response of the system to different thermal loads.

Laser Diode Protection Features

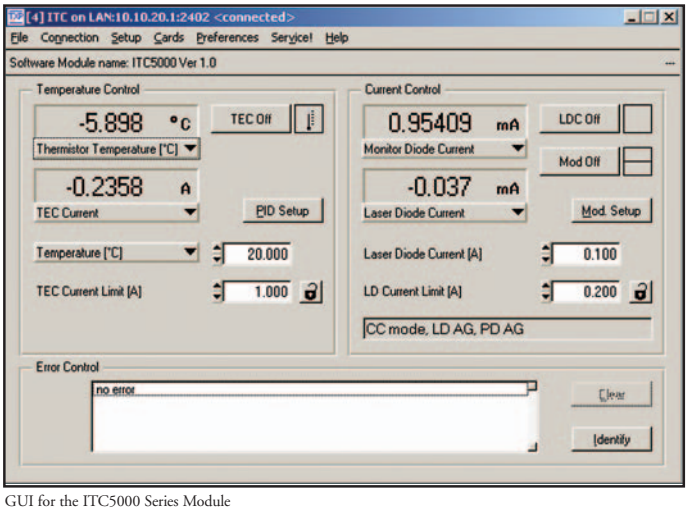
The ITC5000 series modules incorporate proven laser protection features to safeguard sensitive laser diodes. Besides common protection functions, such as current limits, laser current soft start, and interrupt protection, an advanced circuit design ensures that AC power line transients or power outages, as well as RF pickup cannot affect the laser diode.

A laser current limit can be set to safeguard the laser diode. To protect the Peltier element, a TEC current limit is also provided. Additionally, a temperature window can be set that will shut the laser down in the event that the high or low thresholds of the window are exceeded. The limits and the window can be set independently for each installed module.

All ITC5000 modules also include an interlock and a delay of the output current.

Highlights

- Simultaneous Current and Temperature Control
- Low Noise and Ultra-Stable Control of Injection Current
- Constant Current and Constant Power Operation
- Laser Driven With Respect to Ground
- Protected Analog Modulation of the Laser Diode
- Extensive Protection Features
- Shortest Temperature Settling Times



GUI for the ITC5000 Series Module

ITEM	$	£	€	RMB	DESCRIPTION
ITC5022	$ 2,040.00	£ 1,285.20	€ 1.897,20	¥ 19,482.00	TXP5000 Laser Diode Current/TEC Controller ±200mA/1.5A
ITC5052	$ 2,040.00	£ 1,285.20	€ 1.897,20	¥ 19,482.00	TXP5000 Laser Diode Current/TEC Controller ±500mA/1.5A
ITC5102	$ 2,040.00	£ 1,285.20	€ 1.897,20	¥ 19,482.00	TXP5000 Laser Diode Current/TEC Controller ±1A/1.5A

Combination Laser/TEC Controller – ITC5000 Series (cont.)

Specifications

	ITC5022	ITC5052	ITC5102
Laser Controller: Current Control			
Current Range	0 to ±200mA	0 to ±500mA	0 to ±1A
Compliance Voltage		>2.5V (Typical >3V)	
Resolution	4µA	10µA	20µA
Accuracy (Typ. Full Scale)	±100µA	±250µA	±1mA
Noise Without Ripple (10Hz to 10MHz, RMS, Typ.)	<2µA	<7µA	<20µA
Ripple (50Hz, RMS, Typ.)		<0.5µA	
Transients (Processor, Typ.)	<15µA	<30µA	<50µA
Transients (Other, Typ.)	<200µA	<500µA	<1mA
Drift (24 hrs, at Constant Ambient Temperature, Typ.)	<2µA	<5µA	<20µA
Temperature Coefficient		<50ppm/°C	
Laser Controller: Power Control			
Control Range of Photocurrent		10µA to 5mA	
Reverse Bias Voltage		0 to 4V (Adjustable)	
Resolution Photocurrent		0.1µA	
Accuracy (Typ.)		±5µA	
Laser Controller: Current Limit			
Setting Range	0 to >200mA	0 to >500mA	0 to >1A
Resolution	50µA	125µA	250µA
Accuracy	±200µA	±500µA	±2mA
Laser Voltage Measurement			
Measurement Principle		4-Wire (Improves Accuracy by Compensating for Cable Resistance)	
Measurement Range		0 to 4V	
Resolution		0.15mV	
Accuracy		±5 mV	
Analog Modulation			
Input Impedance		10kΩ	
Modulation Coefficient CC	20mA/V ±10%	50mA/V ±10%	100mA/V ±10%
Small Signal 3dB-Bandwidth at CC		200kHz	
Modulation Coefficient CP		0.5mA/V ±10%	
Internal Modulation			
Form		Sinusoidal, Triangle, Square	
Frequency		0.02kHz to 20kHz	
Rise/Fall Time		4µs	
Temperature Controller: Output			
Range of TEC Current		-1.5A to +1.5A	
Compliance Voltage		>3.5V	
Maximum Output Power		5.25W	
Measurement Resolution of TEC Current		60uA	
Measurement Range TEC Voltage		-4V to 4V	
Measurement Resolution of TEC Voltage		0.2mV	
Noise and Ripple Typical		<1mA	
Temperature Sensors: Thermistor			
Control Range		0.2kΩ to 40kΩ	
Resolution		0.8Ω	
Accuracy		±10Ω	
Stability (24hrs)		1Ω	
General Data			
Common LD/TEC Connector		15-Pin D-Sub	
LD MOD IN Connector		SMA	
Size		1 Slot	
Weight		675g	

All data valid at 23 ± 5°C and 45 ± 15% relative humidity.

TXP DWDM Laser Sources – LS5000 Series

LS5000
DFB Laser Source Modules

Features
- CW DFB Laser Source
- L-, C-, and S-Band on 50GHz ITU Grid*
- 10mW and 20mW Optical Power*
- Excellent Wavelength and Power Stability (±2pm, ±0.01dB for 24h)
- Wavelength Tuning (±0.85nm)
- Power Tuning (>6dB, Typical 10dB)
- Versatile Coherence Control

*Depending on Laser Diode Availability

For More Information and Pricing, See Pages 564-565

The LS5000 series consists of DWDM DFB laser source modules for the TXP5000 platform. They cover the 1528 to 1612nm wavelength range on the 50GHz ITU grid and provide 10 or 20mW.* The optical power can be tuned over up to 10dB and the wavelength over ±0.85nm. The light source modules have been designed for excellent stability in power and wavelength for reliable measurement results as required in test setups to characterize BER (Bit Error Rate) performance and EDFA parameters. The modules feature internal modulation capabilities for flexible coherence control to suppress coherent optical effects, especially the triangular modulation format for efficient suppression of Stimulated Brillouin Scattering in fibers.
*Depending on Laser Diode Availability

ITEM	$	£	€	RMB	DESCRIPTION
LS5-X-XXX-10-NM	$ 2,200.00	£ 1,386.00	€ 2.046,00	¥ 21,010.00	WDM Laser Source 10mW, No Direct Modulation
LS5-X-XXX-20-NM	$ 2,500.00	£ 1,575.00	€ 2.325,00	¥ 23,875.00	WDM Laser Source 20mW, No Direct Modulation

TOOLS OF THE TRADE

TXP Series Polarimeter Modules

Inline Deterministic Polarization Controller

The DPC5500, an in-line deterministic polarization controller, combines deterministic state of polarization control, high speed, low loss, and high accuracy in a unique and unprecedented way. It is a versatile solution that may be utilized in many applications, ranging from R&D and manufacturing to industrial applications.

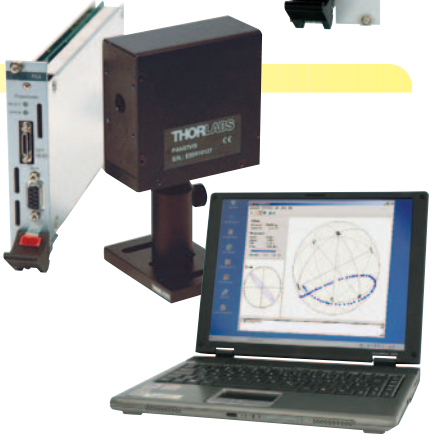
Inline Polarimeter

Our TXP measurement platform offers a multitude of plug-in modules to satisfy the most demanding test and measurement applications. The IPM5300 fiber-optic polarimeter module enables high-speed measurements of the state of polarization (SOP).

See Polarization Tools on Pages 975-983

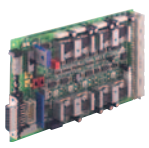
Polarimeter

Our PAX5700 series rotating wave plate-based polarimeter for free-space and fiber applications offers precision SOP measurement. It has a high dynamic range of up to 70dB in the wavelength range of 400-1700nm. It is designed for lab and industry application measurements. The modular design of the PAX5700 series allows easy integration into setups for Jones/Mueller Matrix analysis.



Laser/TEC OEM Drivers Selection Guide

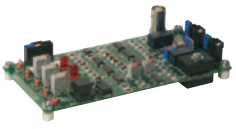
Pages 449-457




OEM Laser Diode & Temperature Controllers

- Low-Noise, Low-Drift Current Source
- Precise TEC Controller

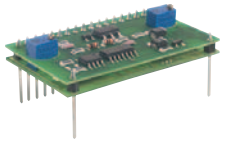
See Pages 450-453

500mA Laser Diode Driver/250mA Blue-Violet Laser Driver

- IP500: Universal 500mA Board Level Driver
- IP250-BV: Higher Compliance Voltage for Blue Laser Diodes

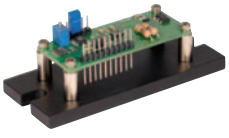
See Page 454




Laser Diode Driver With Constant Power and Analog Modulation

- LD1100: Constant Power CW Applications, Up to 250mA of Drive Current
- LD2000R: Automatic Power Control, Actively Stabilized Laser Output

See Page 455




250mA and 2.5A Precision Constant-Current Laser Driver

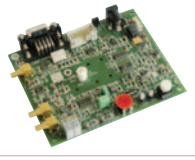
- LD1255R: Features High Stability, Low Noise
- LD3000R: Utilizes High-Current Components

See Page 456

3W OEM TEC Controller

- Offers Space and Savings
- Precise Temperature Control

See Page 457

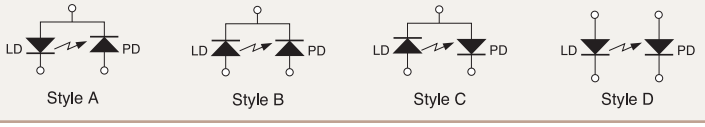


VCSEL Laser Diode Controllers

- 2 Models: VLDC002 and VITC002
- VITC002 Has Additional Temperature Control

See Page 457

Supported Pin Codes



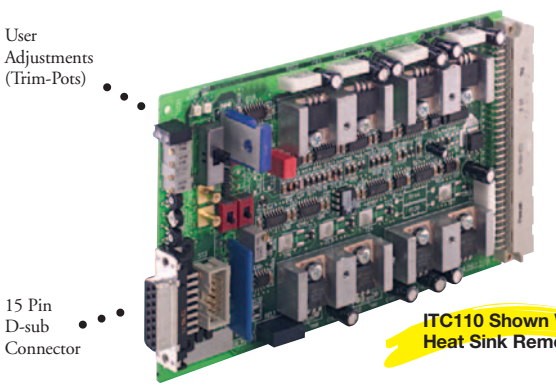
OEM Laser Diode & Temperature Controllers

Model #	I max	V max[1]	ACC	APC	STYLE A	STYLE B	STYLE C	STYLE D	EXT MOD	PWR SUPPLY	COMMENTS
VLDC002	25mA	5V	✔						✔	+5V [2]	Driver Card for VCSEL
VITC002	25mA	5V	✔						✔	+5V [2]	Driver Card for VCSEL
LD2000R	100mA	3.5V		✔	✔			✔	✔	8–12V	Single Supply Operation w/I lim and P lim
EK2000	100mA	3.5V		✔	✔			✔	✔	8–12V	Pre-Wired LD2000 Kit
ITC102	200mA	4V	✔	✔	✔	✔	✔	✔	✔	±12V	Full Featured With TEC Controller
LD1100	250mA	8V		✔	✔	✔		✔		8–12V	Single Supply Operation
EK1101	250mA	8V		✔	✔					8–12V	Pre-Wired LD1100 Kit, Style A
EK1102	250mA	8V		✔		✔				8–12V	Pre-Wired LD1100 Kit, Style B
LD1255R	250mA	3.3V	✔		✔			✔	✔	±12V	Precision Constant Current Driver
IP250-BV	250mA	8V	✔	✔		✔	✔		✔	±12V	Common Cathode Blue Lasers
IP500	500mA	3V	✔	✔	✔	✔	✔	✔	✔	±5V	Universal Driver With I lim and P lim
ITC110	1A	4V	✔	✔	✔	✔	✔	✔	✔	±12V	Full Featured With TEC Controller
LD3000R	2.5A	3.3V	✔		✔			✔	✔	±12V	High-Current LD1255
ITC133	3A	4V	✔	✔	✔	✔	✔	✔	✔	±12V	Full Featured with TEC Controller
TCM1000T	1A	3V	✔	✔	✔	✔	✔	✔	✔	+5V	High-Precision Temperature Controller

1) Represents Compliance Voltage

2) Power Supply Included With Driver

ITC100 Series Combination Laser Diode & TEC Controllers



ITC110 Shown With Heat Sink Removed

ITC110 With Optional ITC100D Display Module (See Page 453), ITC100F Front Panel, and Heat Sink

Introduction

The board level controllers of the ITC100 series combine a low-noise, low-drift current source with a precise thermoelectric cooler (TEC) controller on a single Eurocard-sized board.

Designed with the OEM customer in mind, the ITC100 Series controller board can be operated with or without the display board (ordered separately), which can be connected at any time to set the system control parameters. This facilitates integrating the main control board into OEM applications where the end-user does not need access to the laser/TEC control circuit. This also helps to minimize OEM system costs.

The ITC100 series includes three controller models that offer maximum laser drive currents of ±200mA, ±1A, and ±3A. All three models feature bipolar temperature control, two models offer ±2A/12W, and one offers ±3A/18W of TEC drive power. The ITC133 requires forced cooling or a bigger heat sink for delivering 3A of laser current and 3A of TEC (Peltier element) current simultaneously. With the standard heat sink and convection cooling, the total current is thermally limited to a value between 3A and 6A, which depends on supply voltage, output voltage, and ambient temperature.Operating the controllers only requires a bipolar DC power source of ±(12-15)V. It is important that the power source is free from excessive noise and transients.

OPERATION

System Setup

Setting up ITC100 modules is simple but requires knowledge and skills in electronics. After providing the proper supply voltage of ±(12-15)VDC, four switches allow the LDC mode (CC or CP), LDC polarity, TEC temperature transducer/sensor, and TEC integral feedback control ON/OFF to be set. Additionally, eight trim-pots are provided to set the LD current limit, laser current or power set point, TEC current limit, TEC temperature set point, PID control settings (one trim-pot each for P, I, and D), and the temperature window limits. A complete list of the system trim-pots is shown below in Table 1.

TRIM-POT	DESCRIPTION OF FUNCTION
P1	Sets the Laser Diode Limit Current
P2	Adjusts Laser Set Current (CC) or Power (CP)
P3	TEC Current Limit
P4	TEC Temperature (or Resistance) Set Point
P5	Set TEC P-Share of PID
P6	Set TEC I-Share of PID
P7	Set TEC D-Share of PID
P8	Set Temperature Window

Table 1. Data table showing the functions of the user-adjusted setup controls.

Easy System Integration

Two electrical connectors are provided to facilitate integrating these OEM drivers into larger systems. A 15-pin D-sub connector located along the front edge of the main board provides all the required connections to operate the laser diode and TEC element. If a Thorlabs Laser Mount is used, a special Y cable (CAB430) can be ordered for connection. It also provides an interlock connection that can be used to trigger a laser shutdown, a safety feature that is often mandatory for eye protection in open-beam setups. The other is a 64-pin DIN connector located along the back edge of the board (see photograph on following page). Either of these connectors can be used to connect the laser diode, photodiode, and TE cooler. This connector provides access to the full array of Input/Output functions of the ITC100 series controllers. Aside from the basic connections to the laser diode and TEC element, it provides connections for laser modulation, temperature tuning, and a host of monitoring signals (such as laser current, laser power, temperature, and temperature deviation from the set point). See Figure 1 on the next page.

External Modulation

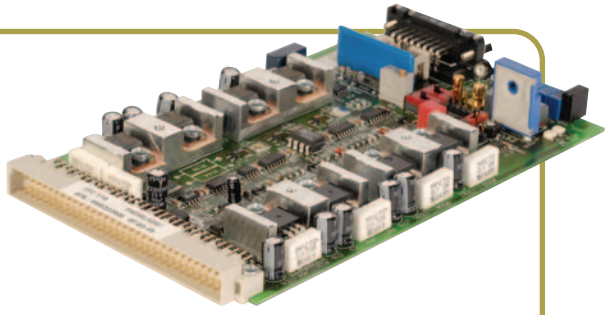
All of the ITC100 series controllers can be externally modulated – independent of the mode of operation, constant current (CC), or constant power (CP). An analog modulation input signal, -5V to +5V, can be put into an SMB coaxial connector located near the front of the board. A TTL modulation signal is input via the 64-pin connector at the rear of the board. The maximum analog modulation frequency in CC mode varies

The optional display module ITC100D shows all important set and measurement values of the ITC100. It can be used to adjust the set values or to occasionally check the set parameters of several boards.

ITC100 Series Combination Laser Diode & TEC Controllers
(Page 2 of 4)

ITC100 Series Highlights

- Extensive Laser Diode Protection Features
- Excellent Temperature Stability: <0.004°C
- Supports AD590, AD592, and LM335 IC Sensors
- Supports All Common NTC Thermistors
- Adjustable P, I, and D Temperature Control Loop
- Analog Modulation of Laser Power Up to 200kHz
- Supports All Laser Diode Pin Configurations



Back view of the ITC100 controller board, with both the display board and the heat sink removed.

between the three models (20kHz, 50kHz, and 200kHz). See the complete list of specifications shown on pages 452-453 for details.

Calibration of the Monitor Photodiode
When using the optional display board, the monitor photodiode current can be calibrated to provide a scaled output voltage that represents the optical power measured in Watts. Using the front panel calibration adjustment, the display of the laser power can be set to the responsivity of the monitor photodiode that is internal to the laser package. In many applications, this eliminates the need for a separate optical power meter.

Displaying All Important Parameters
The laser current, photocurrent, laser current limit, actual temperature, set temperature, and TEC current limit can be displayed on the optional 3 1/2 digit display module, ITC100D.

Power Supply for the ITC100 Series
The ITC100 series control boards require a ±12V to ±15V power supply. Please contact Thorlabs' technical support engineers with any questions or recommendations on suitable power supplies.

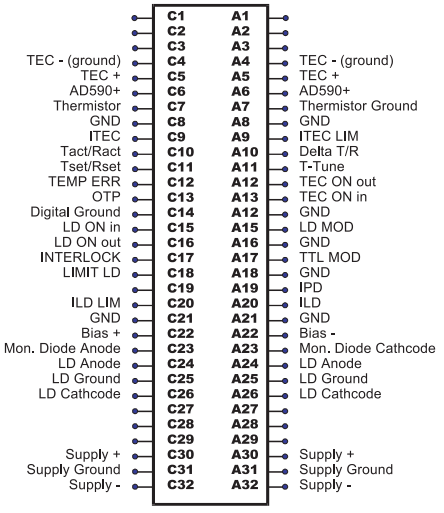


Figure1
Diagram of the 64-Pin DIN Connector With its Corresponding Function.

Adaptable PID Temperature Control Loop
The series features a full PID feedback loop with independent P, I, and D settings for temperature stabilization. When tuned, the PID circuit typically settles to the desired temperature set point within seconds. The proportional gain segment of the feedback loop provides simple linear scaling with respect to the error signal (the difference between the actual and desired temperatures). The integral portion of the feedback loop provides an improved off set regulation, thus allowing the system to approach the set point more accurately. The differential portion of the feedback loop produces a response proportional to the rate of change of the error signal, allowing the dynamic response (settling time) of the system to be optimized. This control will decrease the amplitude of overshot temperature set points.

Using three 1-turn trim-pots (see photograph on previous page), the contribution of each of the PID components can be adjusted independently to optimize the system response time for the application at hand.

FEATURES

Constant Current & Constant Power Modes
The ITC100 Series controllers support operating laser diodes in both constant current (CC) and constant power (CP) modes, while supporting all laser diode and photodiode pin configurations. To ensure the best possible performance, laser diodes are driven with respect to ground. In comparison to controller designs that use a floating-ground, the ITC100 series controllers offer significant advantages regarding noise, transient suppression, and stability.

Extensive Laser Protection
After the module is powered on, a soft-start circuit ensures a slow increase in laser current without voltage peaks. The laser is also protected when the laser controller is turned off by an automatic shorting of the laser diode to ground. A built-in protection feature prevents the laser current limits from being exceeded, even while using external modulation. Additional protection features include the following: over and under temperature protection, a supply voltage monitor to ensure appropriate supply voltage, and a safety interlock signal that can be used to shut down the laser (often required for higher power lasers).

Temperature Window Protection
To additionally safeguard the laser diode, the ITC100 series provides an adjustable temperature window that allows both an upper and lower temperature limit to be set. If the actual laser temperature departs from the preset window, the laser diode injection current will automatically be switched off. When the laser temperature is within the temperature window again, the laser current will slowly switch on. If required, the temperature window protection can be disabled.

Laser/TEC Drivers Benchtop
Laser/TEC Drivers Platforms
Laser/TEC OEM Drivers
Laser Mounts
Laser Diodes
Pigtailed Lasers
Laser Modules
Accessories

ITC100 Series Combination Laser Diode & TEC Controllers
(Page 3 of 4)

Supported Temperature Sensors
All common NTC thermistors and IC temperature sensors (AD590, AD592, and LM335) can be used as the temperature feedback for the ITC100 series controllers. The temperature displays in ohms when using a thermistor and in °C when using temperature sensor ICs.

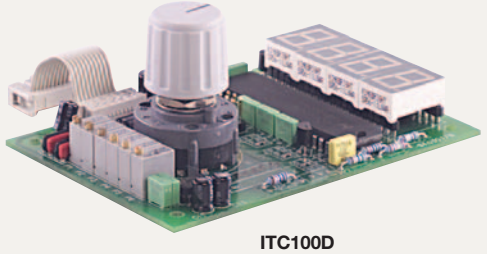
CONTACT US
Thorlabs Technical Support
To get further information and facilitate the integrating of the OEM ITC100 Series into your system, please contact our technical support group at any of the offices listed on the back cover of this catalog.

ITC100 Laser Controller Specifications

	ITC102	ITC110	ITC133
Current Control			
Display Laser Current ON		LED	
Trim Potentiometers (15-turn)		I_{LD}, I_{PD} resp. P_{LD}, $I_{LD\ LIM}$	
Control Range of Laser Current	0 to ± 200mA	0 to ± 1A	0 to ± 3 A[1)]
Compliance Voltage		> 4V	
Setting Accuracy / Repeatability		± 2%(full scale)/±0.1%	
Noise (10Hz to 10MHz, rms)	< 2µA	< 6µA	< 25µA
Drift (30min., 0-10Hz, Typ.)	< 20µA	< 100µA	< 300µA
Temperature Coefficient		< 50 ppm/°C	
Power Control			
Control Range Photocurrent		5µA to 2mA	
Accuracy / Repeatability		± 2%/±0.1%	
Current Limit			
Setting Range	0 to >200mA	0 to >1A	0 to >3A
Setting Accuracy / Repeatability		± 2%/±0.1%	
Analog Modulation Input			
Input Resistance		10kΩ	
Modulation Coefficient, CC	40mA/V ±5%	200mA/V ±5%	600mA/V ±5%
Small Signal 3dB Bandwidth, CC	DC to 200kHz	DC to 50kHz	DC to 20kHz
Modulation Coefficient, CP		0.4mA/V ±5%	
TTL Modulation Input			
Rise/Fall time	< 10µs	< 50µs	< 100µs
TTL Control Input		LD ON	
Measurements and Control Outputs			
Analog Measurement Values		I_{LD}, I_{PD}, $I_{LD\ LIM}$	
Measurements Outputs		0 to ± 5V	
Measurements Accuracy		± 2%	
TTL Control Outputs		LD ON, LIMIT	
General Data			
Supply Voltage/Current	±12 to ±15V/2.3A	±12 to ±15V/3.1A	±12 to ±15V/3.1A
Operating Temperature		0 to + 40°C	
Storing Temperature		-40°C to +70°C	
Warm-Up Time for Rated Accuracy		10min	
Dimensions (W x H x D)		100 x 42 x 160mm (Eurocard)	
Weight		< 0.7kg	

1) The total combined current for the ITC133 is limited by the total thermal dissipation loss. Optimized cooling by fan or bigger heat sink allows 3A LD and 3A TEC at the same time provided the power supply supplies 6.1A

ITC100D Module Specifications



ITC100D

- **Resolution:** 3.5 Digits
- **Displayed Parameters LDC:** Laser Current, Monitor Current, and Laser Current Limit

Displayed Parameters
- **TEC:** Actual Temperature, Set Temperature, and TEC Current Limit
- **Accuracy:** ±1 Digit
- **Operating Temperature:** 0 to +40°C

Storage Temperature:
- -40 to +70°C
- **Warm-Up Time for Rated Accuracy:** 10 minutes
- **Weight:** <0.1kg
- **Dimensions:** 100 x 70 x 45mm

ITC100 Series Combination Laser Diode & TEC Controllers
(Page 4 of 4)

ITC100 Temperature Controller Specifications

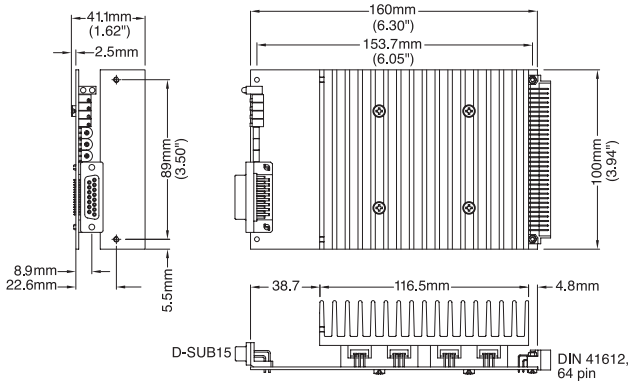
	ITC102	ITC110	ITC133[1]
Temperature Control			
Display TEC Current ON		LED	
Trim Potentiometers (15-turn)		$I_{TEC\ LIM}$, T_{SET} / R_{SET}	
Trim Potentiometers (1-turn)		P-, I- and D-Share	
TEC Output			
Control Range of TEC current	-2A to +2A	-2A to +2A	-3 A to +3A[1]
Compliance Voltage		> 6V	
Maximum Output Power	12W	12W	18W
Noise and Ripple	< 1mA	< 1mA	< 3mA
Thermistor Temperature Sensors			
Control Range		0.1Ω to 80kΩ	
Setting Accuracy (full scale)		± 2%	
Repeatability (full scale)		± 0.1%	
Temperature Stability typ.		< 2Ω	
IC Temperature Sensors AD590, AD592, & LM335			
Control Range		- 20°C to +80°C	
Setting Accuracy (Full Scale)		± 2%	
Repeatability (Full Scale)		± 0.1%	
Temperature Stability (typ.)		< 0.004°C	
TEC Current Limit			
Setting Range	0 to ≥2A	0 to ≥2A	0 to ≥3A
Accuracy		± 5%	
Temperature Control Inputs			
TTL Control Input		TEC ON	
Analog Control Input		T_{SET} / R_{SET}	
Input Resistance		10kΩ	
Input Coefficient Thermistor		16kΩ/V	
Input Coefficient IC-Sensor		20°C/V	
Measurement and Control Outputs			
TTL Control Outputs		TEC ON, TEMP OK	
Analog Outputs		T_{SET}/R_{SET}, T_{ACT}/R_{ACT}, $I_{TEC\ Lim}$ (I_{TEC}, DT/DR)	
Measurement Accuracy		±2%	

1) The total combined current for the ITC133 is limited by the total thermal dissipation loss. Optimized cooling by fan or bigger heat sink allows 3A LD and 3A TEC at the same time provided the power supply provides 6.1A

ITC Series KRYO Option
All three versions of the ITC100 series LD/TEC controllers can be modified to accept input from a Pt100 type thermistor, allowing use in cryostats and other extremely low temperature applications.

- **Control Range:** 76K–136K (200Ω – 450Ω)
- **Stability:** 0.005K (typ.)

Contact Europe@Thorlabs.com for special order information



Putting It All Together

TEC Mounts for 5.6mm & 9mm Laser Packages

LDM21

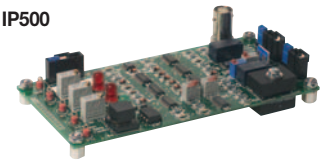
TCLDM9

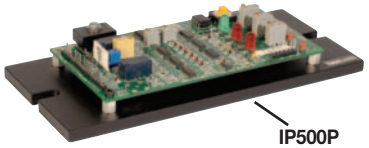
See Page 461 for Details

ITEM	$	£	€	RMB	DESCRIPTION
ITC102	$ 558.00	£ 351.50	€ 518,90	¥ 5,328.90	LD & TEC Controller, LD 200mA, TEC 12W
ITC110	$ 558.00	£ 351.50	€ 518,90	¥ 5,328.90	LD & TEC Controller, LD 1 A, TEC 12W
ITC133	$ 588.00	£ 370.40	€ 546,80	¥ 5,615.40	LD & TEC Controller, LD 3 A, TEC 18W
ITC100D	$ 150.00	£ 94.50	€ 139,50	¥ 1,432.50	ITC100 Display Control Module, Removable
ITC100F	$ 48.00	£ 30.20	€ 44,60	¥ 458.40	ITC100 Series Front Panel
ITC100P	$ 18.00	£ 11.30	€ 16,70	¥ 171.90	64-Pin Female DIN Connector
CAB430	$ 120.00	£ 75.60	€ 111,60	¥ 1,146.00	15-Pin D-Sub Connector for LD and TEC Controller

500mA Laser Diode Driver

IP500





IP500P
Sold Separately

The IP500 is a universal 500mA board-level driver capable of supporting all pin configurations in either constant current or constant power mode. Designed for use within higher-level assemblies, this versatile device can easily and safely control all laser diode/photodiode pin configurations in 5.6mm and 9mm lasers.

The driver accepts photodiode feedback currents of up to 2.0mA. Pin configurations and operating modes are easily set using on-board jumpers. Three indicators display whether the laser is enabled, operating at current limit, or in an alarm shutdown condition. There is also no need to power down the entire unit, because a separate enable switch turns the laser on and off. Connections are provided for remote interlocks and remote monitoring, and wire harnesses for all required connections are provided with the unit.

IP500 Features

- Supports all LD/PD Pin Configurations
- Constant Current & Constant Power Operation
- User-Configurable Current & Power Limits
- Laser Diode Inputs Shorted During Idle Operation to Protect the Device
- Auto Alarm Shutdown When Laser Connection is Open or Reversed
- Includes Input & Output Wires
- Test Points for Laser Diode Current, Monitor Photodiode Current, Current Limit & Power Limit Set-Point.
- OEM Plug-In Version Available; Call for Details

IP500 Specifications

- **Input Power:** ±5VDC @ 500mA

Constant Current Mode

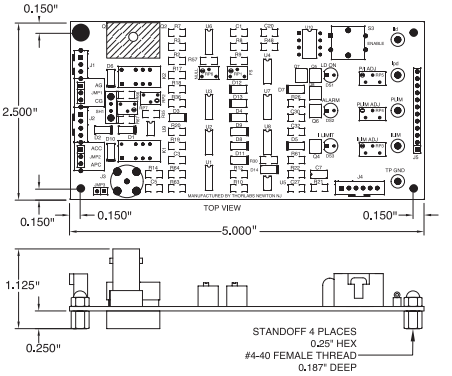
- **Control Range:** 0 to ±500mA
- **Setting Accuracy:** ±0.5mA
- **Compliance Voltage:** >3.0VDC
- **Ripple & Noise (10Hz to 10MHz):** <10µA RMS
- **Short-Time Fluctuations (<15s, <10Hz):** <50µA
- **Temperature Coefficient:** <100ppm/°C
- **Drift (30min, <10Hz):** <100µA
- **Limit Adjust Range:** 0->500mA
- **Limit Accuracy:** ±2.5mA

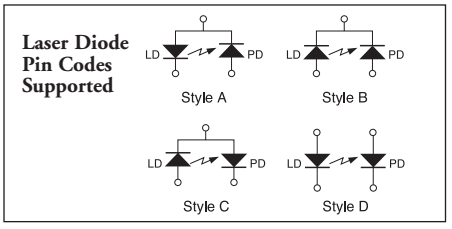
Constant Power Mode

- **Control Range Photodiode Current:** 5µA to 2mA
- **Setting Accuracy:** ±2µA
- **Drift (30min, <10Hz):** <1µA
- **Limit Adjust Range:** 0->2.5mA
- **Limit Accuracy:** ±2µA

Analog Modulation/ Control Voltage

- **Input Resistance:** 10kΩ
- **Bandwidth:** DC to 50kHz
- **Transfer Function (ACC Mode):** 50mA/V
- **Input Range:** 0-10V





ITEM #	$	£	€	RMB	DESCRIPTION
IP500	$ 299.00	£ 188.40	€ 278,10	¥ 2,855.50	500mA Universal Laser Diode Driver
IP500P	$ 22.00	£ 13.90	€ 20,50	¥ 210.10	Laser Driver Mounting Plate for IP250 & IP500

250mA Blue-Violet Laser Diode Driver

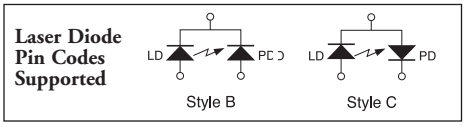
IP250-BV
Mounted on an IP500P (Power Supply Not Included)

- 250mA Blue Laser Diode Driver
- Optimized for Lasers with Vop Greater than 5V
- Input Power ±12VDC @ 275mA
- Control Range: 0 to ±250mA (CC), 5µA to 2mA (CP)
- 0-10V Analog Modulation Bandwidth: DC to 50kHz

The IP250-BV is a medium power, board-level laser diode controller optimized for the higher operating voltages of the blue and the blue-violet laser diodes. The driver is in the form of a PCB assembly with provisions for mounting into other higher-level assemblies. It can accommodate only common cathode (cathode-grounded) laser diode pin-out configurations and allows control of the laser by means of either constant current or constant power modes. The driver contains circuitry for complying with the various laser safety requirements as well as protection circuitry for the laser diode.

The driver has a maximum injection current of 250mA, and the operating modes are easily set using on-board jumpers. It automatically shuts itself down when laser connections are open or reversed, and laser diode inputs are shorted during idle operation to protect the device.

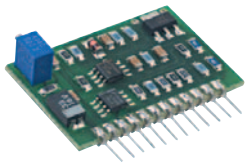
The end-user must provide DC power and the proper connections between the unit and the laser diode and is responsible for the proper limit settings needed for their particular laser diode and application.

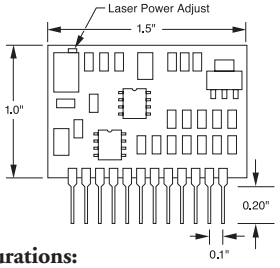


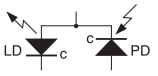
ITEM #	$	£	€	RMB	DESCRIPTION
IP250-BV	$ 299.00	£ 188.40	€ 278,10	¥ 2,855.50	250mA Blue Laser Diode Driver
IP500P	$ 22.00	£ 13.90	€ 20,50	¥ 210.10	Laser Driver Mounting Plate for IP250 & IP500

Laser Diode Driver: Constant Power

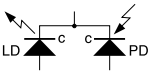
LD1100







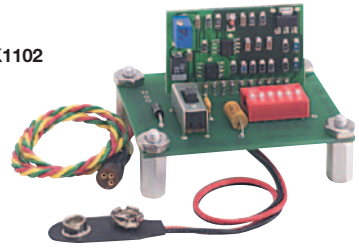
PIN STYLE A
EK1101 is pre-wired for this laser pin-out



PIN STYLE B
EK1102 is pre-wired for this laser pin-out

Supports Laser Pin Configurations:
- Common Laser Anode - Photodiode Cathode
- Common Laser Cathode - Photodiode Cathode

EK1102



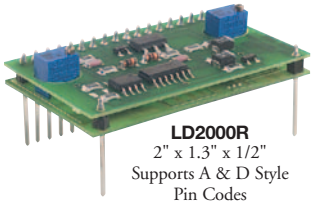
The EK1100 Series Evaluation Kits are ready-to-use, pre-assembled LD1100 Laser Drivers with an evaluation PCB (EB1100), a cable with laser socket (S8060), and a power supply cable (9V battery clip). Some soldering is necessary. Simply attach the laser and battery, set the gain-setting jumper, and operate the laser.

The LD1100 Laser Diode Driver is a constant-power laser driver module, driving lasers up to 250mA. It features an on-board, 12-turn trim-pot for continuous laser output adjustment, pin-programmable feedback gain, ON/OFF control input, and a current monitor output for observing the laser drive current. With dimensions of only 1" x 1.5", the LD1100 is a compact module that can be embedded into a custom design. All input and output signals are provided on a 12-pin SIP connector, which allows simple integration into a printed circuit design.

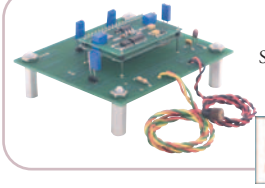
LD1100 Features
- APC (Automatic Power Control) CW Operation
- 0-250mA Drive Current
- Pin Programmable Feedback Gain
- Supports Monitor Photodiode Currents from 5µA to 5mA
- 12-Turn Power Adjustment
- Output Current Monitor
- External ON/OFF Control
- Compact 1" x 1.5" SIP Package
- Single Supply Operation 8-12VDC

ITEM #	$	£	€	RMB	DESCRIPTION
LD1100	$ 78.00	£ 49.10	€ 72,50	¥ 744.90	APC Laser Driver, 0-250mA
EK1101	$ 99.50	£ 62.70	€ 92,50	¥ 950.20	Driver Kit Pre-Wired to Style A
EK1102	$ 99.50	£ 62.70	€ 92,50	¥ 950.20	Driver Kit Pre-Wired to Style B
LDS2	$ 81.40	£ 51.30	€ 75,70	¥ 777.40	9VDC Power Supply for EK1101, EK1102

Laser Diode Driver: Constant Power With Analog Modulation

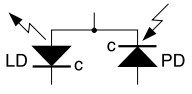


LD2000R
2" x 1.3" x 1/2"
Supports A & D Style Pin Codes



EK2000
Power Supply Sold Separately

RoHS COMPLIANT



PIN STYLE A
Supports common laser diode anode and photodiode cathode

LDS2
Power Supply Sold Separately

The LD2000R is a low-noise, stable laser diode current source that can be operated with laser diodes that have a common laser diode anode and monitor photodiode cathode. The driver operates in an automatic power control (APC) mode using the built-in monitor photodiode integrated in the laser diode for feedback. On-board trim-pots are provided for controlling the laser power and current limit, which can also be controlled via an external voltage source. The LD2000R supports a wide range of laser diodes with drive currents up to 100mA and photodiode currents from 20µA to 125µA. The LD2000R also has an external input for support of applications having a style A pin configuration (common laser diode anode and photodiode cathode) requiring modulation of the laser output.

LD2000R Features
- Constant Power Mode From 20µA to 125µA
- Laser Drive Currents From 0-100mA
- Low Noise/Ultra-Stable Laser Control
- On-Board Trim-Pots Control Laser Power and Current Limit
- Slow Start for Diode Protection
- Compact 2.05" x 1.30" Design

ITEM #	$	£	€	RMB	DESCRIPTION
LD2000R	$ 98.00	£ 61.70	€ 91,10	¥ 935.90	100mA APC Diode Laser Driver, DC-30 kHz Modulation
EK2000	$ 159.00	£ 100.20	€ 147,90	¥ 1,518.50	Evaluation Kit, Pre-Wired for Laser Pin Style A and D
LDS2	$ 81.40	£ 51.30	€ 75,70	¥ 777.40	9VDC Power Supply for EK2000 Evaluation Kit

* Power supply sold separately.

Laser/TEC Drivers Benchtop
Laser/TEC Drivers Platforms
Laser/TEC OEM Drivers
Laser Mounts
Laser Diodes
Pigtailed Lasers
Laser Modules
Accessories

250mA Precision Constant Current Laser Driver

The LD1255R is a low-noise, ultra-stable, constant current laser diode driver. This 250mA driver supports laser pin configurations A and D, and is ideally suited for demanding diode laser applications such as operating a laser diode in an external cavity tunable laser.

This second-generation laser diode driver measures 2.45" x 1.00" and includes on-board Zener and Schottky diode protection as well as a disable pin. The op-amp and voltage reference design enables more precise laser current control.

A power cable assembly (LD1255-CAB) is available to connect the LD1255R driver to Thorlabs PS-12DC-US power supply (± 12VDC).

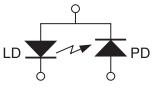
LD1255R
Mounted on an LD1255P
(Power Supply Not Included)

RoHS COMPLIANT

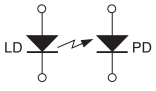
Specifications

- **Drive Current:** 0.2-250mA
- **Current Noise:** <1μA$_{RMS}$
- **Output Current Drift:** 2μA/°C
- **Current Control Input:** 0-5V (50mA/V)
- **Laser Current Monitor:** 10mV/mA
- **Photodiode Monitor:** 1V/mA
- **Power Requirements:** ±8 to ±12VDC, 300mA
- **Signal Bandwidth:** 1.2kHz

PS-12DC-US



Pin Style A



Pin Style D

LD1255R Features

- Low Current Noise
- Low Temperature Drift
- On-Board 12-Turn Laser Current Control
- External Input for Laser Current Control
- Monitor Outputs for Laser Current & Photodiode Current
- Laser Disable Pin
- Slow-Start Circuit for Laser Protection
- Constant Power Mode from 20-125μA

ITEM #	$	£	€	RMB	DESCRIPTION
LD1255R	$ 119.00	£ 75.00	€ 110,70	¥ 1,136.50	250mA Precision Constant Current Diode Driver
LD1255P	$ 15.00	£ 9.50	€ 14,00	¥ 143.30	Mounting Plate for LD1255R
LD1255-CAB	$ 14.00	£ 8.80	€ 13,00	¥ 133.70	LD1255R Power Cable Assembly
PS-12DC-EU	$ 38.00	£ 23.90	€ 35,30	¥ 362.90	±12VDC Power Supply 100/120VAC
PS-12DC-US	$ 59.80	£ 37.70	€ 55,60	¥ 571.10	±12VDC Power Supply 220/240VAC

2.5A Precision Constant Current Laser Driver

The LD3000R is a higher-power version of our popular LD1255R ultra-stable, low-noise, laser diode driver. The LD3000R utilizes high-current components and an aluminum housing that provides additional heat sinking.

Power Supply Not Included

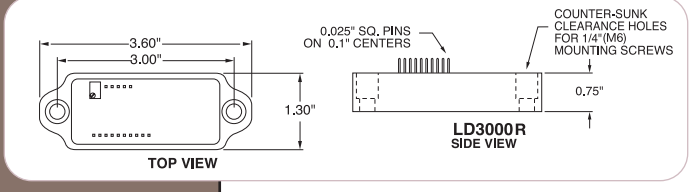
RoHS COMPLIANT

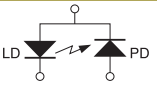
LD3000R Features

- Low-Noise, Stable Constant Current Sources
- On-Board 12-Turn Laser Current Control
- External Input for Laser Current Control
- Monitor Outputs for Laser Current & Photodiode Current
- Slow-Start Circuit for Laser Protection
- Low Noise 12μA$_{RMS}$ @ 1.0A

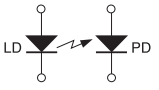
Specifications

- **Drive Current:** 2mA-2.5A
- **Operating Mode:** Constant Current
- **Current Control Input:** 0-5V (500mA/V)
- **Laser Current Monitor:** 1V/A
- **Photodiode Monitor:** 1V/mA
- On-Board Zener & Schottky Diode Protection
- **Power Requirements:** ±8 to ±12VDC 2.7A





Pin Style A



Pin Style D

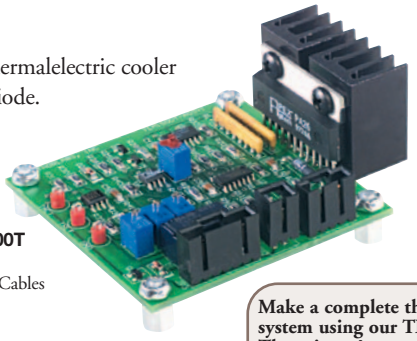
ITEM #	$	£	€	RMB	DESCRIPTION
LD3000R	$ 168.00	£105.80	€156,20	¥ 1,604.40	2.5A Precision Constant Current Laser Driver

3W TEC Controller Module

The TCM1000T TEC Controller Module regulates current through a Thermalelectric cooler (TEC), maintaining a constant temperature of a device, typically a laser diode.

TCM1000T Specifications

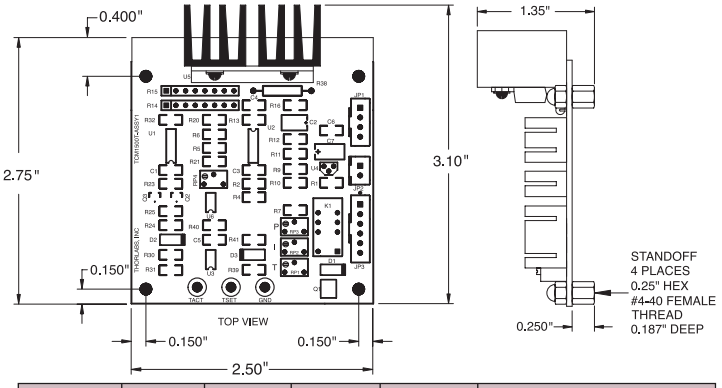
- **TEC Current Range:** –1A to +1A
- **Max Output Power:** 3W
- **Compliance Voltage:** >3V
- **Stability:** ±0.1°C (24 hrs. @ fixed ambient)
- **Input Power:** +5VDC @ 1.25A Max.



TCM1000T
Includes
Interface Cables

Make a complete thermal-control system using our TECS and Thermistors!

See Page 499



TCM1000T Features

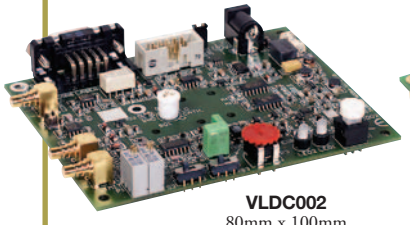
- High Precision Temperature Control
- Provides 3W of Power, Current Limited to 1A
- Maintains Temperature Based on Feedback Provided From a 10k NTC Type Thermistor Sensor
- Maximum Adjustment Range is 5K to 25K
- Interface Cables Included
- OEM Plug-In Version Available (Call for Details)

ITEM #	$	£	€	RMB	DESCRIPTION
TCM1000T	$ 239.00	£ 150.60	€ 222,30	¥ 2,282.50	3W TEC Control Module

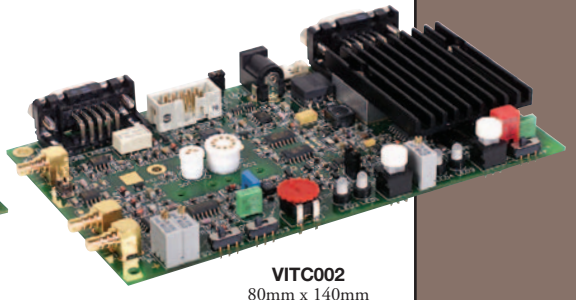
OEM VCSEL Diode Drivers with Current Modulator: 1Hz to 10kHz

OEM VCSEL Diode Drivers

- Output Current: 0-25mA
- Compliance Voltage: >5V
- Integrated Current Modulator: 1Hz to ≥10kHz
- Temperature Control: 10-40°C (VITC002 only)
- Adjustable Hardware Current Limit
- Monitor Current Output
- On-Board Laser Diode Socket
- Open Output Detection and Safety Interlock
- Complete With Universal Input 5VDC Power Supply



VLDC002
80mm x 100mm



VITC002
80mm x 140mm

These Laser Diode Controllers are ideally suited for powering the expanded selection of Vertilas VCSEL diodes presented on pages 488 and 489. The Vertilas laser diodes can be plugged directly into the on-board sockets. Any other VCSEL diodes with grounded laser anode can be operated using a shielded DB9 cable.

These controllers are designed to supply the low drive current typical of a VCSEL. Special attention has been paid to ensuring an extremely clean low noise drive current to prevent damage to highly sensitive VCSEL diodes.

An integrated current modulation feature allows high-speed sweeping of the wavelength of the VCSEL for spectroscopy applications. Alternatively, an analog input enables external modulation of the wavelength. An adjustable upper limit on the modulation current protects the laser diode from accidental damage when using either of these features.

A temperature window indicator LED shows when the diode leaves a desired operation temperature range, thus providing an indication that an unwanted wavelength-shift may have occurred (VITC002 only). Two other features, an open circuit detector and an interlock, both enhance the safe operation of a sensitive VCSEL diode.

ITEM #	$	£	€	RMB	DESCRIPTION
VLDC002	$ 360.00	£ 226.80	€ 334,80	¥ 3,438.00	VCSEL Driver w/o Temp. Controller, Socket for VCLXXXX on Board
VITC002	$ 420.00	£ 264.60	€ 390,60	¥ 4,011.00	VCSEL Driver w/ Temp. Controller, Socket for VCTXXXX on Board

LASER DIODE MOUNTS

To ensure the most stable operating environment and provide outstanding protection for your laser diode, Thorlabs offers a number of mounts designed for various popular laser diode packages. From 5.6mm and 9mm devices to 14-pin butterfly lasers, we have a mount available for just about every application.

With two thermo-electric elements and embedded temperature sensors, the TCLDM9 offers a versatile mount for 5.6mm and 9mm packages. At half the size, the LDM21 is available for applications where space is limited.

The LM14S2 is our versatile 14-pin butterfly mount. Compatible with both Telecom and Pump-type laser diodes, this mount comes with the ability to reconfigure the pins for any type of butterfly laser, and it is also compatible with many two-port electro-optic devices.

Thorlabs' line of collimation and focusing tubes with optics offer precision mounts for standard 9mm and 5.6mm laser packages.

The SR9 Series of strain relief and ESD protection products offers a convenient and safe means of connecting your 5.6mm or 9mm laser diode to our line of Laser Diode Controllers.

The LM14S2 Butterfly Laser Diode Mount is designed to operate with all lasers and two-port electro-optic devices in a 14-pin "butterfly" package. The top surface includes heat sink fins and a recessed region to mount the laser diode, resulting in a very low-profile package.

The LM14S2 includes a laser diode "TEC Lockout" feature, which disables the laser when the TEC Controller is not active.* It is designed to allow up to 5A laser current and 5A TEC current**.

This mount also provides Zero Insertion Force Sockets (ZIF), a remote interlock connection, and an LED to indicate that the laser diode is enabled.

Two modules come with the package: the first is preconfigured for both Type-1 and Type-2 lasers, and the second is a user-configurable module designed to allow custom wiring of the mount. A Bias-T Adapter is also included with the product, allowing for RF modulation of butterfly lasers specifically designed with this capability.

The LM14S2 is pin-for-pin compatible with all Thorlabs' Benchtop Laser Diode Controllers and TEC Controllers, and most of our Platform Laser and TEC Controllers as well, eliminating the need for custom-made interface cables.

- Zero Insertion Force (ZIF) Sockets
- Easy Integration With Thorlabs' Laser Diode and TEC Controllers
- Compact Low-Profile Design
- TEC Lockout Protection Circuit

* TEC Lockout only functions with Thorlabs Laser and TEC Controllers and can be easily bypassed if not required.
**The TEC Controller requires that the laser package have an integrated TE cooler and thermal sensor.

The TCLDM9 mount is ideal for temperature-controlled operation of all 3-pin and 4-pin laser diodes in 9mm (TO-18) and 5.6mm (TO-46) packages, as well as our fiber coupled pigtailed lasers. It includes a Bias-T for RF modulation of the laser current up to 500MHz, and can be easily integrated into any existing optical setup. The mount can be adapted to the polarity of the laser and monitor diodes by miniature switches located at the top.

The mount features holes on the bottom surface and the front plate. The bottom surface has #8-32 and M4 mounting holes, and the front plate has tapped holes to mount our ER-series Cage Assembly Rods.

The LDM21 Miniature TEC-Cooled Laser Diode Mount measures half the size of our TCLDM9 mount, and is capable of accepting both 5.6mm and 9mm laser diode packages.

With an integrated thermal electric cooler element and a 10kW thermistor, this mount keeps laser wavelengths stabilized by precisely holding the case temperature to within 0.002°C.

The small size of the LDM21 makes this mount ideal for optical setups where space is limited. Completely compatible with our extensive line of Laser Diode and TEC Controllers, this mount can operate with all standard laser diode pin configurations.

The front side of the mount has a standard 1.035- 40 thread, making it compatible with our SM1 Series of optical components and allowing for the addition of collimating or focusing optics. The back side of the mount accepts DB9 inputs from a laser current source and TEC controller.

*TEC Lockout only functions with Thorlabs lasers and TEC controllers and can be easily bypassed if not required.

Thorlabs' line of collimation and focusing tubes with optics offers precision mounts for standard 9mm and 5.6mm laser packages. Lasers can be easily replaced, and the lens mounts have adjustable focus. The packages include a main tube, an optic, a retaining ring, a rubber O-ring, and an adapter (for the 5.6mm packages). The collimation tubes feature a diffraction-limited aspheric optic with a multi-layer broadband AR coating.

The SR9 Series of strain relief and ESD protection products offers a convenient and safe means of connecting 5.6mm or 9mm laser diodes to our line of Laser Diode Controllers.

Each model comes with a laser socket mounted to a small Printed Circuit Board. The PCB contains a Schottky diode to clamp any reverse voltages that might appear across the laser diode, as well as a Zener diode to shunt any excessive voltages or ESD away from the diode.

The series is available with or without a DB9 connector. All SR9x-DB9 models are pin compatible with our LDC200C and LDC340 Series Laser Controllers.

Laser Mounts Selection Guide

Pages 459-463

Butterfly Laser & Electro-Optic Package Mount

- Zero Insertion Force (ZIF) Sockets
- Compact Low-Profile Design
- Compatible With One and Two Port Devices

See Page 460

Mounts for 5.6mm & 9mm Laser Packages

- Controls Temperature of 5.6mm and 9mm Laser Diode Packages
- Includes TEC Lockout Circuitry
- Completely Compatible With Our Line of Laser Diode & TEC Controllers

See Page 461

Collimation & Focusing Tubes With Optics

- 5.6mm & 9mm Laser Packages
- Laser Diodes Can Be Easily Replaced
- Lens Mounts With Adjustable Focus
- Threaded Retaining Ring for Collimation Tube

See Page 462

Strain Relief & ESD Protection

- Includes Laser Socket and Shielded Cable
- Threads Into LT Series Housing, Secures Laser Socket
- Includes Clamping & Reverse Protection Diodes
- Available With DB9 Connector

See Page 462

Collimation Packages & Laser Mounts

- TO-3 Collimation Package & Laser Mount
- Ø9mm & Ø5.6mm Collimation Packages
- Universal Laser Mount: Ø5.6mm & Ø9mm
- Broad Selection of Collimation Optics Available

See Page 463

Benchtop Drivers
Platform Drivers
OEM Drivers
Laser Diode Mounts
Laser Diodes
Pigtailed Lasers
Laser Modules
Accessories

Mounts for Butterfly Laser & Electro-Optic Packages

LM14S2

The **LM14S2** mount is designed to operate with all lasers and two-port electro-optic devices in a 14-pin "butterfly" package. The top surface includes heat sink fins and a recessed region to mount the laser diode, resulting in a very low-profile package.

The **LM14S2** includes a laser diode "TEC Lockout" feature, which disables the laser when the TEC Controller is not active.* It is designed to allow up to 5A laser current and 5A TEC current. This mount also provides **Zero Insertion Force Sockets (ZIF)**, a remote interlock connection, and an LED to indicate that the laser diode is enabled.

This package comes with two modules, each plugging into the connector at the bottom of the mount. The first module is preconfigured for both Type-1 and Type-2 lasers, and the second is user-configured to allow custom wiring of the mount. A Bias-T Adapter is also included with the product, allowing for RF modulation of butterfly lasers specifically designed with this capability.

The LM14S2 is pin-for-pin compatible with all Thorlabs' Benchtop Laser Diode Controllers and TEC Controllers, and most of our Platform Laser and TEC Controllers as well, eliminating the need for custom-made interface cables.

Thorlabs' LM14S2 mount is capable of facilitating operation and temperature stabilization of all commercially available laser modules in 14-pin butterfly packages and a variety of electro-optic devices. This mount offers:

- Zero Insertion Force (ZIF) Sockets
- Easy Integration with Thorlabs' Laser Diode and TEC Controllers
- Compact, Low-Profile Design
- TEC Lockout Protection Circuit
- Compatible with One-and Two-Port Devices

Specifications

- **Maximum Laser Current:** 5A
- **DC Input Resistance:** 0Ω
- **Polarity of Laser Diode:** AG
- **Polarity of Monitor Diode:** Floating
- **Maximum TEC Current:** 5A
- **Temperature Sensor:** Thermistor[1]
- **Temperature Range (at 25°C With 2A TEC Current):** 0 - 70°C[2]
- **Temperature Coefficient of Heat Sink:** 3°C/W
- **Dimensions:** 3.5"x 3.5"x 1.25"

1 – Integrated into laser package
2 – Depending on laser diode used

* TEC Lockout only functions with Thorlabs' Lasers and TEC controllers and can be easily bypassed if not required. The TEC controller requires that the laser package have an integrated TE cooler and thermal sensor.

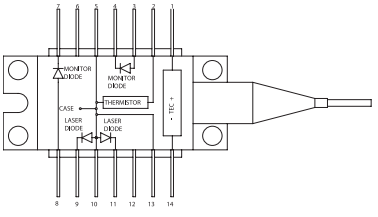
Collimation Packages

See Page 1010

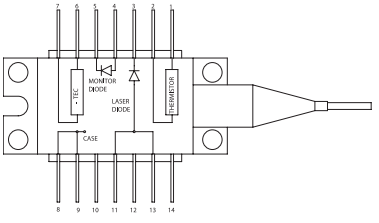
Pin Assignment of the 14-Pin Sockets

Pin #	Connector (Type-1)	Pin #	Connector (Type-2)
1	TEC anode	1	Thermistor ground
2	Thermistor	2	Thermistor
3	PD anode	3	LD cathode (DC)
4	PD cathode	4	PD anode
5	Thermistor ground	5	PD cathode
6	n.c.	6	TEC anode
7	PD cathode	7	TEC cathode
8	PD anode	8	LD anode, ground
9	LD cathode	9	LD anode, ground
10	LD anode, ground	10	n.c.
11	LD cathode	11	LD anode, ground
12	n.c.	12	LD cathode (RF)
13	LD anode, ground	13	LD anode, ground
14	TEC cathode	14	n.c.

LM14S2: Shown With a Two Port Electro-Optic Device



TYPE 1 PUMP LASER DIODE
*View shows alternate locations for monitor and laser diodes



TYPE 2 TELECOM LASER DIODE

ITEM #	$	£	€	RMB	DESCRIPTION
LM14S2	$ 315.00	£ 198.50	€ 293,00	¥ 3,008.30	Universal 14-Pin Butterfly Laser Diode Mount

Mounts for 5.6mm & 9mm Laser Packages

TCLDM9

The TCLDM9 mount is ideal for temperature-controlled operation of all 3-pin and 4-pin laser diodes in 9mm (TO-18) and 5.6mm (TO-46) packages, as well as our fiber-coupled pigtailed lasers. It includes a Bias-T for RF modulation of the laser current up to 500MHz, and can be easily integrated into any existing optical setup. The mount can be adapted to the polarity of the laser and monitor diodes by miniature switches located at the top. User-protection features of the TCLDM9 mount include an LED that indicates an enabled laser located along the top, and a remote interlock connector located on the side.

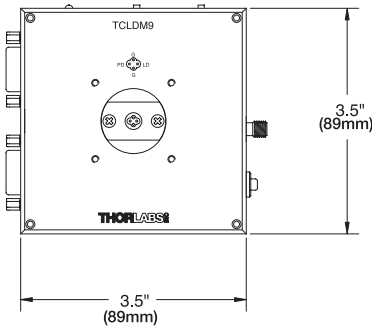
The bottom surface features #8-32 and M4 mounting holes, and the front plate features tapped holes to mount our ER-Series Cage Assembly Rods.

A laser diode can be changed quickly and easily simply by inserting the laser diode into the socket according to the imprinted pin assignment, and fastening the clamp ring with two screws. The diode socket is located very close to the front of the cold plate, making the connection of short lead devices easier. The pass-through design of the socket allows installation of long lead diodes (up to 3/4") without trimming.

Laser protection features include optional grounding configurations, and the "TEC Lockout" circuit* that prevents the laser from being enabled when the TEC controller is inactive. The built-in TE cooler facilitates temperature-controlled operation of the laser diode, which is protected against air drafts by the clamp ring.

*TEC Lockout only functions with Thorlabs lasers' and TEC controllers and can be easily bypassed if not required.

See Our Selection of ER-Series Cage Assembly Rods, Page 227



Specifications

- **Laser Diode Package:** 5.6mm & 9mm
- **Maximum Laser Current:** 2A
- **DC Input Resistance:** 1Ω
- **Polarity of Laser Diode:** Selectable
- **Polarity of Monitor Diode:** Selectable
- **Maximum RF Power:** 200mW, RMS
- **Modulation Frequency (Bias-T):** 0.2-500MHz
- **RF Input Resistance (Bias-T):** 50Ω
- **Maximum TEC Current:** 5A
- **Temperature Sensor:** AD592, 10kΩ Thermistor
- **Temperature Range (at 25°C with 2A TEC Current):** 5-70°C

ITEM #	$	£	€	RMB	DESCRIPTION
TCLDM9	$ 432.00	£ 272.20	€ 401,80	¥ 4,125.60	TEC LD Mount, 5.6mm & 9mm laser packages

*Universal Design is Imperial & Metric Compatible

Miniature TEC-Cooled Laser Diode Mount

LDM21
Optics and Adapter
Not Included

The LDM21 Miniature TEC-Cooled Laser Diode Mount measures half the size of our TCLDM9 mount, and is capable of accepting both 5.6mm and 9mm laser diode packages.

With an integrated thermal electric cooler element and a 10kΩ thermistor, this mount keeps laser wavelengths stabilized by precisely holding the case temperature to within 0.002°C.

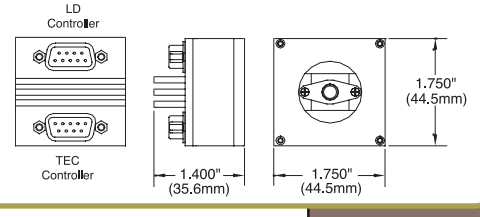
The small size of the LDM21 makes this mount ideal for optical setups where space is limited. Completely compatible with our extensive line of laser diode and TEC controllers, this mount can operate with all standard laser diode pin configurations.

The front side of the mount has a standard 1.035-40 thread, making it compatible with our SM1 Series of optical components and allowing for the addition of collimating or focusing optics. The back side of the mount accepts DB9 inputs from a laser current source and TEC controller.

See Our SM1 Accessories on Page 207

Specifications

- **Laser Diode Package:** 5.6mm & 9mm
- **Maximum Laser Current:** 1A
- **Polarity of Laser Diode:** Selectable
- **Polarity of Monitor Diode:** Selectable
- **Maximum TEC Current:** 5A
- **Temperature Sensor:** 10kΩ Thermistor
- **Temperature Range:** 20–30°C
- **Laser Interface:** Female DB9
- **Temperature Interface:** Male DB9



ITEM #	$	£	€	RMB	DESCRIPTION
LDM21	$ 299.00	£ 188.40	€ 278,10	¥ 2,855.50	Miniature TEC-Cooled Laser Diode Mount

*Universal Design is Imperial & Metric Compatible

Benchtop Drivers
Platform Drivers
OEM Drivers
Laser Diode Mounts
Laser Diodes
Pigtailed Lasers
Laser Modules
Accessories

Collimation Tubes With Optics: 5.6mm & 9mm Laser Packages

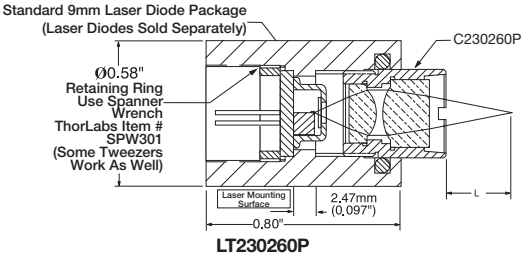
- Precision Mount for Standard 9mm and 5.6mm Laser Packages
- Threaded Retaining Ring for Holding Laser
- Easily Replaces Laser Diodes
- Lens Mount With Adjustable Focus

COLLIMATION & FOCUSING TUBE
For 5.6mm & 9mm Packages
Adapter for 5.6mm Lasers Included

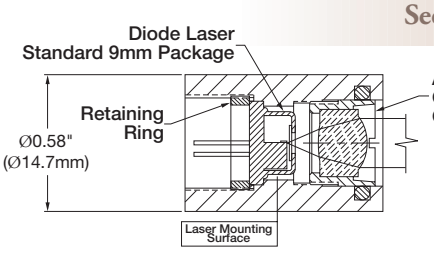
INCLUDES OPTIC

Thorlabs' line of collimation and focusing tubes with optics offer precision mounts for standard 9mm and 5.6mm laser packages. Lasers can be easily replaced, and the lens mounts have an adjustable focus. The packages include a main tube, an optic, a retaining ring, a rubber O-ring, and an adapter (for the 5.6mm packages). The collimation tubes feature a diffraction-limited aspheric optic with a multilayer broadband AR coating.

Lasers Sold Separately
See Page 465



LT230260P
Magnification: 3.41, Image NA: 0.16 Max.
(Magnification: 2.44, Image NA: 0.22 Max. for LT230220P)



SPW301
SPANNER WRENCH
For Focus Adjustment of
Our Collimation Package

ITEM #	$	£	€	RMB	DESCRIPTION
SPW301	$ 13.70	£ 8.60	€ 12,70	¥ 130.80	Spanner Wrench for LT110P, LT220P, and LT230P
SPW302	$ 14.20	£ 8.90	€ 13,20	¥ 135.60	Spanner Wrench for LT240P
AD15F	$ 29.90	£ 18.85	€ 27,80	¥ 285.50	Adapter for Collimation Tubes to SM1 Thread

Collimation Tubes & Optics

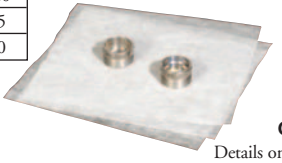
ITEM #	$	£	€	RMB	WAVELENGTH RANGE	PACKAGE LENGTH	ASPHERIC OPTIC	NUMERICAL APERTURE	f(mm)
LT110P-B	$111.00	£ 69.90	€103,20	¥1,060.10	600-1050nm	0.85"	A110TM-B	0.40	6.24
LT220P-B	$111.00	£ 69.90	€103,20	¥1,060.10	600-1050nm	1.00"	A220TM-B	0.25	11.0
LT230P-B	$111.00	£ 69.90	€103,20	¥1,060.10	600-1050nm	0.75"	A230TM-B	0.55	4.5
LT240P-B	$143.00	£ 90.10	€133,00	¥1,365.70	600-1050nm	0.95"	A240TM-B	0.50	8.0

Focusing Tubes and Optics

ITEM #	$	£	€	RMB	DESCRIPTION	L
LT230220P-B	$ 228.00	£ 143.60	€ 212,00	¥2,177.40	Laser Tube with C230220P-B Optic Pair	0.241"
LT230260P-B	$ 228.00	£ 143.60	€ 212,00	¥2,177.40	Laser Tube with C230260P-B Optic Pair	0.551"

*Compatible with SPW301 & AD15F shown above

AD15F
Mounting adapter for integrating our collimation tubes into our SM1 family of mechanical components.



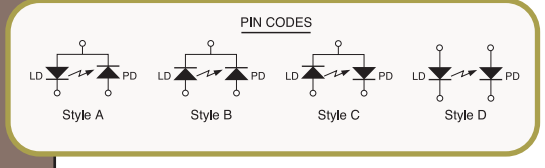
C230220P-B
Details on these molded glass aspheres as well as our entire selection of these products can be found on pages 737-768.

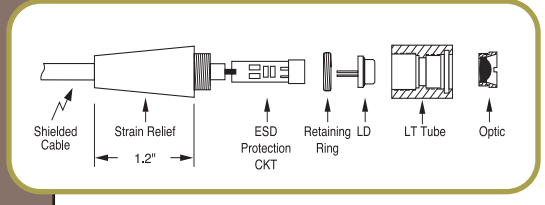
- Includes Laser Socket and 2' of Shielded Cable
- Threads Into LT Housing, Secures Laser Socket
- Includes Clamping and Reverse Protection Diodes to Suppress ESD
- Available With DB9 Connector for Mating Directly With LDC200C Series Laser Controllers

The SR9 Series of strain relief and ESD protection products offer a convenient and safe means for connecting 5.6mm or 9mm laser diodes to our line of Laser Diode Controllers.

Each model comes with a laser socket mounted to a small printed circuit board. The PCB contains a Schottky diode to clamp any reverse voltages that might appear across the laser diode as well as a Zener diode to shunt any excessive voltages or ESD away from the diode.

Optional DB9 Connector for the LDC200C Series





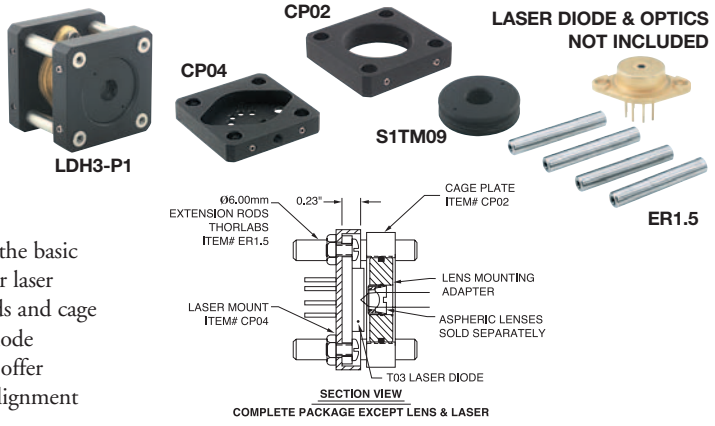
Strain Relief & ESD Protection for LT Series Tubes

ITEM #	$	£	€	RMB	CODE	DESCRIPTION
SR9A	$ 42.00	£ 26.50	€ 39,10	¥ 401.10	A	ESD Protection and Strain Relief
SR9A-DB9	$ 45.00	£ 28.40	€ 41,90	¥ 429.80	A	ESD Protection and Strain Relief w/ DB9
SR9B	$ 42.00	£ 26.50	€ 39,10	¥ 401.10	B	ESD Protection and Strain Relief
SR9B-DB9	$ 45.00	£ 28.40	€ 41,90	¥ 429.80	B	ESD Protection and Strain Relief w/ DB9
SR9C	$ 42.00	£ 26.50	€ 39,10	¥ 401.10	C	ESD Protection and Strain Relief
SR9C-DB9	$ 45.00	£ 28.40	€ 41,90	¥ 429.80	C	ESD Protection and Strain Relief w/ DB9
SR9D	$ 42.00	£ 26.50	€ 39,10	¥ 401.10	D	ESD Protection and Strain Relief
SR9D-DB9	$ 45.00	£ 28.40	€ 41,90	¥ 429.80	D	ESD Protection and Strain Relief w/ DB9

*Compatible with all LT Tubes

TO-3 Collimation Package

- Ideal for Collimating High-Power Laser Diodes
- Complete Package as Shown in the Photograph, Each Unit is Shipped Assembled (Laser and Aspheric Lens Not Included)
- Compatible With Our Extensive Line of Ø1" Lens Tubes
- Broad Selection of Collimation Optics (See Page 738)



Our Cage System Collimation Kits conveniently provide all the basic components required to assemble and collimate a high-power laser diode quickly. The LDH3-P1 kit is assembled using cage rods and cage plates, along with specialized components for various laser diode packages. Cage plates are assembled on the cage rods, which offer coarse positional adjustment and excellent center-to-center alignment of the laser diode and collimating optic.

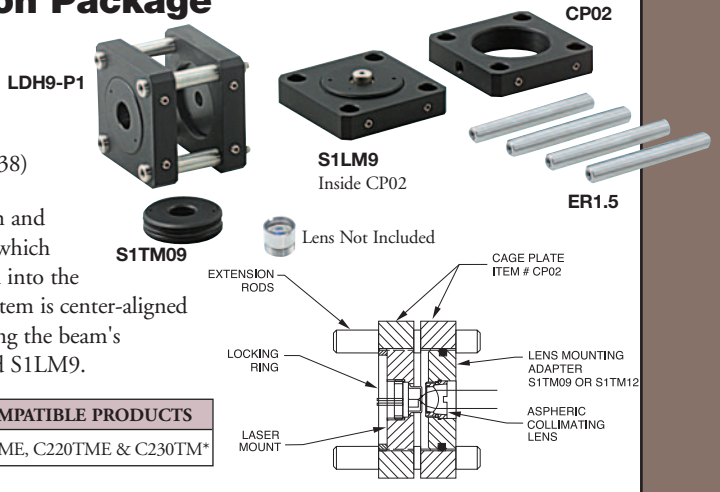
Each package is shipped assembled (laser and aspheric lens not included) and is compatible with Thorlabs' extensive lines of Ø1" lens tubes and collimation optics (see pages 207 and 738, respectively).

ITEM#	METRIC ITEM#	$	£	€	RMB	COMPATIBLE PRODUCTS
LDH3-P1	LDH3-P1/M	$ 117.50	£ 74.00	€ 109,30	¥1,122.10	C110TME, C220TME & C230TM*
CP02	CP02/M	$ 15.63	£ 9.80	€ 14,50	¥ 149.20	-
CP04	–	$ 67.20	£ 42.30	€ 62,50	¥ 641.80	-
ER1.5	–	$ 5.42	£ 3.41	€ 5,04	¥ 51.70	30mm & 60mm Cage Systems
S1TM09	–	$ 20.10	£ 12.70	€ 18,70	¥ 192.00	SM05 & SM1 Series Cage Systems

*See page 738 for optics

Universal Laser Mount: Collimation Package

- Ideal for Collimating High-Power Laser Diodes
- Compatible With Our Extensive Line of Ø1" Lens Tubes (See Page 207)
- Broad Selection of Collimation Optics (Sold Separately, See Page 738)



The LDH9-P1 collimation package is designed for use with Ø5.6mm and Ø9mm laser packages. A laser diode is mounted within the S1LM9, which is then mounted within a CP02. A mounted aspheric lens is threaded into the S1TM09, which is then threaded into a second CP02. The whole system is center-aligned via precision cage assembly rods, allowing for manual positioning along the beam's propagation axis. Parts include CP02 (x2), ER1.5 (x4), S1TM09, and S1LM9.

ITEM#	METRIC ITEM#	$	£	€	RMB	COMPATIBLE PRODUCTS
LDH9-P1	LDH9-P1/M	$ 94.60	£ 59.60	€ 88,00	¥ 903.40	C110TME, C220TME & C230TM*

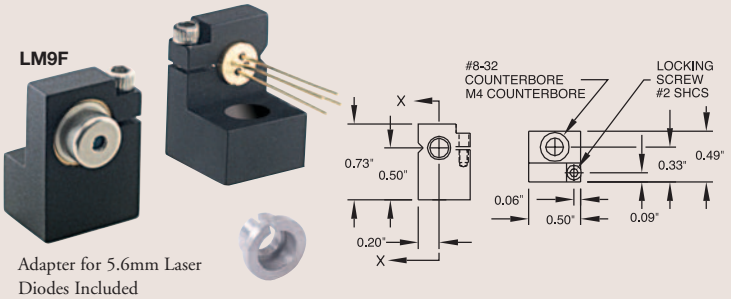
*See page 738 for Optics

Ø9mm & Ø5.6mm Laser Mount

The S1LM9 laser diode mounts are designed for mounting 5.6mm and 9mm laser diodes directly into our SM1 Ø1" lens tube systems. The mount is designed such that the laser diode is aligned to the optical axis of the lens tube, enabling easy assembly of lens tube-based setups. We recommend using the SPW801 spanner wrench (see page 917), together with an SM1RR retaining ring (see page 208), to lock the S1LM9 laser diode mount into the lens tube.

ITEM #	$	£	€	RMB	DESCRIPTION
S1LM9	$ 26.80	£ 16.90	€ 24,90	¥ 255.90	SM1 Series Mount for 5.6mm & 9mm Lasers

Universal Laser Mount: 5.6mm & 9mm



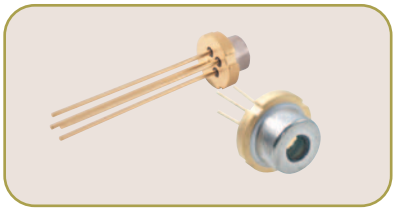
Adapter for 5.6mm Laser Diodes Included

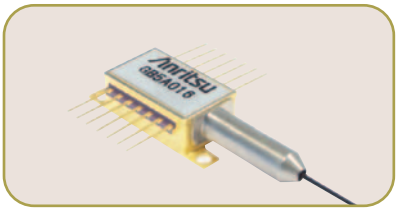
ITEM #	$	£	€	RMB	DESCRIPTION
LM9F	$ 24.70	£ 15.60	€ 23,00	¥ 235.90	5.6mm & 9mm Universal Laser Mount

*Universal Design is Imperial & Metric Compatible with 5.6mm & 9.0mm Lasers

LASER DIODE OVERVIEW

- 5.6mm, 9mm, and VCSEL Laser Diodes
- DFB C and L-Band Butterfly Laser Pigtails
- Fiber Bragg Stabilized Pump Laser Diodes
- Fiber Pigtailed Laser Diodes





All laser diodes are extremely electrostatic sensitive; see page 496 for our selection of antistatic products.

5.6mm, 9mm and VCSEL Laser Diodes

Thorlabs offers an extensive selection of discreet laser diodes in 5.6mm, 9mm and VCSEL packages. Ranging in wavelengths from 405nm to 1550nm, we have a diode to work in nearly any application. Our selection of 5.6mm and 9mm diodes includes both Fabry-Perot and DFB lasers in a variety of standard pin configurations. Most of our lasers are fully compatible with our entire line of laser diode and TEC controllers as well as our selection of Laser Diode Mounts (See Pages 459).

- Output Powers Up to 1W
- Standard Pin Configurations
- Fabry-Perot and DFB
- VCSEL Diodes
- 405nm to 1550nm
- Compatible with Thorlabs' Laser Diode and TEC Controllers

Fiber Pigtailed 5.6 & 9mm Laser Diodes

Thorlabs' full line of fiber pigtailed laser diodes (manfactured by either Thorlabs or our customers) are assembled at our extensive pigtailing facilities in the United States.

A high-quality alignment process ensures maximum efficiency at an affordable price.

Our selection includes both single mode and multimode pigtails, whose typical high-coupling efficiency delivers more power from the diode.

- 8° Angled-Cleaved Fiber at Laser Diode
- Visible to Near IR Models
- Single Mode and Multimode Fibers
- Angle-Cleaved Fiber to Minimize Intensity Noise (Single Mode Only)
- Pigtailing of Customer-Supplied Diodes Available
- DFB Pigtails Include In-Line Isolator

DFB Laser C-and L-Band Butterfly Laser Pigtails

Thorlabs offers a full range of pigtailed lasers with wavelengths centered on the ITU grid (100GHz spacing). These lasers include polarization maintaining (PM) fiber, with an extinction ratio of better than 20dB and a side mode suppression ratio of 40dB (typ.). These DFB lasers meet the stringent reliability standards for the telecom industry. With their built-in 30dB optical isolation, thermoelectric cooler (TEC) and thermistor, these 20mW lasers will provide many hours of reliable operation when operated with our laser diode current controllers/TEC controllers.

- Wavelength: ITU Grid, 100GHz Steps
- Single Longitudinal Mode
- Accurate Peak Wavelength (±0.5nm)
- Built-In Optical Isolator (30dB)
- Built-In Cooler and Thermistor

Laser Diode Selection Guide

ITEM#	WAVELENGTH (nm)	P (mW)	PACKAGE (mm)	PIN CODE	PAGE
DL3146-151	405	7	5.60	5B	466
DL5146-152	405	35	5.60	5B	466
LPS-635-FC	635	2.5	Pigtailed	9A	492
HL6314MG[1,2]	635	3	5.60	5A	466
HL6312G[1,2]	635	5	9.00	9A	467
HL6335G	635	5	9.00	9A	467
DL3148-025	635	6	5.60	5A	467
HL6320G[1,2]	635	10	9.00	9A	468
HL6344G	635	10	9.00	9A	468
HL6322G	635	15	9.00	9A	468
DL4038-026	635	20	9.00	9A	469
DL5038-021	635	35	9.00	9A	469
LPM-635-SMA	635	7.5	Pigtailed	9A	492
DL3147-060	650	7	5.60	5A	469
GH06510B2A	654	10	5.60	5B	470
RLD65MZT2	655	10	5.6	5B	470
HL6501MG[1]	658	35	5.60	5C	470
DL6147-040	658	40	5.60	5A	471
HL6512MG	658	50	5.60	OPEN	471
DL7147-201	658	60	5.60	OPEN	471
ML120G21	658	80	5.60	OPEN	472

1 Single Mode - Longitudinal 2 Single Mode - Transverse

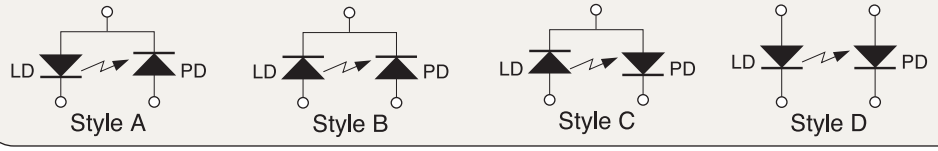
Laser Diode Selection Guide

ITEM#	WAVELENGTH (nm)	P (mW)	PACKAGE (mm)	PIN CODE	PAGE	
HL6535MG[1]	658	90	5.60	OPEN	472	
LPS-660-FC	660	7.5	Pigtailed	5C	492	
LPM-660-SMA	660	22.5	Pigtailed	5C	492	
ML101J8	660	45	5.60	OPEN	472	
HL6548FG	660	90	9.00	9D	473	
ML101J27	660	130	5.60	OPEN	473	
HL6722G[1,2]	670	5	9.00	9A	473	
HL6724MG[1,2]	670	5	5.60	5A	474	
DL3149-057	670	7	5.60	5A	474	
HL6714G[1,2]	670	10	9.00	9A	474	
LPS-675-FC	675	2.5	Pigtailed	9A	492	
FLD6A2TK	685	35	5.60	OPEN	475	
HL6738MG[1,2]	690	35	5.60	5C	475	
VCSEL-780	780	1.65	—	–	475	
L780P010	780	10	5.60	5A	476	
GH0781JA2C	784	120	5.60	OPEN	476	
RLD78MA-E	785	5	5.6	5B	476	
LPS-785-FC	785	6.25	Pigtailed	5A	492	
DL4140-001S	785	25	5.60	5C	477	
HL7851G[1,2]	785	50	9.00	9A	477	
DL7140-201S	785	80	5.60	5C	477	
L785P100	785	100	5.60	5A	478	
L808P010	808	10	5.60	5A	478	
L808P030	808	30	5.60	5A	478	
L808P200	808	200	5.60	5A	479	
L808P1WJ	808	1WATT	9	9A	479	
LPS-830-FC	830	10.0	Pigtailed	9C	492	
DL5032-001	830	30	9.00	9A	479	
HL8325G[1,2]	830	40	9.00	9C	480	
DL7032-001[1,2]	830	100	9.00	9A	480	
DL8142-201	830	180	5.60	5C	481	
VCSEL-850	850	1.85	—	–	481	
L850P010	850	10	5.60	5A	481	
L850P030	850	30	5.60	5A	482	
L850P100	850	100	5.60	5A	482	
L904P010	904	10	5.60	5A	482	
L904P030	904	30	5.60	5A	483	
L915P1WJ	915	1WATT	9.00	9A	483	
L975P1WJ	975	1 WATT	9.00	9A	483	
VCSEL-980	980	1.85	—	–	484	
L980P010	980	10	5.60	5A	484	
L980P030	980	30	5.60	5A	484	
L9805E2P5[2]	980	50	5.60	5A	485	
L980P100	980	100	5.60	5A	485	
PL980P200	980	200	Pigtailed	BFY-14Pin	485	
L980P200J	980	200	9	9A	491	
L980P300J	980	300	9	9A	486	
L1060P100J	1060	100	9	9A	486	
LPS-1310-FC	1310	2.5	Pigtailed	5D	492	
ML725B11F	1310 DFB	6	5.60	5D	486	DFB
ML725B8F[2]	1310	10	5.60	5D	487	
ML925B45F	1550	6	5.60	5D	487	
ML925B11F	1550 DFB	6	5.60	5D	492	DFB
LPS-1550-FC	1550	1.5	Pigtailed	5D	492	
LPS-1550DFB-FC	1550DFB	1.5	Pigtailed	5D	492	DFB

1 Single Mode - Longitudinal 2 Single Mode - Transverse

All laser diodes are extremely electrostatic sensitive; see page 496 for our selection of antistatic products.

PIN CODES



1. All specifications are typical; see individual items for complete details.
2. Pin code is based on laser pin configuration and is used to help select socket cable assemblies.

Note: The 5 and 9 of the pin code designate 5.6mm or 9mm packages, respectively.

Laser/TEC Drivers Benchtop
Laser/TEC Drivers Platforms
Laser/TEC OEM Drivers
Laser Mounts
Laser Diodes
Pigtailed Lasers
Laser Modules
Accessories

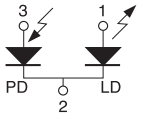
All laser diodes are extremely electrostatic sensitive; see page 496 for our selection of antistatic products.

λ = 405nm P = 7mW, Single Mode Sanyo DL3146-151

- **Short Wavelength:** 405nm (typ.)
- **Output Power:** 5mW CW
- **Low Threshold Current:** I_{th} = 35mA (typ.)
- **Package:** 5.6mm

CAUTION: ELECTROSTATIC SENSITIVE

Pin Description
1 laser anode
2 common case
3 monitor diode anode



PIN CODE 5B

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
DL3146-151	£ 1,169.20	€ 1.725,90	¥ 17,722.90

*For quantities over 5 pieces, please call our local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
DL3146-151	$ 1,855.80	$ 1,766.00	$ 1,657.20	Sanyo 405nm, 7mW

Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_O	7mW
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	30V
Operation Case Temperature	T_C	0 to 60°C
Storage Temperature	T_{stg}	-40 to 85°C

Optical-Electrical Characteristics (T_C=25°C, P=5mW)

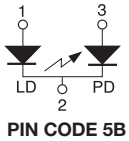
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	-	35mA	55mA
Operating Current	I_{op}	-	40mA	60mA
Monitor Current	I_m	0.1mA	0.2mA	1.0mA
Operating Voltage	V_{op}	-	5.0V	6.0V
Lasing Wavelength	λ_p	395nm	405nm	415nm
Beam Divergence (Perpendicular)	$\theta\perp$	16°	20°	24°
Beam Divergence (Parallel)	θ//	6°	8°	14°
Off-Axis Angle (Perpendicular)	$\Delta\theta_v$	-3°	-	3°
Off-Axis Angle (Parallel)	$\Delta\theta_h$	-2°	-	2°
Slope Efficiency (mW/mA)	η_s	0.5	0.8	-

λ = 405nm P = 35 mW, Single Mode Sanyo DL5146-152

- **Short Wavelength:** 405nm (typ.)
- **Light Output:** 35mW CW
- **Low Threshold Current:** I_{th} = 38mA (typ.)
- **Package:** 5.6mm

CAUTION: ELECTROSTATIC SENSITIVE

Pin Description
1 laser anode
2 common case
3 monitor diode anode



PIN CODE 5B

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
DL5146-152	£ 1,640.50	€ 2.421,70	¥ 24,868.20

*For quantities over 5 pieces, please call our local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
DL5146-152	$ 2,604.00	$ 2,492.57	$ 2,326.40	Sanyo 405nm, 35mW

Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_O	35mW
Optical Output Power (Pulse)	P_O	50mW
LD Reverse Voltage	V_R	2V
Operation Case Temperature	T_C	0 to 60°C
Storage Temperature	T_{stg}	-40 to 85°C

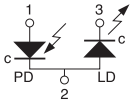
Optical-Electrical Characteristics (T_C=25°C, P=35mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	-	38mA	60mA
Operating Current	I_{op}	-	75mA	100mA
Threshold Voltage	V_{th}	-	4.6V	5.6V
Operating Voltage	V_{op}	-	5.1V	6.1V
Lasing Wavelength	λ_p	395nm	405nm	415nm
Beam Divergence (Perpendicular)	$\theta\perp$	16°	20°	24°
Beam Divergence (Parallel)	θ//	6°	8°	14°
Off-Axis Angle (Perpendicular)	$\Delta\theta_v$	-3°	-	3°
Off-Axis Angle (Parallel)	$\Delta\theta_h$	-2°	-	2°
Slope Efficiency (mW/mA)	η_s	0.7	1.0	-

λ = 635nm P = 3mW, Single Mode Hitachi HL6314MG

CAUTION: ELECTROSTATIC SENSITIVE

Pin Description
1 monitor diode anode
2 common case
3 laser cathode



PIN CODE 5A

- 5.6mm Package
- AlGaInP Index-Guided MQW Structure
- Single Longitudinal Mode
- Low 8µm Astigmatism @3mW
- High Polarization Ratio >350:1 @3mW
- Pulsed Optical Power 5mW With a 50% Duty Cycle and a Maximum Pulse Width of 1µs

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
HL6314MG	£ 20.10	€ 29,60	¥ 304.50

*For quantities over 5 pieces, please call our local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
HL6314MG	$ 31.88	$ 27.90	$ 20.60	Hitachi 635nm, 3mW

Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_O	3mW
LD Reverse Voltage	$V_{R(PD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	30V
Operation Case Temperature	T_c	-10 to 50°C
Storage Temperature	T_{stg}	-40 to 85°C

Optical-Electrical Characteristics (T_C=25°C, P=3mW)

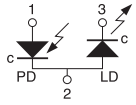
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	–	25mA	35mA
Operation Current	I_{op}	–	30mA	42mA
Operation Voltage	V_{op}	–	–	2.7V
Lasing Wavelength	λ_p	630nm	635nm	640nm
Beam Divergence (FWHM)	θ//	6°	8°	10°
	$\theta\perp$	23°	30°	39°
Monitor Current	I_m	0.08mA	0.15mA	0.40mA

Note: All data is presented as typical unless otherwise specified.

λ = 635nm P = 5mW, Single Mode Hitachi HL6312G

- 9mm Package
- AlGaInP Index-Guided MQW Structure
- Single Longitudinal Mode
- Low 6µm Astigmatism @ 5mW
- High Polarization Ratio >400 @5mW
- Pulsed Optical Power 6mW With a 50% Duty Cycle and a Maximum Pulse Width of 1µs

Pin Description
1 monitor diode anode
2 common case
3 laser cathode



PIN CODE 9A

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
HL6312G	£ 27.80	€ 41,10	¥ 421.60

*For quantities over 5 pieces, please call our local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
HL6312G	$ 44.15	$ 38.65	$ 30.44	Hitachi 635nm, 5mW

Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_o	5mW
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	30V
Operation Case Temperature	T_C	-10 to 50°C
Storage Temperature	T_{stg}	-40 to 85°C

Optical-Electrical Characteristics (T_C=25°C, P=5mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	20mA	45mA	70mA
Operation Current	I_{op}	–	55mA	85mA
Operation Voltage	V_{op}	–	–	2.7V
Lasing Wavelength	λ_p	625nm	635nm	640nm
Beam Divergence (FWHM)	θ//	5°	8°	11°
	θ⊥	25°	31°	37°
Monitor Current	I_m	0.2mA	0.4mA	0.8mA

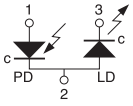
Note: All data is presented as typical unless otherwise specified.

λ = 635nm P = 5mW, Single Mode Hitachi HL6335G

- 9mm Package
- Nearly Circular Beam
- Low Operating Current
- TM Mode Oscillation
- Single Longitudinal Mode

Pin Description
1 monitor diode anode
2 common case
3 laser cathode

CAUTION: ELECTROSTATIC SENSITIVE



PIN CODE 9A

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
HL6335G	£ 37.10	€ 54,70	¥ 562.00

*For quantities over 5 pieces, please call our local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
HL6335G	$ 58.85	$ 51.50	$ 40.54	Hitachi 635nm, 5mW

Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_o	5mW
Pulse Optical Output Power	$P_{o(Pulse)}$	6mW*
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	30V
Operation Case Temperature	T_C	-10 to +50°C
Storage Temperature	T_{stg}	-40 to +85°C

Note: Pulse condition: Pulse width ≤ 1µs, duty = 50%

Optical-Electrical Characteristics (T_C=25°C, P=5mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Optical Output Power	P_o	5mW	–	–
Threshold Current	I_{th}	–	20mA	30mA
Slope Efficiency	ηs	0.5mW/mA	0.8mW/mA	1.1mW/mA
Operation Current	I_{op}	–	25mA	40mA
Operation Voltage	V_{op}	–	2.4V	2.7V
Lasing Wavelength	λ_p	630nm	635nm	640nm
Beam Divergence (FWHM)	θ//	13°	17°	25°
	θ⊥	16°	20°	25°
Aspect Ratio	θ⊥/θ//	–	1.2	1.5
Monitor Current	I_m	0.03mA	0.07mA	0.12mA

All laser diodes are extremely electrostatic sensitive; see page 496 for our selection of antistatic products.

λ = 635nm P = 6mW, Single Mode Sanyo DL3148-025

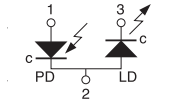
Absolute Maximum Ratings (T_C=25°C)

PARAMETER		SYMBOL	RATING
Light Output		P_o	6mW
Reverse Voltage	Laser	V_R	2V
	PD		30V
Operating Temperature		T_{op}	-10 to +40°C
Storage Temperature		T_{stg}	-40 to +85°C

Optical-Electrical Characteristics (T_C=25°C, P=5mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	–	20mA	35mA
Operation Current	I_{op}	–	30mA	45mA
Operation Voltage	V_{op}	–	2.2V	2.4V
Lasing Wavelength	λ_p	630nm	635nm	640nm
Beam Divergence (FWHM)	θ//	25°	30°	35°
	θ⊥	6°	8°	10°
Astigmatism	As	–	8µm	–

Pin Description
1 monitor diode anode
2 common case
3 laser cathode



PIN CODE 5A

CAUTION: ELECTROSTATIC SENSITIVE

- 5.6mm Package
- Low Threshold Current
- Low Operating Voltage
- Laser Pointer Applications

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
DL3148-025	£ 12.30	€ 18,10	¥ 186.20

*For quantities over 5 pieces, please call our local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
DL3148-025	$ 19.50	$ 18.54	$ 17.10	Sanyo 635nm, 6mW

Beam Profilers

See Page 966

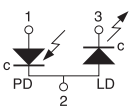
Laser/TEC Drivers Benchtop
Laser/TEC Drivers Platforms
Laser/TEC OEM Drivers
Laser Mounts
Laser Diodes
Pigtailed Lasers
Laser Modules
Accessories

λ = 635nm P = 10mW, Single Mode Hitachi HL6320G

Maximum Ratings (Tc=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	Po	10mW
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	30V
Operation Case Temperature	T_C	-10 to 50°C
Storage Temperature	Tstg	-40 to 85°C

Pin Description
1 monitor diode anode
2 common case
3 laser cathode



PIN CODE 9A

CAUTION: ELECTROSTATIC SENSITIVE

- 9mm Package
- InGaAsP Index Guided Structure

Optical-Electrical Characteristics (Tc=25°C, P=10mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	Ith	20mA	50mA	75mA
Operation Current	Iop	–	70mA	95mA
Operation Voltage	Vop	–	–	2.7V
Lasing Wavelength	λp	625nm	635nm	640nm
Beam Divergence (FWHM)	θ//	5°	8°	11°
	θ⊥	25°	31°	37°
Monitor Current	Im	0.05mA	0.17mA	0.30mA

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
HL6320G	£ 54.10	€ 79,80	¥ 819.90

*For quantities over 5 pieces, please call our local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
HL6320G	$ 85.85	$ 75.10	$ 59.13	Hitachi 635nm, 10mW

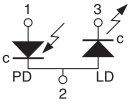
λ = 635nm P = 10mW, Single Mode Hitachi HL6344G

Absolute Maximum Ratings (Tc=25°C)

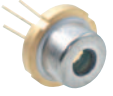
CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_o	10mW
Pulse Optical Output Power	$P_{o(Pulse)}$	12mW*
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	30V
Operation Case Temperature	T_C	-10 to +50°C
Storage Temperature	T_{stg}	-40 to +85°C

Pulse condition: Pulse width ≤ 1μs, duty = 50%

Pin Description
1 monitor diode anode
2 common case
3 laser cathode



PIN CODE 9A



See Our Selection of VCSEL Laser Diodes Starting on Page 488

- 9mm Package
- Nearly Circular Beam
- Low Operating Current
- TM Mode Oscillation
- Single Longitudinal Mode

CAUTION: ELECTROSTATIC SENSITIVE

Optical-Electrical Characteristics (Tc=25°C, P=10mW)

CHARACTERISTIC		SYMBOL	MIN.	TYP.	MAX.
Threshold Current		Ith	–	20mA	35mA
Slope Efficiency		ηs	0.5mW/mA	0.8mW/mA	1.2mW/mA
Operation Current		Iop	–	35mA	45mA
Operation Voltage		Vop	–	2.4V	2.7V
Lasing Wavelength		λp	630nm	635nm	640nm
Beam Divergence	Parallel	θ//	–	17°	25°
	Perpendicular	θ⊥	–	20°	25°
Aspect Ratio θ⊥/θ//			–	1.2	1.5
Monitor Current		I_m	0.06mA	0.14mA	0.24mA

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
HL6344G	£ 64.00	€ 94,50	¥ 970.30

*For quantities over 5 pieces, please call our local office for pricing.

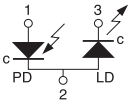
ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
HL6344G	$ 101.60	$ 88.90	$ 69.21	Hitachi 635nm, 10mW

λ = 635nm P = 15mW, Single Mode Hitachi HL6322G

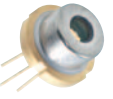
Maximum Ratings (Tc=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	Po	15mW
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	30V
Operation Case Temperature	T_{opr}	-10 to 50°C
Storage Temperature	Tstg	-40 to 85°C

Pin Description
1 monitor diode anode
2 common case
3 laser cathode



PIN CODE 9A



CAUTION: ELECTROSTATIC SENSITIVE

- 9mm Package
- Single Longitudinal Mode
- TM Mode Oscillation

Optical-Electrical Characteristics (Tc=25°C, P=15mW)

CHARACTERISTIC		SYMBOL	MIN.	TYP.	MAX.
Threshold Current		Ith	20mA	55mA	70mA
Slope Efficiency		ηs	0.3mW/mA	–	0.7mW/mA
Operation Current		I_{OP}	–	85mA	100mA
Operation Voltage		V_{OP}	–	–	2.7V
Lasing Wavelength		λp	630nm	635nm	640nm
Beam Divergence	Parallel	θ//	6°	8°	11°
	Perpendicular	θ⊥	25°	30°	36°
Monitor Current		I_m	0.1mA	0.2mA	0.4mA

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
HL6322G	£ 77.90	€ 114,90	¥ 1,180.40

*For quantities over 5 pieces, please call a local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
HL6322G	$ 123.60	$ 110.00	$ 93.00	Hitachi 635nm, 15mW

All laser diodes are extremely electrostatic sensitive; see page 496 for our selection of anti static products.

For Pigtailing service, contact Tech Support at 973-579-7227, techsupport@thorlabs.com

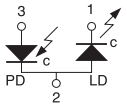
Single Mode & Multimode Volume Discounts 635nm to 1550nm

λ = 635nm P = 20mW, Single Mode Sanyo DL4038-026

CAUTION: ELECTROSTATIC SENSITIVE

Pin Description
1 laser cathode
2 common case
3 monitor diode anode

- 9mm Package
- AlGaInP Index-Guided MQW Structure
- High Power/Low Threshold Current



PIN CODE 9A

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
DL4038-026	£ 384.30	€ 567,30	¥ 5,825.50

*For quantities over 5 pieces, please call our local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
DL4038-026	$ 610.00	$ 554.55	$ 508.33	Sanyo 635nm, 20mW

Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_o	20mW
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	30V
Operation Case Temperature	T_C	-10 to 40°C
Storage Temperature	T_{stg}	-40 to 85°C

Optical-Electrical Characteristics (T_C=25°C, P=20mW)

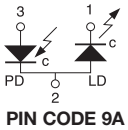
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	–	40mA	60mA
Operation Current	I_{op}	–	70mA	85mA
Operation Voltage	V_{op}	–	2.3V	2.6V
Lasing Wavelength	λ_p	–	635nm	645nm
Beam Divergence	θ//	6°	7°	10°
(FWHM)	θ⊥	22°	28°	35°
Monitor Current	I_m	0.1mA	0.2mA	0.5mA

λ = 635nm P = 35mW, Single Mode Sanyo DL5038-021

CAUTION: ELECTROSTATIC SENSITIVE

Pin Description
1 laser cathode
2 common case
3 monitor diode anode

- 9mm Package
- AlGaInP Index Guided-MQW Structure
- High Power/Low Threshold Current
- Emitter Size 1 x 3 Microns



PIN CODE 9A

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
DL5038-021	£ 242.40	€ 357,90	¥ 3,674.80

*For quantities over 5 pieces, please call a local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
DL5038-021	$ 384.80	$ 349.82	$ 310.32	Sanyo 635nm, 35mW Laser Diode

Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_o	35mW
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	30V
Operation Case Temperature	T_C	-10 to 40°C
Storage Temperature	Tstg	-40 to 85°C

Optical-Electrical Characteristics (T_C=25°C, P=30mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	–	50mA	70mA
Operation Current	I_{op}	–	90mA	110mA
Operation Voltage	V_{op}	–	2.4V	2.7V
Lasing Wavelength	λp	–	635nm	645nm
Beam Divergence	θ//	6°	7°	9°
(FWHM)	θ⊥	25°	30°	35°
Monitor Current	I_m	0.1mA	0.3mA	0.6mA

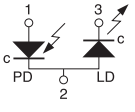
All laser diodes are extremely electrostatic sensitive; see page 496 for our selection of antistatic products.

λ = 650nm P = 7mW, Single Mode Sanyo DL3147-060

CAUTION: ELECTROSTATIC SENSITIVE

Pin Description
1 monitor diode anode
2 common case
3 laser cathode

- 5.6mm Package
- Low Threshold Current
- High Operating Temperature: 5mW @ 70°C



PIN CODE 5A

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
DL3147-060	£ 7.10	€ 10,40	¥ 107.00

*For quantities over 5 pieces, please call a local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
DL3147-060	$ 11.20	$ 9.80	$ 7.63	Sanyo 650nm, 7mW

Absolute Maximum Ratings (T_C=25°C)

PARAMETER		SYMBOL	RATING
Light Output		Po	7mW
Reverse Voltage	Laser	V_R	2V
	PD		30V
Operating Temperature		T_{op}	-10 to +70°C
Storage Temperature		T_{stg}	-40 to +85°C

Optical-Electrical Characteristics (T_C=25°C, P=5mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	–	20mA	35mA
Operation Current	I_{op}	–	30mA	45mA
Operation Voltage	V_{op}	–	2.3V	2.6V
Lasing Wavelength	λp	645nm	650nm	660nm
Beam Divergence	θ//	7°	8°	10°
(FWHM)	θ⊥	25°	30°	35°
Monitoring Current	I_m	0.08mA	0.2mA	0,4mA
Astigmatism	As	–	8µm	–

LASER DIODE CONTROLLERS
See Pages 414-430

Laser/TEC Drivers Benchtop
Laser/TEC Drivers Platforms
Laser/TEC OEM Drivers
Laser Mounts
Laser Diodes
Pigtailed Lasers
Laser Modules
Accessories

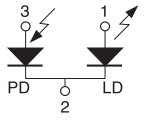
λ = 654nm P = 10mW, Single Mode Sharp GH06510B2A

Absolute Maximum Ratings (T_C=25°C)

PARAMETER		SYMBOL	RATING
Optical Power Output		P_o	10mW
Reverse Voltage	Laser	V_R	2V
	PD		30V
Operating Temperature*		T_{op}	-10 to +70°C
Storage Temperature		T_{stg}	-40 to +85°C
Soldering Temperature		T_{sld}	260°C

*Case Temperature

Pin Description
1 laser anode
2 common case
3 monitor diode anode



PIN CODE 5B

- 5.6mm Package
- Low Drive Current

CAUTION: ELECTROSTATIC SENSITIVE

Optical-Electrical Characteristics (T_C=25°C, P=7mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	–	30mA	45mA
Operation Current	I_{op}	–	40mA	55mA
Operation Voltage	V_{op}	–	2.2V	2.5V
Lasing Wavelength	λ_p	640nm	654nm	660nm
Divergence Parallel	θ//	7°	8.5°	10°
Divergence Perpendicular	θ⊥	24°	29°	33°
Monitor Current	I_m	0.08mA	0.2mA	0.4mA

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
GH06510B2A	£ 13.50	€ 20,00	¥ 205.30

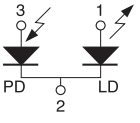
*For quantities over 5 pieces, please call a local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
GH06510B2A	$ 21.50	$ 18.45	$ 13.91	Sharp 654nm, 10mW Laser Diode

λ = 655nm P = 10mW, Single Mode ROHM RLD65MZT2

- 5.6mm Package
- Low Threshold Current: 25mA (T_c=25°C)

Pin Description
1 laser anode
2 common case
3 monitor diode anode



PIN CODE 5B

CAUTION: ELECTROSTATIC SENSITIVE

Absolute Maximum Ratings (T_C=25°C)

PARAMETER		SYMBOL	RATING
Optical Power Output		P_o	10mW
Reverse Voltage	Laser	V_R	2V
	PD		30V
Operating Temperature		T_{op}	-10 to +70°C
Storage Temperature		T_{stg}	-40 to +85°C

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
RLD65MZT2	£ 12.70	€ 18,80	¥ 192.90

*For quantities over 5 pieces, please call a local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
RLD65MZT2	$20.20	$ 17.70	$ 13.97	Rohm 655nm, 10mW Laser Diode

Optical-Electrical Characteristics (T_C=25°C,P=5mW)

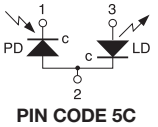
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	–	25mA	60mA
Operation Current	I_{op}	–	35mA	70mA
Operation Voltage	V_{op}	–	2.3V	2.6V
Lasing Wavelength	λ_p	645	655nm	660nm
Divergence Parallel	θ//	7°	8°	10°
Divergence Perpendicular	θ⊥	20°	27°	35°
Slope Efficiency (mW/mA)	ηs	0.2	0.4	0.8
Monitor Current	I_m	0.1	0.2	0.5
Parallel Deviation Angle	Δ ϕ//	-2°	0°	+2°
Perpendicular Deviation Angle	Δ ϕ⊥	-3°	0°	+3°
Emission Point Accuracy	Δ X Δ X Δ Z	-80µm	0	+80µm
Peak Emission Wavelength	λ	645nm	655nm	660nm
Astigmatism	As	-	-	10µm

λ = 658nm P = 35mW, Single Mode Hitachi HL6501MG

CAUTION: ELECTROSTATIC SENSITIVE

- 5.6mm Package
- AlGaInP Structure
- Astigmatism (typ.) 0.6µm
- Pulsed Optical Power 50mW With a 50% or Less Duty Cycle and a Maximum Pulse Width of 100ns.
- Emitter Size: 1 x 5µm

Pin Description
1 monitor diode cathode
2 common case
3 laser anode



PIN CODE 5C

Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_o	35mW
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	30V
Operation Case Temperature	T_c	-10 to 60°C
Storage Temperature	T_{stg}	-40 to 85°C

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
HL6501MG	£ 31.70	€ 46,70	¥ 479.90

*For quantities over 5 pieces, please call a local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
HL6501MG	$ 50.25	$ 43.95	$ 33.45	Hitachi 658nm, 35mW

Optical-Electrical Characteristics (T_C=25°C, P=30mW)

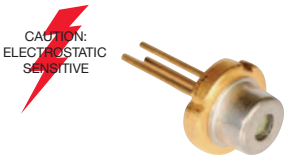
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	30mA	45mA	70mA
Operation Current	I_{op}	–	65mA	95mA
Operation Voltage	V_{op}	2.1	2.6V	3.0V
Lasing Wavelength	λ_p	645nm	658nm	665nm
Beam Divergence (FWHM)	θ//	7°	8.5°	10.5°
	θ⊥	18°	22°	26°
Monitor Current	I_m	0.05mA	0.2mA	1.5mA

All laser diodes are extremely electrostatic sensitive; see page 496 for our selection of antistatic products.

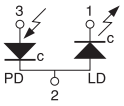
Laser Safety Goggles

See Page 895

λ = 658nm P = 40mW, Single Mode Sanyo DL6147-040



5.6mm PACKAGE



PIN CODE 5A

- 5.6mm Package
- Low Threshold Current: 30mA (typ.)

Pin Description
1 laser cathode
2 common case
3 monitor diode anode

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
DL6147-040	£ 23.39	€ 34,53	¥ 254,60

*For quantities over 5 pieces, please call a local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
DL6147-040	$ 37.13	$ 33.18	$ 27.12	Sanyo 658nm, 40mW

NEW THIS YEAR

Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	Po	45mW
LD Reverse Voltage	$V_{R(LD)}$	2V
Operation Case Temperature	T_c	-10 to 60°C [1]
Storage Temperature	T_{stg}	-40 to 85°C

Optical-Electrical Characteristics (T_C=25°C, P=40mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	–	30mA	50mA
Operation Current	I_{op}	–	65mA	85mA
Operation Voltage	V_{op}	–	2.4V	2.8V
Lasing Wavelength	λ_p	650nm	658nm	665nm
Beam Divergence (FWHM)	θ//	7°	10°	13°
	θ⊥	12°	16°	20°

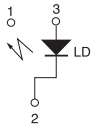
λ = 658nm P = 50mW, Single Mode Hitachi HL6512MG

Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_o	50mW
Optical Output Power (Pulse)	P_o	70mW [1]
LD Reverse Voltage	$V_{R(LD)}$	2V
Operation Case Temperature	T_c	-10 to 70°C [1]
Storage Temperature	T_{stg}	-40 to 85°C

1) Note: The value of -10 to +70°C is effective under pulse operation. The value under CW operation is -10 to +60°C.

Pin Description
1 no connection
2 laser cathode
3 laser anode



OPEN PIN CODE COMPATIBLE WITH STYLE A, B, & C

5.6mm PACKAGE

- 5.6mm Package
- Single Longitudinal Mode
- High Output Power: 70mW(pulse), PW=100ns, Duty=50%
- Wide Operating Temperature Range

Optical-Electrical Characteristics (T_C=25°C, P=50mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	30	45mA	60mA
Operation Current	I_{OP}	–	115mA	135mA
Operation Voltage	V_{OP}	2.1	2.6	3.0V
Beam Divergence (parallel to junction)	θ//	7°	8.5°	11°
Beam Divergence (perpendicular to junction)	θ⊥	18°	21°	26°
Lasing Wavelength	λ_p	650nm	658nm	662nm

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
HL6512MG	£ 27.80	€ 41,10	¥ 421.60

*For quantities over 5 pieces, please call a local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
HL6512MG	$ 44.15	$ 38.65	$ 31.00	Hitachi 658nm, 50mW

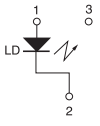
All laser diodes are extremely electrostatic sensitive; see page 496 for our selection of antistatic products.

λ = 658nm P = 60mW, Single Mode Sanyo DL7147-201

5.6mm PACKAGE

- 5.6mm Package
- Pulsed Optical Power 100mW
- 1µm Astigmatism @ 50mW

Pin Description
1 laser anode
2 laser cathode
3 no connection



OPEN PIN CODE COMPATIBLE WITH STYLE A, B, & C

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
DL7147-201	£ 44.80	€ 66,10	¥ 679.00

*For quantities over 5 pieces, please call our local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
DL7147-201	$ 71.10	$ 62.20	$ 48.90	Sanyo 658nm, 60mW

Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_o	60mW
Optical Output Power (Pulse)	P_o	100mW*
LD Reverse Voltage	$V_{R(LD)}$	2V
Operation Case Temperature	T_c	-10 to 75°C
Storage Temperature	T_{stg}	-40 to 85°C

*Note: Pulse width ≤0.1µs, duty=50%

Optical-Electrical Characteristics (T_C=25°C, P=50mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	–	40mA	50mA
Operation Current	I_{op}	–	90mA	120mA
Operation Voltage	V_{op}	–	2.5V	3.0V
Lasing Wavelength	λ_p	–	658nm	662nm
Beam Divergence (FWHM)	θ//	7.5°	9°	11°
	θ⊥	15°	16°	20°

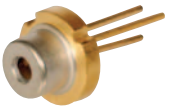
Optical Power Meters

See Page 946

Laser/TEC Drivers Benchtop
Laser/TEC Drivers Platforms
Laser/TEC OEM Drivers
Laser Mounts
Laser Diodes
Pigtailed Lasers
Laser Modules
Accessories

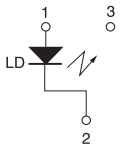
λ = 658nm P = 80mW, Single Mode Mitsubishi ML120G21

CAUTION: ELECTROSTATIC SENSITIVE



- 5.6mm Package
- Low Aspect Ratio(θ⊥/θ//): 1.8 (typ.)
- Low Astigmatic Distance: 1µm (typ.)

Pin Description
1 laser anode
2 laser cathode
3 no connection



OPEN PIN CODE COMPATIBLE WITH STYLE A, B, & C

Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_O	80mW
Optical Output Power(Pulse)	P_O	160mW*
Reverse Voltage	V_{RL}	2V
Operation Case Temperature	T_C	-10 to 75°C
Storage Temperature	T_{stg}	-40 to 100°C

*Note: Pulse width ≤50ns, duty = 50%

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
ML120G21**	£ 44.00	€ 64,90	¥ 666.60

*For quantities over 5 pieces, please call a local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
ML120G21**	$ 69.80	$ 61.05	$ 47.57	Mitsubishi 658nm, 80mW

**Not Compatible with TCLDM9

Optical-Electrical Characteristics (T_C=25°C, P=80mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	–	65mA	–
Operation Current	I_{OP}	–	150mA	–
Operation Voltage	V_{OP}	–	2.4V	3.0V
Slope efficiency	ηs	–	0.95mW/mA	–
Peak wavelength	λp	654nm	658nm	662nm
Beam divergence angle (//)	θ//	7°	9.5°	12°
Beam divergence angle (⊥)	θ⊥	14°	17°	20°

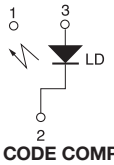
Note: All data is presented as typical unless otherwise specified.

λ = 658nm P = 90mW, Single Mode Hitachi HL6535MG

CAUTION: ELECTROSTATIC SENSITIVE

- 5.6mm Package
- Low Operating Current:
  I_{op}(1) = 135mA(P_o=80mW)
  I_{op}(2) = 295mA (P_o=240mW Pulse PW = 50ns, Duty = 40%)

Pin Description
1 no connection
2 laser cathode
3 laser anode



OPEN PIN CODE COMPATIBLE WITH STYLE A, B, & C

Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_o	90mW
Pulse Optical Output Power (CW)	$P_{o(pulse)}$	240mW [1]
LD Reverse Voltage	$V_{R(LD)}$	2V
CW Operating Temperature	$T_{opr\ (CW)}$	-10 to 75°C
Storage Temperature	T_{stg}	-40 to 85°C

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
HL6535MG	£ 42.70	€ 63,10	¥ 648.00

*For quantities over 5 pieces, please call a local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
HL6535MG	$ 67.85	$ 59.35	$ 47.00	Hitachi 658nm, 90mW

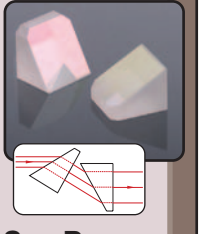
Optical-Electrical Characteristics (T_C=25°C, P= 80mW)

Characteristic	Symbol	Min.	TYP.	Max.
Threshold Current	I_{th}	–	55mA	70mA
Operation Current (CW)	I_{op}	–	135mA	170mA
Operation Current (Pulse)	I_{op}	–	295mA [1]	-
Lasing Wavelength	λ	652nm	658nm	662nm
Beam Divergence (FWHM)	θ//	7.5°	10°	12°
	θ⊥	15°	17°	19°
Operating Voltage	V_{op}	–	2.6V	3.0V

Note 1: 240mW (pulse), PW=50ns, duty = 40%

All laser diodes are extremely electrostatic sensitive; see page 496 for our selection of antistatic products.

Anamorphic Prism Pair



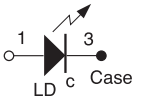
See Page 796

λ = 660nm P = 45mW, Single Mode Mitsubishi ML101J8

CAUTION: ELECTROSTATIC SENSITIVE

- 5.6mm Package
- AlGaInP Structure
- Single Transverse Mode
- 45mW CW or 60mW Pulsed (Pulse Width <1µs and Duty Less Than 50%)

Pin Description
1 laser anode
2 no connection
3 laser cathode/case



OPEN PIN CODE COMPATIBLE WITH STYLE A, B, & C

Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_o	45mW
LD Reverse Voltage	$V_{R(LD)}$	2V
Operation Case Temperature	T_c	-10 to 60°C
Storage Temperature	T_{stg}	-40 to 100°C

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
ML101J8	£ 63.10	€ 93,20	¥ 956.90

*For quantities over 5 pieces, please call a local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
ML101J8	$ 100.20	$ 87.65	$ 70.08	Mitsubishi 660nm, 45mW

Optical-Electrical Characteristics (T_C=25°C, P=40mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	–	57mA	–
Operation Current	I_{op}	–	117mA	–
Operation Voltage	V_{op}	–	2.5V	3.0V
Lasing Wavelength	λ	655nm	660nm	666nm
Beam Divergence (FWHM)	θ//	–	8.5°	–
	θ⊥	–	22°	–

Note: All data is presented as typical unless otherwise specified.

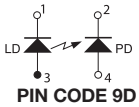
λ = 660nm P = 90mW, Single Mode Hitachi HL6548FG

CAUTION: ELECTROSTATIC SENSITIVE

NEW THIS YEAR

- 9mm Package
- AlGaInP Structure
- Single Longitudinal Mode

Pin Description
1 laser cathode
2 monitor diode cathode/case
3 laser anode
4 monitor diode anode



PIN CODE 9D

Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_o	100mW
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	30V
Storage Temperature	T_{stg}	-40 to 85°C
Operation Case Temperature	T_c	-10 to 60°C

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
HL6548FG	£ 124.70	€ 184,10	¥ 1,890.90

*For quantities over 5 pieces, please call a local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
HL6548FG	$ 198.00	$ 173.54	$ 159.74	Hitachi 660nm, 90mW

Optical-Electrical Characteristics (T_C=25°C, P=90mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	–	55mA	70mA
Operation Current	I_{op}	–	140mA	180mA
Operation Voltage	V_{op}	–	2.4V	2.8V
Lasing Wavelength	λ	654nm	660nm	665nm
Beam Divergence	θ//	7°	10°	13°
(FWHM)	θ⊥	15°	17°	20°
Monitor Current	I_m	–	0.6mA	–

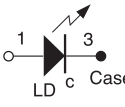
λ = 660nm P = 130mW, Single Mode Mitsubishi ML101J27

CAUTION: ELECTROSTATIC SENSITIVE

5.6mm PACKAGE

- 5.6mm Package
- High Output Power: 350mW (Pulse Operation)
- Low Aspect Ratio: 1.7 (Typ.)
- Low Astigmatic Distance: 1µm (Typ.)

Pin Description
1 laser anode
2 no connection
3 laser cathode/case



OPEN PIN CODE COMPATIBLE WITH SYLE A, B AND C

Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_o	130mW
Optical Output Power (Pulse)	$P_{o(pulse)}$	350mW
LD Reverse Voltage	$V_{R(LD)}$	2V
CW Operating Temperature	$T_{opr\ (CW)}$	-10 to 75°C
Storage Temperature	T_{stg}	-40 to 100°C

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
ML101J27	£ 109.70	€ 161,90	¥ 1,662.70

*For quantities over 5 pieces, please call a local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
ML101J27	$ 174.10	$ 152.35	$ 120.53	Mitsubishi 660nm, 130mW

Optical-Electrical Characteristics (T_C=25°C, P=120mW)

Characteristic	Symbol	Min.	TYP.	Max.
Threshold Current	I_{th}	–	80mA	–
Operation Current (CW)	I_{op}	–	200mA	–
Slope Efficiency (mW/mA)	ηs	–	0.95	–
Lasing Wavelength	λp	654nm	660nm	664nm
Beam Divergence	θ//	7°	10°	12°
(FWHM)	θ⊥	14°	17°	20°
Operating Voltage	V_{op}	–	2.5V	3.0V

All laser diodes are extremely electrostatic sensitive; see page 496 for our selection of antistatic products.

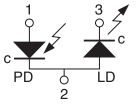
λ = 670nm P = 5mW, Single Mode Hitachi HL6722G

Maximum Ratings (T_C=25°C)

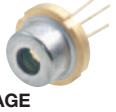
CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_o	5mW
Optical Output Power(Pulse)	P_o	6mW*
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	30V
Operation Case Temperature	T_c	-10 to 50°C
Storage Temperature	T_{stg}	-40 to 85°C

*Note: Pulse width ≤ 1µs, duty ≤ 50%

Pin Description
1 monitor diode anode
2 common case
3 laser cathode



PIN CODE 9A



9mm PACKAGE

CAUTION: ELECTROSTATIC SENSITIVE

- 9mm Package
- AlGaInP Index-Guided Laser Diode with a Multi-Quantum Well (MQW) Structure
- Pulsed Optical Power 6mW with a 50% Duty Cycle and a Maximum Pulse Width of 1µs
- Single Longitudinal Mode
- 8µm Astigmatism @ 5mW

Optical-Electrical Characteristics (T_C=25°C, P= 5mW)

Characteristic	Symbol	Min.	TYP.	Max.
Threshold Current	I_{th}	20mA	32mA	55mA
Operation Current	I_{op}	–	42mA	70mA
Operation Voltage	V_{op}	–	–	2.7V
Lasing Wavelength	λp	660nm	670nm	680nm
Beam Divergence	θ//	5°	8°	11°
(FWHM)	θ⊥	22°	30°	38°
Monitor Current	I_m	1mA	2mA	3mA

Note: All data is presented as typical unless otherwise specified.

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
HL6722G	£ 23.10	€ 34,10	¥ 350.00

*For quantities over 5 pieces, please call a local office for pricing.

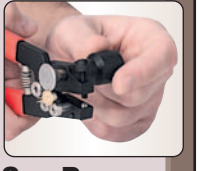
ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
HL6722G	$ 36.65	$ 32.05	$ 26.23	Hitachi 670nm, 5mW

Laser Diode Drivers

See Page 414

Laser/TEC Drivers Benchtop
Laser/TEC Drivers Platforms
Laser/TEC OEM Drivers
Laser Mounts
Laser Diodes
Pigtailed Lasers
Laser Modules
Accessories

All laser diodes are extremely electrostatic sensitive; see page 496 for our selection of antistatic products.

Laser Diode Can Opener

See Page 921

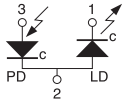
λ = 670nm P = 5mW, Single Mode Hitachi HL6724MG

Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_o	5mW
Optical Output Power (Pulse)	P_o	6mW*
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	30V
Operation Case Temperature	T_C	-10 to 50°C
Storage Temperature	T_{stg}	-40 to 85°C

*Note: Pulse width ≤ 1µs, duty ≤ 50%

Pin Description
1 laser cathode
2 common case
3 monitor diode anode



PIN CODE 5A

5.6mm PACKAGE

CAUTION: ELECTROSTATIC SENSITIVE

- 5.6mm Package
- AlGaInP Index-Guided Laser Diode With A
- Multi-Quantum Well (MQW) Structure
- Pulsed Optical Power 6mW with a 50% Duty Cycle and a Maximum Pulse Width of 1µs @5mW
- Single Longitudinal Mode
- 5µm Astigmatism @ 5mW

Optical-Electrical Characteristics (T_C=25°C, P=5mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	–	25mA	35mA
Operation Current	I_{op}	–	35mA	50mA
Operation Voltage	V_{op}	–	–	2.7V
Lasing Wavelength	λp	660nm	670nm	680nm
Beam Divergence (FWHM)	θ//	5°	8°	11°
	θ⊥	22°	30°	40°
Monitor Current	I_m	0.4mA	0.9mA	2mA

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
HL6724MG	£ 14.20	€ 21,00	¥ 215.80

*For quantities over 5 pieces, please call a local office for pricing.

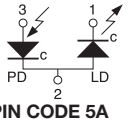
ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
HL6724MG	$ 22.60	$ 19.80	$ 15.54	Hitachi 670nm, 5mW

λ = 670nm P = 7mW, Single Mode Sanyo DL3149-057

Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_o	7mW
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	30V
Operation Case Temperature	T_C	-10 to 60°C
Storage Temperature	T_{stg}	-40 to 85°C

Pin Description
1 laser cathode
2 common case
3 monitor diode anode



PIN CODE 5A

5.6mm PACKAGE

CAUTION: ELECTROSTATIC SENSITIVE

- 5.6mm Package
- AlGaInP Index-Guided MQW Structure
- 8µm Astigmatism @7mW
- High Operating Temperature 5mW at 60°C

Optical-Electrical Characteristics (T_C=25°C, P= 5mW)

Characteristic	Symbol	Min.	TYP.	Max.
Threshold Current	I_{th}	–	25mA	35mA
Operating Voltage	V_{op}	–	2.3V	2.6V
Lasing Wavelength	λp	660nm	670nm	678nm
Beam Divergence (FWHM)	θ//	6.5°	8°	10°
	θ⊥	25°	30°	35°
Monitor Current	I_m	0.5mA	1.5mA	2.0mA

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
DL3149-057	£ 9.60	€ 14,20	¥ 146.10

*For quantities over 5 pieces, please call a local office for pricing.

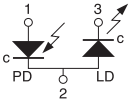
ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
DL3149-057	$ 15.30	$ 13.40	$ 9.90	Sanyo 670nm, 7mW

λ = 670nm P =10mW, Single Mode Hitachi HL6714G

CAUTION: ELECTROSTATIC SENSITIVE

9mm PACKAGE

Pin Description
1 monitor diode anode
2 common case
3 laser cathode



PIN CODE 9A

- 9mm Package
- AlGaInP Index-Guided Laser Diode with a Multi-Quantum Well (MQW) Structure
- Pulsed Optical Power 12mW with a 50% Duty Cycle and a Maximum Pulse Width of 1µs
- Single Longitudinal Mode
- Low Astigmatism: 10µm (typ.)

Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_o	10mW
Optical Output Power (Pulse)	P_o	12mW*
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	30V
Operation Case Temperature	T_C	-10 to 50°C
Storage Temperature	T_{stg}	-40 to 85°C

*Note: Pulse width ≤ 1µs, duty ≤ 50%

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
HL6714G	£ 44.30	€ 65,40	¥ 671.80

*For quantities over 5 pieces, please call a local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
HL6714G	$ 70.35	$ 61.55	$ 46.90	Hitachi 670nm, 10mW

Optical-Electrical Characteristics (T_C=25°C, P=10mW)

Characteristic	Symbol	Min.	TYP.	Max.
Threshold Current	I_{th}	20mA	35mA	60mA
Operating Current	I_{op}	-	55mA	90mA
Lasing Wavelength	λp	660nm	670nm	680nm
Beam Divergence (FWHM)	θ//	5°	8°	11°
	θ⊥	18°	22°	30°
Monitor Current	I_m	0.3mA	0.8mA	1.5mA

Note: All data is presented as typical unless otherwise specified

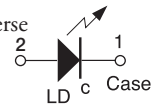
λ = 685nm P = 35mW, Single Mode Eudyna FLD6A2TK

CAUTION: ELECTROSTATIC SENSITIVE

Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power	P_o	35mW
Reverse Voltage	$V_{R(LD)}$	2V
Operating Temperature	T_{op}	0 to 70°C
Storage Temperature	T_{stg}	-40 to 80°C

- Modulation Up to 300MHz
- Low Aspect Ratio (1.31)
- Longitudinal and Transverse Single Mode



Pin Description
1 LD cathode/case
2 LD anode

5.6mm PACKAGE

OPEN PIN CODE
COMPATIBLE WITH PIN STYLE A, B, & C

Optical-Electrical Characteristics (T_C=25°C, P=35mW)

CHARACTERISTIC	SYMBOL	MIN	TYP.	MAX
Threshold Current	I_{th}	15mA	25mA	35mA
Operation Current	I_{op}	35mA	50mA	60mA
Operation Voltage	V_{op}	2.0V	2.5V	2.8V
Slope Efficiency	ηs	0.9mW/mA	1.2mW/mA	1.6mW/mA
Lasing Wavelength	λp	675nm	685nm	695nm
Beam Divergence (//)	θ//	11°	13°	16°
Beam Divergence (⊥)	θ⊥	14°	17°	20°

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
FLD6A2TK	£ 30.90	€ 45,60	¥ 468.00

*For quantities over 5 pieces, please call our local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
FLD6A2TK	$ 49.00	$ 42.90	$ 34.60	Eudyna 685nm, 35mW

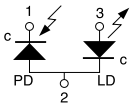
λ = 690nm P = 35mW, Single Mode Hitachi HL6738MG

CAUTION: ELECTROSTATIC SENSITIVE

Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_O	35mW
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	30V
Operation Case Temperature	T_C	-10 to 70°C
Storage Temperature	T_{stg}	-40 to 85°C

Pin Description
1 monitor diode cathode
2 common case
3 laser anode



PIN CODE 5C

- 5.6mm Package
- AlGaInP Structure
- 6µm Astigmatism @ 5mW
- Very High Operating Temperature (70°C)

Optical Power Meters
See Page 946

Optical-Electrical Characteristics (T_C=25°C, P=30mW)

Characteristic	SYMBOL	MIN	TYP.	MAX
Threshold Current	I_{th}	30mA	45mA	70mA
Operation Current	I_{op}	-	65mA	95mA
Operation Voltage	V_{op}	2.1V	2.5V	2.8V
Lasing Wavelength	λp	680nm	690nm	695nm
Beam Divergence (//)	θ//	7°	8.5°	10.5°
Beam Divergence (⊥)	θ⊥	17°	19°	23°
Monitor Current	I_m	0.02mA	0.1mA	0.45mA

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
HL6738MG	£ 34.70	€ 51,20	¥ 526.20

*For quantities over 5 pieces, please call our local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
HL6738MG	$ 55.10	$ 48.20	$ 36.67	Hitachi 690nm, 35mW

λ = 780nm P = 1.65mW, Multimode VCSEL-780

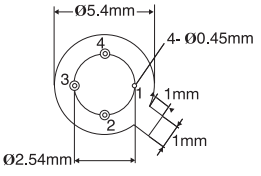
CAUTION: ELECTROSTATIC SENSITIVE

Absolute Maximum Ratings (T_C=25°C)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	TEST CONDITION
Dark Current	λ_r	–	0.2	1	nA	Vr = 10V
Shunt Resistance	R_p	100	200	–	GΩ	–
Breakdown Voltage	V_{br}	–	50	–	V	–
Junction Capacitance	C_p	–	40	–	pF	@Vr = 10V, 10kHz

- Flat Window
- Monitor Photodiode
- High Speed 2.5Gbps
- High-Speed Data Communications and Telecommunications Applications
- Multimode

Pin Description
1 Case
2 LD anode
3 LD cathode/PD anode
4 PD Cathode



Bottom View

Optical-Electrical Characteristics (T_C=25°C)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	TEST CONDITION
Peak Wavelength	λp	770	780	795	nm	If = 8mA@RT
Spectral Width (FWHM)	Δλ	–	0.5	1	nm	If = 8mA@RT
Beam Divergence	θ	10	16	30	Deg	Full width at 1/e²; If = 8mA@RT
Forward Voltage	V_f	1.7	2.1	2.5	V	If = 8mA@RT
Threshold Current	I_{th}	0.5	1.5	3	mA	–
Slope Efficiency	ΔP/ΔI	0.12	0.24	0.4	W/A	If = 8mA@RT
Optical Output Power	P_{out}	–	1.65	–	mW	If = 8mA@RT
Dynamic Resistance	ΔV/ΔI	40	55	65	Ω	If = 8mA@RT
Reverse Breakdown Voltage	V_{br}	–	10	–	V	–
Monitor Current	I_m	100	–	–	µA	If = 8mA@RT

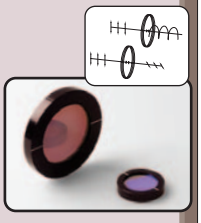
CHARACTERISTIC	MIN	MAX	UNIT	CONDITION
Storage Temperature	-40	100	°C	-
Operating Temperature	0	70	°C	-
Continuous Forward Current	-	8	mA	-
Continuous Reverse Voltage	-	5	V	@10µA

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
VCSEL-780	£ 15.00	€ 22,10	¥ 227.30

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
VCSEL-780	$ 23.80	$ 20.80	$ 16.05	780nm VCSEL Laser Diode

*For quantities over 5 pieces, please call our local office for pricing.

Benchtop Drivers
Platform Drivers
OEM Drivers
Laser Diode Mounts
Laser Diodes
Pigtailed Lasers
Laser Modules
Accessories

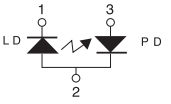
Polarization Optics

See Page 809

λ = 780nm P = 10mW, Single Mode Thorlabs L780P010

5.6mm PACKAGE

- 5.6mm Package
- Index-Guided MQW Structure
- Emitter Size: 1 x 5µm

Pin Description
1 laser cathode
2 common case
3 monitor diode anode



PIN CODE 5A

Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_o	10mW
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	30V
Operating Temperature	T_{op}	-10 to 50°C
Storage Temperature	T_{stg}	-40 to 85°C

Optical-Electrical Characteristics (T_C=25°C, P=10mW)

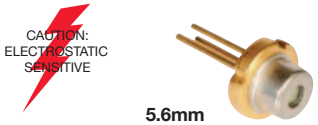
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	15mA	35mA	50mA
Operation Current	I_{op}	25mA	50mA	70mA
Operation Voltage	V_{op}	1.8V	2.0V	2.5V
Slope Efficiency	ηs	0.3mW/mA	0.5mW/mA	0.7mW/mA
Lasing Wavelength	λp	770nm	780nm	795nm
Beam Divergence (//)	θ//	8°	10°	12°
Beam Divergence (⊥)	θ⊥	25°	30°	40°
Astigmatism	As	–	11µm	–
Monitor Current	I_m	0.05mA	0.3mA	1.0mA

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
L780P010	£ 13.60	€ 20,10	¥ 206.30

*For quantities over 5 pieces, please call our local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
L780P010	$ 21.60	$ 18.90	$ 14.37	Thorlabs 780nm, 10mW

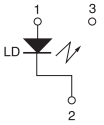
λ = 784nm P = 120mW, Single Mode Sharp GH0781JA2C



5.6mm PACKAGE

- 5.6mm Package
- High Coupling Efficiency

Pin Description
1 laser anode
2 laser cathode
3 no connection



OPEN PIN CODE COMPATIBLE WITH STYLE A, B, & C

Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC		SYMBOL	RATING
Optical Output Power (CW)		P_o	120mW
Optical Output Power (Pulse)[2]		P_o	180mW
Reverse Voltage		V_{RL}	2V
Operating Temperature[1]	CW	$T_{opc(c)}$	-10 to 65°C
	Pulse[2]	$T_{opp(c)}$	-10°to 75°C
Storage Temperature		T_{stg}	-40 to 85°C

[1] Case temperature [2] Pulse width: 0.5µs, Duty:50%

Optical-Electrical Characteristics (T_C=25°C, P=100mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	–	30mA	40mA
Operation Current	I_{op}	–	141mA	167mA
Operation Voltage	V_{op}	–	2.1V	2.5V
Peak wavelength	λp	780nm	784nm	787nm
Beam Divergence (//)	θ//	7.8°	8.7°	9.6°
Beam Divergence (⊥)	θ⊥	14.5°	16°	17.5°

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
GH0781JA2C	£ 21.80	€ 32,20	¥ 330.40

*For quantities over 5 pieces, please call a local office for pricing.

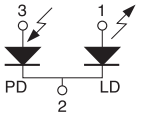
ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
GH0781JA2C	$ 34.60	$ 30.30	$ 22.85	Sharp 784nm,120mW

λ = 785nm P = 5mW, Single Mode ROHM RLD78MA-E

5.6mm PACKAGE

- 5.6mm Package
- Signal-to-Noise Ratio Guaranteed Over Entire Operating Temperature Range
- Reduced Facet Reflection
- 1/3 the Dispersion of Conventional Laser Diodes

Pin Description
1 laser anode
2 common case
3 monitor diode anode



PIN CODE 5B

Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_o	5mW
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	30V
Operating Temperature	T_{op}	-10 to 60°C
Storage Temperature	T_{stg}	-40 to 85°C

Optical-Electrical Characteristics (T_C=25°C, P=3mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	-	35mA	60mA
Operation Current	I_{op}	-	45mA	70mA
Operation Voltage	V_{op}	-	1.9V	2.3V
Slope Efficiency	ηs	0.1mW/mA	0.25mW/mA	0.6mW/mA
Lasing Wavelength	λp	770nm	785nm	810nm
Beam Divergence (//)	θ//	8°	11°	15°
Beam Divergence (⊥)	θ⊥	20°	37°	45°
Signal-to-noise ratio	S/N	60dB	-	–
Monitor Current	I_m	100µA	200µA	600µA

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
RLD78MA-E	£ 5.20	€ 7,70	¥ 79.30

*For quantities over 5 pieces, please call a local office for pricing.

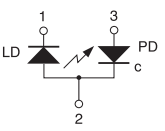
ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
RLD78MA-E	$ 8.30	$ 7.25	$ 5.63	Rohm 785nm, 5mW

λ = 785nm P = 25mW, Single Mode Sanyo DL4140-001S

Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_o	25mW
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	30V
Operation Case Temperature	T_C	-10 to 60°C
Storage Temperature	T_{stg}	-20 to 85°C

Pin Description
1 laser cathode
2 common case
3 monitor diode anode



PIN CODE 5A

5.6mm PACKAGE

CAUTION: ELECTROSTATIC SENSITIVE

- 5.6mm Package
- High Output Power
- Low Astigmatism

Optical-Electrical Characteristics (T_C=25°C, P=25mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	-	30mA	50mA
Operation Current	I_{op}	-	65mA	90mA
Slope Efficiency	ηs	0.3mW/mA	0.6mW/mA	0.80mW/mA
Lasing Wavelength	λp	776nm	785nm	800nm
Beam Divergence (//)	θ//	7°	9°	12°
Beam Divergence (⊥)	θ⊥	15°	25°	35°
Astigmatism	As	-	-	10µm
Monitor Current	I_m	0.3	0.8	1.5mA

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
DL4140-001S	£ 24.35	€ 35,95	¥ 369.10

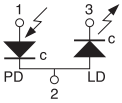
*For quantities over 5 pieces, please call a local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
DL4140-001S	$ 38.65	$ 33.80	$ 24.95	Sanyo 785nm, 25mW

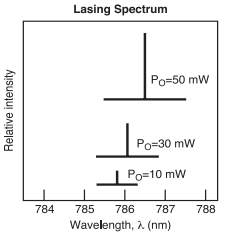
λ = 785nm P = 50mW, Single Mode Hitachi HL7851G

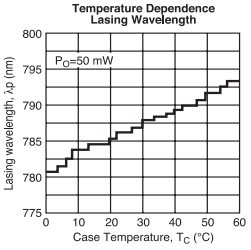
- 9mm Package, MQW Structure
- Low Astigmatism <5µm Typ. @ 50mW
- Pulsed Optical Power 60mW with a 50% Maximum Duty Cycle and a Maximum Pulse Width of 1µs

Pin Description
1 monitor diode anode
2 common case
3 laser cathode



PIN CODE 9A





Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_O	50mW
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	30V
Operation Case Temperature	T_c	-10 to 60°C
Storage Temperature	T_{stg}	-40 to 85°C

Optical-Electrical Characteristics (T_C=25°C, P=50mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	–	45mA	70mA
Operation Current	I_{op}	–	140mA	170mA
Operation Voltage	V_{op}	–	2.3V	2.7V
Lasing Wavelength	λp	775nm	785nm	795nm
Beam Divergence (FWHM)	θ//	8°	9.5°	12°
	θ⊥	18°	23°	28°
Monitor Current (P=50mW)	I_m	25µA	–	150µA

Note: All data is presented as typical unless otherwise specified.

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
HL7851G	£ 54.10	€ 79,80	¥ 819.90

*For quantities over 5 pieces, please call a local office for pricing.

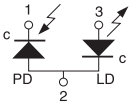
ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
HL7851G	$ 85.85	$ 75.10	$ 57.45	Hitachi 785nm, 50mW Laser Diode

λ = 785nm P = 80mW, Single Mode Sanyo DL7140-201S

Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_O	80mW
Optical Output Power (Pulse)	P_O	85mW
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	30V
Operation Case Temperature	T_C	-10 to 60°C
Storage Temperature	T_{stg}	-40 to 85°C

Pin Description
1 monitor diode cathode
2 common case
3 laser anode



PIN CODE 5C

CAUTION: ELECTROSTATIC SENSITIVE

- Replaces DL7140-201
- 5.6mm Package
- Single Mode Index-Guided Structure
- 10µm Astigmatism @ 70mW

Optical-Electrical Characteristics (T_C=25°C, P=70mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	–	30mA	50mA
Operation Current	I_{op}	–	100mA	140mA
Operation Voltage	V_{op}	–	2.0V	2.8V
Lasing Wavelength	λp	775nm	785nm	800nm
Beam Divergence (FWHM)	θ//	6°	8°	10°
	θ⊥	15°	17°	20°
Monitor Current	I_m	0.1mA	0.25mA	0.6mA

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
DL7140-201S	£ 30.60	€ 45,10	¥ 463.20

*For quantities over 5 pieces, please call a local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
DL7140-201S	$ 48.50	$ 43.45	$ 32.35	Sanyo 785nm, 80mW

Optical Isolators

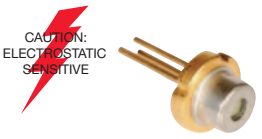
See Page 671

Benchtop Drivers
Platform Drivers
OEM Drivers
Laser Diode Mounts
Laser Diodes
Pigtailed Lasers
Laser Modules
Accessories

Aspheric Lenses

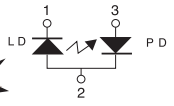
See Page 738

λ = 785nm P = 100mW, Multimode Thorlabs L785P100



5.6mm PACKAGE

Pin Description
1 laser cathode
2 common case
3 monitor diode anode



PIN CODE 5A

- 5.6mm Package
- Low Beam Divergence
- High Power: 100mW CW, 220mW Pulsed
- Multimode

NEW WAVELENGTH

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
L785P100	£ 24.30	€ 35,90	¥ 368.60

*For quantities over 5 pieces, please call a local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
L785P100	$ 38.60	$ 33.75	$ 27.94	Thorlabs 785nm, 100mW

Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_o	100mW
Optical Output Power (Pulsed)*	P_{op}	220mW
LD Reverse Voltage	$V_{R(LD)}$	2V
Operating Temperature	Top	-10 to 70°C
Storage Temperature	T_{stg}	-40 to 85°C

*Pulse Condition: Pulse width = 0.5µs, duty = 50%.

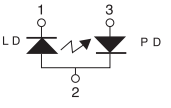
Optical-Electrical Characteristics (T_C=25°C, P=90mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	25mA	35mA	55mA
Operation Current	I_{op}	90mA	115mA	160mA
Operation Voltage	V_{op}	1.5V	2.0V	2.2V
Slope Efficiency	ηs	0.8mW/mA	1.1mW/mA	1.3mW/mA
Lasing Wavelength	λp	775nm	785nm	795nm
Beam Divergence (//)	θ//	8°	9°	10°
Beam Divergence (⊥)	θ⊥	15°	17°	19°
Monitor Current	I_m	0.1mA	0.5mA	0.7mA

λ = 808nm P = 10mW, Single Mode Thorlabs L808P010

5.6mm PACKAGE

Pin Description
1 laser cathode
2 common case
3 monitor diode anode



PIN CODE 5A

- 5.6mm Package
- Index-Guided MQW Structure
- Emitter Size: 1 x 5µm

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
L808P010	£ 12.10	€ 17,90	¥ 183.40

*For quantities over 5 pieces, please call a local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
L808P010	$ 19.20	$ 16.80	$ 12.70	Thorlabs 808nm, 10mW

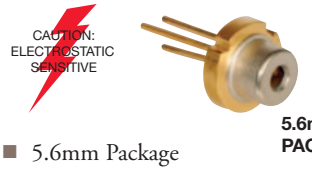
Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_o	10mW
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	30V
Operating Temperature	T_{op}	-10 to 50°C
Storage Temperature	T_{stg}	-40 to 85°C

Optical-Electrical Characteristics (T_C=25°C, P=10mW)

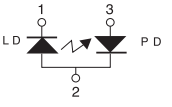
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	10mA	25mA	40mA
Operation Current	I_{op}	25mA	50mA	70mA
Operation Voltage	V_{op}	1.8V	2.0V	2.5V
Slope Efficiency	ηs	0.3mW/mA	0.5mW/mA	0.7mW/mA
Lasing Wavelength	λp	795nm	808nm	815nm
Beam Divergence (//)	θ//	8°	10°	12°
Beam Divergence (⊥)	θ⊥	25°	30°	40°
Astigmatism	As	–	11µm	–
Monitor Current	I_m	0.05mA	0.3mA	1.0mA

λ = 808nm P = 30mW, Single Mode Thorlabs L808P030



5.6mm PACKAGE

Pin Description
1 laser cathode
2 common case
3 monitor diode anode



PIN CODE 5A

- 5.6mm Package
- Index-Guided MQW Structure
- Emitter Size: 1 x 5µm

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
L808P030	£ 46.10	€ 68,00	¥ 698.10

*For quantities over 5 pieces, please call our local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
L808P030	$ 73.10	$ 63.95	$ 48.20	Thorlabs 808nm, 30mW

Absolute Maximum Ratings (T_C=25°C)

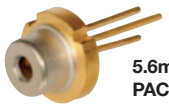
CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_o	30mW
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	30V
Operating Temperature	T_{op}	-10 to 50°C
Storage Temperature	T_{stg}	-40 to 85°C

Optical-Electrical Characteristics (T_C=25°C, P=30mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	30mA	50mA	70mA
Operation Current	I_{op}	40mA	100mA	150mA
Operation Voltage	V_{op}	1.8V	2.0V	2.5V
Slope Efficiency	ηs	0.5mW/mA	0.7mW/mA	0.9mW/mA
Lasing Wavelength	λp	795nm	808nm	820nm
Beam Divergence (//)	θ//	8°	10°	12°
Beam Divergence (⊥)	θ⊥	25°	30°	40°
Astigmatism	A_s	–	11µm	–
Monitor Current	I_m	0.05mA	0.3mA	1mA

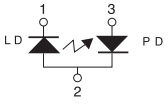
λ = 808nm P = 200mW, Multimode Thorlabs L808P200

CAUTION: ELECTROSTATIC SENSITIVE



5.6mm PACKAGE

Pin Description
1 laser cathode
2 common case
3 monitor diode anode



PIN CODE 5A

- 5.6mm Package
- Index-Guided MQW Structure
- Emitter Size: 1 x 40µm
- Multimode

Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_o	200mW
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	30V
Operating Temperature	T_{op}	-10 to 50°C
Storage Temperature	T_{stg}	-40 to 85°C

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
L808P200	£ 38.00	€ 56,10	¥ 575.90

*For quantities over 5 pieces, please call our local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
L808P200	$ 60.30	$ 52.75	$ 38.95	Thorlabs 808nm, 200mW

Optical-Electrical Characteristics (T_C=25°C, P=200mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	60mA	80mA	100mA
Operation Current	I_{op}	220mA	260mA	300mA
Operation Voltage	V_{op}	1.8V	2.0V	2.5V
Slope Efficiency	ηs	0.5mW/mA	0.7mW/mA	0.9mW/mA
Lasing Wavelength	λp	805nm	808nm	811nm
Beam Divergence (//)	θ//	8°	10°	12°
Beam Divergence (⊥)	θ⊥	25°	30°	40°
Monitor Current	I_m	0.5mA	1.3mA	2.0mA

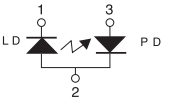
λ = 808nm P = 1 Watt, Multimode Thorlabs L808P1WJ

Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_o	1W
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	20V
Operating Temperature	T_{op}	-20 to 40°C
Storage Temperature	T_{stg}	-40 to 80°C

- 9.0mm Package
- Single Emitter
- Emitter Size: 1 x 100µm
- Patented Device Structure
- Multimode

Pin Description
1 laser cathode
2 common case
3 monitor diode anode



PIN CODE 9A

Optical Power Meters

See Page 946

Optical-Electrical Characteristics (T_C=25°C, P=1W)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	–	1A	1.2A
Operating Current	I_{op}	–	2.0A	2.3A
Operating Voltage	V_{op}	–	1.7V	2.0V
Slope Efficiency	ηs	0.9W/A	1.05W/A	-
Lasing Wavelength	λp	798nm	808nm	818nm
Beam Divergence (//)	θ//	4°	7°	10°
Beam Divergence (⊥)	θ⊥	30°	35°	40°
Monitor Current	I_m	0.1mA	-	10mA

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
L808P1WJ	£ 226.20	€ 333,90	¥ 3,428.50

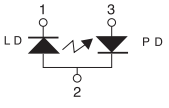
*For quantities over 5 pieces, please call our local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
L808P1WJ	$ 359.00	$ 314.15	$ 235.90	Thorlabs 808nm, 1W

λ = 830nm P = 40mW, Single Mode Sanyo DL5032-001

CAUTION: ELECTROSTATIC SENSITIVE

Pin Description
1 laser cathode
2 common case
3 monitor diode anode



PIN CODE 9A

- 9mm Package
- Low Threshold Current
- High Output Power
- Single Transverse Mode

Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Light Output (CW)	P_o	40mW
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	30V
Operating Temperature	T_{opr}	-10 to +60°C
Storage Temperature	T_{stg}	-40 to +85°C

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
DL5032-001	£ 71.30	€ 105,20	¥ 1,080.10

*For quantities over 5 pieces, please call a local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
DL5032-001	$ 113.10	$ 85.95	$ 75.05	Sanyo 830nm, 40mW

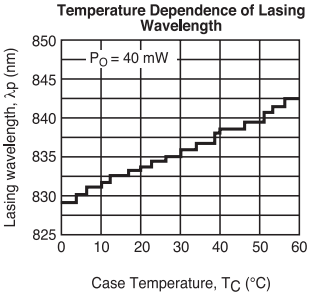
Optical-Electrical Characteristics (T_C=25°C, P=30mW)

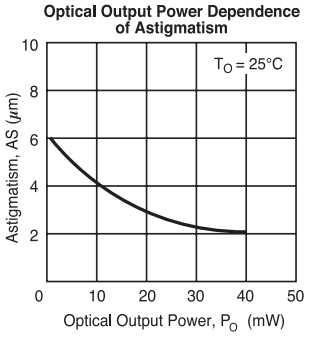
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	20mA	30mA	40mA
Operation Current	I_{op}	–	60mA	90mA
Operation Voltage	V_{op}	–	1.9V	2.5V
Lasing Wavelength	λp	810nm	830nm	840nm
Beam Divergence (//)	θ//	5°	7.5°	10°
Beam Divergence (⊥)	θ⊥	15°	18°	23°
Monitor Current	I_m	0.05mA	0.1mA	–
Astigmatism	A_s	–	–	10µm

Benchtop Drivers
Platform Drivers
OEM Drivers
Laser Diode Mounts
Laser Diodes
Pigtailed Lasers
Laser Modules
Accessories

λ = 830nm P = 40mW, Single Mode Hitachi HL8325G

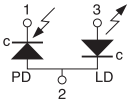
- 9mm Package
- GaAlAs Triple Quantum Well Structure
- Pulsed Optical Power 50mW with a 50% Maximum Duty Cycle and a Maximum Pulse Width of 1µs
- Single Longitudinal & Transverse Mode





HIGH POWER/LOW ASTIGMATISM

Pin Description
1 monitor diode cathode
2 common case
3 laser anode



PIN CODE 9C

CAUTION: ELECTROSTATIC SENSITIVE

Optical-Electrical Characteristics (T_C=25°C, P=40mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	–	40mA	70mA
Operation Current	I_{op}	–	120mA	–
Slope Efficiency	ηs	0.4mW/mA	0.5mW/mA	0.9mW/mA
Lasing Wavelength	λp	820nm	830nm	840nm
Beam Divergence	θ//	7°	10°	14°
(FWHM)	θ⊥	18°	22°	32°
Monitor Current (P=4mW)	I_m	20µA	40µA	130µA

*Pulse Condition: Pulse width = 1µs, duty = 50%.

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
HL8325G	£ 117.10	€ 172,90	¥ 1,775.30

*For quantities over 5 pieces, please call a local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
HL8325G	$ 185.90	$ 162.65	$ 120.10	Hitachi 830nm, 40mW

Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_o	40mW
Pulsed	P_o	50mW
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	30V
Operation Case Temperature	T_c	-10 to 60°C
Storage Temperature	T_{stg}	-40 to 85°C

Optical Filter Wheels

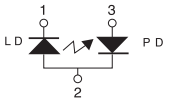
See Page 172

λ = 830nm P = 100mW, Single Mode Sanyo DL7032-001

Absolute Maximum Ratings (Tc=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_o	100mW
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	15V
Operation Case Temperature	T_C	-10 to 50°C
Storage Temperature	T_{stg}	-40 to 85°C

Pin Description
1 laser cathode
2 common case
3 monitor diode anode



PIN CODE 9A

CAUTION: ELECTROSTATIC SENSITIVE

- 9mm Package
- Single Longitudinal Mode

Optical-Electrical Characteristics (Tc=25°C, P=100mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	–	50mA	70mA
Operation Current	I_{op}	–	140mA	180mA
Operating Voltage	V_{op}	–	1.9V	2.4V
Lasing Wavelength	λp	810nm	830nm	840nm
Slope Efficiency	ηs	0.6mW/mA	1mW/mA	1.3mW/mA
Beam Divergence	θ//	5°	7°	11°
(FWHM)	θ⊥	12°	18°	23°
Monitor Current	I_m	0.05mA	0.3mA	-

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
DL7032-001	£ 189.90	€ 280,40	¥ 2,879.30

*For quantities over 5 pieces, please call a local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
DL7032-001	$ 301.50	$ 263.80	$ 199.75	Sanyo 830nm, 100mW

See Pages 570-573

HeNe Lasers

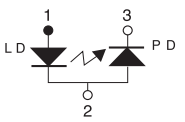
Thorlabs offers a variety of Helium Neon Lasers with powers from 0.5mW to 35mW as stock items. Wavelengths of 543, 594, 604, 612, 633, 1150, 1520, & 3390nm are available in various form factors. The most commonly used HeNe lasers are at 633nm and have become common components in a variety of applications in both research and industry. When used at powers less than 1mW, these lasers are ideal for alignment and educational applications.

λ = 830nm P = 180mW, Single Mode Sanyo DL8142-201

Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_o	180mW
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	30V
Operation Case Temperature	T_C	-10 to 50°C
Storage Temperature	T_{stg}	-40 to 85°C

Pin Description
1 laser anode
2 common case
3 monitor diode cathode



PIN CODE 5C

CAUTION: ELECTROSTATIC SENSITIVE

- 5.6mm Package
- High Power Output
- Recommended Usage: CW <150mW

Optical-Electrical Characteristics (T_C=25°C, P=150mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	–	50mA	70mA
Operation Current	I_{op}	–	200mA	250mA
Operation Voltage	V_{op}	–	1.9V	2.2V
Lasing Wavelength	λp	815nm	830nm	840nm
Beam Divergence (FWHM)	θ//	5°	8°	11°
	θ⊥	12°	16°	25°
Slope Efficiency	ηs	0.7mW/mA	1mW/mA	–
Monitor Current	I_m	0.15mA	0.4mA	1.0mA

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
DL8142-201	£ 203.40	€ 300,20	¥ 3082.70

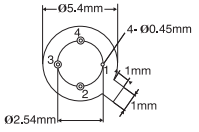
*For quantities over 5 pieces, please call a local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
DL8142-201	$ 322.80	$ 268.00	$ 250.78	Sanyo 830nm, 180mW

λ = 845nm P = 1.85mW, Multimode VCSEL-850

- Flat Window
- Monitor Photodiode
- High Speed 2.5Gbps
- Multimode

Pin Description
1 Case
2 LD anode
3 LD cathode/PD anode
4 PD Cathode



Bottom View

CAUTION: ELECTROSTATIC SENSITIVE

Monitoring Pin Specifications

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	TEST CONDITION
Dark Current	I_r	–	0.2	1	nA	Vr = 10V
Shunt Resistance	P_p	100	200	–	GΩ	–
Breakdown Voltage	V_{br}	–	50	–	V	–
Junction Capacitance	C_p	–	40	–	pF	@Vr = 10V, 10kHz

Maximum Ratings

CHARACTERISTIC	MIN.	MAX.	UNIT	CONDITION
Storage Temperature	–40	100	°C	–
Operating Temperature	0	85	°C	–
Continuous Forward Current	–	10	mA	–
Continuous Reverse Voltage	–	5	V	@10A

Optical-Electrical Characteristics

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Peak Wavelength*	λp	830	845	860	nm
Spectral Width (RMS)*	Δλ	–	–	0.85	nm
Beam Divergence	θ	–	25	30	Deg
Forward Voltage*	V_f	1.7	1.9	2.2	V
Threshold Current	I_{th}	–	2.2	3	mA
Slope Efficiency*	ηs	0.12	0.32	0.4	W/A
Optical Output Power*	P_{out}	–	1.85	–	mW
Dynamic Resistance*	ΔV/ΔI	20	40	65	Ω
Rise / Fall Time	t_r / t_f	–	50	100	ps
Operating Temp. Range	T_{op}	–5	25	80	°C

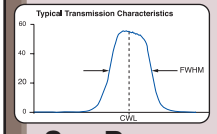
*Forward current = 8mA@RT

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
VCSEL-850	$ 22.40	$ 18.90	$ 14.96	845nm VCSEL Laser Diode

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
VCSEL-850	£ 14.10	€ 20,80	¥ 213.90

*For quantities over 5 pieces, please call a local office for pricing.

Laser Line Filters



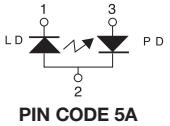
See Page 842

λ = 850nm P = 10mW, Single Mode Thorlabs L850P010

CAUTION: ELECTROSTATIC SENSITIVE

5.6mm PACKAGE

Pin Description
1 laser cathode
2 common case
3 monitor diode anode



PIN CODE 5A

- 5.6mm Package
- Index-Guided MQW Structure
- Emitter Size: 1 x 5µm

Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_o	10mW
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	30V
Operating Temperature	T_{op}	-10 to 50°C
Storage Temperature	T_{stg}	-40 to 85°C

Optical-Electrical Characteristics (T_C=25°C, P=10mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	10mA	25mA	40mA
Operation Current	I_{op}	25mA	50mA	70mA
Operation Voltage	V_{op}	1.8V	2.0V	2.5V
Slope Efficiency	ηs	0.3mW/mA	0.5mW/mA	0.7mW/mA
Lasing Wavelength	λp	835nm	850nm	865nm
Beam Divergence (//)	θ//	8°	10°	12°
Beam Divergence (⊥)	θ⊥	25°	30°	40°
Astigmatism	A_s	–	11µm	–
Monitor Current	I_m	0.05mA	0.3mA	1mA

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
L850P010	£ 13.60	€ 20,10	¥ 206.30

*For quantities over 5 pieces, please call a local office for pricing.

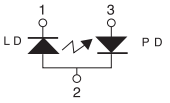
ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
L850P010	$ 21.60	$ 18.90	$ 13.95	Thorlabs 850nm, 10mW

Benchtop Drivers
Platform Drivers
OEM Drivers
Laser Diode Mounts
Laser Diodes
Pigtailed Lasers
Laser Modules
Accessories

λ = 850nm P = 30mW, Single Mode Thorlabs L850P030

5.6mm PACKAGE

Pin Description
1 laser cathode
2 common case
3 monitor diode anode



PIN CODE 5A

- 5.6 mm Package
- Index-Guided MQW Structure
- Emitter Size: 1 x 5µm

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
L850P030	£ 51.40	€ 75,90	¥ 779.30

*For quantities over 5 pieces, please call a local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
L850P030	$ 81.60	$ 71.40	$ 52.70	Thorlabs 850nm, 30mW

Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	Po	30mW
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	30V
Operating Temperature	T_{op}	-10 to 60°C
Storage Temperature	T_{stg}	-40 to 85°C

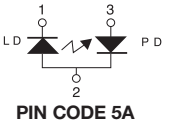
Optical-Electrical Characteristics (T_C=25°C, P=30mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	–	20mA	35mA
Operation Current	I_{op}	–	65mA	95mA
Operation Voltage	V_{op}	–	2.0V	2.5V
Slope Efficiency	ηs	0.4mW/mA	0.7mW/mA	1.0mW/mA
Lasing Wavelength	λp	840nm	850nm	860nm
Beam Divergence (//)	θ//	7°	8.5°	12°
Beam Divergence (⊥)	θ⊥	23°	30°	35°
Astigmatism	A_s	–	–	15µm
Monitor Current	I_m	–	0.2mA	0.5mA

λ = 850nm P = 100mW, Multimode Thorlabs L850P100

5.6mm PACKAGE

Pin Description
1 laser cathode
2 common case
3 monitor diode anode



PIN CODE 5A

- 5.6 mm Package
- Index-Guided MQW Structure
- Emitter Size: 1 x 40µm
- Multimode

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
L850P100	£ 60.20	€ 88,80	¥ 912.00

*For quantities over 5 pieces, please call a local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
L850P100	$ 95.50	$ 83.55	$ 61.70	Thorlabs 850nm, 100mW

Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_o	100mW
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	30V
Operating Temperature	T_{op}	-10 to 50°C
Storage Temperature	T_{stg}	-40 to 85°C

Optical-Electrical Characteristics (T_C=25°C, P=100mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	50mA	70mA	90mA
Operation Current	I_{op}	150mA	200mA	350mA
Operation Voltage	V_{op}	1.8V	2.0V	2.5V
Slope Efficiency	ηs	0.5mW/mA	0.7mW/mA	0.9mW/mA
Lasing Wavelength	λp	835nm	850nm	865nm
Beam Divergence (//)	θ//	8°	10°	12°
Beam Divergence (⊥)	θ⊥	25°	30°	40°
Astigmatism	A_s	–	11µm	–
Monitor Current	I_m	0.1mA	0.3mA	1.5mA

λ = 904nm P = 10mW, Single Mode Thorlabs L904P010

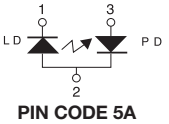
Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_o	10mW
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	30V
Operating Temperature	T_{op}	-10 to 50°C
Storage Temperature	T_{stg}	-40 to 85°C

Optical-Electrical Characteristics (T_C=25°C, P=10mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	10mA	25mA	40mA
Operation Current	I_{op}	25mA	50mA	70mA
Operation Voltage	V_{op}	1.8V	2.0V	2.5V
Slope Efficiency	ηs	0.3mW/mA	0.5mW/mA	0.7mW/mA
Lasing Wavelength	λp	890nm	904nm	920nm
Beam Divergence (//)	θ//	8°	10°	12°
Beam Divergence (⊥)	θ⊥	25°	30°	40°
Astigmatism	A_s	–	11µm	–
Monitor Current	I_m	0.05mA	0.3mA	1.0mA

Pin Description
1 laser cathode
2 common case
3 monitor diode anode



PIN CODE 5A

5.6mm PACKAGE

- 5.6mm Package
- Index-Guided MQW Structure
- Emitter Size: 1 x 5µm

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
L904P010	£ 13.90	€ 20,60	¥ 211.10

*For quantities over 5 pieces, please call a local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
L904P010	$ 22.10	$ 19.35	$ 14.30	Thorlabs 904nm, 10mW

λ = 904nm P = 30mW, Single Mode Thorlabs L904P030

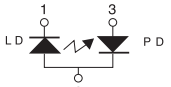
CAUTION: ELECTROSTATIC SENSITIVE

Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_o	30mW
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	30V
Operating Temperature	T_{op}	-10 to 50°C
Storage Temperature	T_{stg}	-40 to 85°C

Pin Description
1 laser cathode
2 common case
3 monitor diode anode

5.6mm PACKAGE



PIN CODE 5A

- 5.6mm Package
- Index-Guided MQW Structure
- Emitter Size: 1 x 5µm

Optical-Electrical Characteristics (T_C=25°C, P=30mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	30mA	50mA	70mA
Operation Current	I_{op}	40mA	100mA	150mA
Operation Voltage	V_{op}	1.8V	2.0V	2.5V
Slope Efficiency	ηs	0.5mW/mA	0.7mW/mA	0.9mW/mA
Lasing Wavelength	λp	890nm	904nm	920nm
Beam Divergence (//)	θ//	8°	10°	12°
Beam Divergence (⊥)	θ⊥	25°	30°	40°
Astigmatism	A_s	–	11µm	–
Monitor Current	I_m	0.05mA	0.3mA	1.0mA

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
L904P030	£ 50.20	€ 74,10	¥ 761.10

*For quantities over 5 pieces, please call a local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
L904P030	$ 79.70	$ 69.75	$ 51.50	Thorlabs 904nm, 30mW

λ = 915nm P = 1W, Multimode Thorlabs L915P1WJ

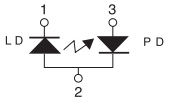
CAUTION: ELECTROSTATIC SENSITIVE

Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	Po	1W
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	20V
Operating Temperature	T_{op}	-20 to 40°C
Storage Temperature	T_{stg}	-40 to 80°C

Pin Description
1 laser cathode
2 common case
3 monitor diode anode

9mm PACKAGE



PIN CODE 9A

- 9mm Package
- Multimode
- Emitter Size: 1 x 100µm

Optical-Electrical Characteristics (T_C=25°C, P=1W)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	–	0.5A	0.7A
Operation Current	I_{op}	–	1.5A	2.0A
Operation Voltage	V_{op}	–	1.5V	2.0V
Slope Efficiency	ηs	0.85W/A	1.0W/A	–
Lasing Wavelength	λp	905nm	915nm	925nm
Beam Divergence (//)	θ//	3°	5°	10°
Beam Divergence (⊥)	θ⊥	28°	33°	38°
Monitor Current	I_m	0.1mA	–	10mA

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
L915P1WJ	£ 230.50	€ 340,30	¥ 3,494.30

*For quantities over 5 pieces, please call a local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
L915P1WJ	$ 365.90	$ 320.15	$ 236.35	Thorlabs 915nm, 1W

λ = 975nm P = 1W, Multimode Thorlabs L975P1WJ

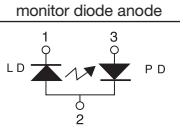
CAUTION: ELECTROSTATIC SENSITIVE

Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_o	1W
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	20V
Operating Temperature	T_{op}	-20 to 40°C
Storage Temperature	T_{stg}	-40 to 80°C

Pin Description
1 laser cathode
2 common case
3 monitor diode anode

9mm PACKAGE



PIN CODE 9A

- 9mm Package
- Multimode
- Emitter Size: 1 x 100µm

Optical-Electrical Characteristics (T_C=25°C, P=1W)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	–	0.4A	0.7A
Operation Current	I_{op}	–	1.5A	2.0A
Operation Voltage	V_{op}	–	1.5V	2.0V
Slope Efficiency	ηs	0.75W/A	0.85W/A	-
Lasing Wavelength	λp	965nm	975nm	985nm
Beam Divergence (//)	θ//	3°	5°	10°
Beam Divergence (⊥)	θ⊥	28°	33°	38°
Monitor Current	I_m	0.1mA	-	10mA

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
L975P1WJ	£ 237.50	€ 350,60	¥ 3,600.40

*For quantities over 5 pieces, please call a local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
L975P1WJ	$377.00	$ 329.90	$ 243.55	Thorlabs 975nm, 1W

Polarization Measurement Tools

See Page 975

Laser Diode Pigtailing

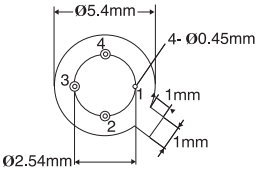
See Page 492

Laser Diode Technologies

λ = 980nm P = 1.85mW, Multimode VCSEL-980

CAUTION: ELECTROSTATIC SENSITIVE

- Multimode
- Flat Window
- Monitor Photodiode
- High Speed 2.5Gbps



Bottom View

Pin Description
1 Case
2 LD anode
3 LD cathode/PD anode
4 PD Cathode

Absolute Maximum Ratings

CHARACTERISTIC	MIN.	MAX.	UNIT	CONDITION
Storage Temperature	–40	100	°C	–
Operating Temperature	0	85	°C	–
Continuous Forward Current	–	10	mA	–
Continuous Reverse Voltage	–	5	V	@10A

Optical-Electrical Characteristics (T_C=25°C, I_f=8mA)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Peak Wavelength	λp	970	980	990	nm
Spectral Width (RMS)	Δλ	–	–	0.85	nm
Beam Divergence	θ	–	25	30	Deg
Forward Voltage	V_f	1.7	1.9	2.2	V
Threshold Current	I_{th}	–	2.2	3	mA
Slope Efficiency	ΔP/ΔI	0.12	0.32	0.4	W/A
Optical Output Power	P_{out}	–	1.85	–	mW
Dynamic Resistance DV/DI	20	40	65	W	
Rise / Fall Time	t_r / t_f	–	50	100	ps
Jitter p-p	ti	–	35	–	ps
λp Temperature Coefficient	Δλp/ΔT	–	0.06	–	nm/°C
Operating Temp. Range	T_{op}	–5	25	80	°C
Monitor Current	I_m	100	–	–	μA

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
VCSEL-980	£ 15.40	€ 22,70	¥ 233.00

*For quantities over 5 pieces, please call a local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
VCSEL-980	$ 24.40	$ 21.35	$ 15.75	980nm VCSEL laser diode

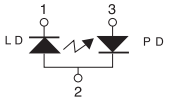
λ = 980nm P = 10mW, Single Mode Thorlabs L980P010

CAUTION: ELECTROSTATIC SENSITIVE

5.6mm PACKAGE

- 5.6mm Package
- Index-Guided MQW Structure
- Emitter Size: 1 x 5μm

Pin Description
1 laser cathode
2 common case
3 monitor diode anode



PIN CODE 5A

Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_o	10mW
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	30V
Operating Temperature	T_{op}	-10 to 50°C
Storage Temperature	T_{stg}	-40 to 85°C

Optical-Electrical Characteristics (T_C=25°C, P=10mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	10mA	25mA	40mA
Operation Current	I_{op}	25mA	50mA	70mA
Operation Voltage	V_{op}	1.8V	2.0V	2.5V
Slope Efficiency	ηs	0.3mW/mA	0.5mW/mA	0.7mW/mA
Lasing Wavelength	λp	965nm	980nm	995nm
Beam Divergence (//)	θ//	8°	10°	12°
Beam Divergence (⊥)	θ⊥	25°	30°	40°
Astigmatism	A_s	–	11μm	–
Monitor Current	I_m	50μA	300μA	1000μA

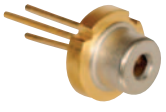
ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
L980P010	£ 15.80	€ 23,30	¥ 239.70

*For quantities over 5 pieces, please call a local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
L980P010	$ 25.10	$ 21.95	$ 16.20	Thorlabs 980nm, 10mW

λ = 980nm P = 30mW, Single Mode Thorlabs L980P030

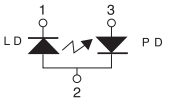
CAUTION: ELECTROSTATIC SENSITIVE



5.6mm PACKAGE

- 5.6mm Package
- Index-Guided MQW Structure
- Emitter Size: 1 x 5μm

Pin Description
1 laser cathode
2 common case
3 monitor diode anode



PIN CODE 5A

Absolute Maximum Ratings (Tc=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_o	30mW
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	30V
Operating Temperature	T_{op}	-10 to 50°C
Storage Temperature	T_{stg}	-40 to 85°C

Optical-Electrical Characteristics (Tc=25°C, P=30mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	30mA	50mA	70mA
Operation Current	I_{op}	40mA	100mA	150mA
Operation Voltage	V_{op}	1.8V	2.0V	2.5V
Slope Efficiency	ηs	0.5mW/mA	0.7mW/mA	0.9mW/mA
Lasing Wavelength	λp	965nm	980nm	995nm
Beam Divergence (//)	θ//	8°	10°	12°
Beam Divergence (⊥)	θ⊥	25°	30°	40°
Monitor Current	I_m	0.05mA	0.3mA	1mA

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
L980P030	£ 51.40	€ 75,90	¥ 779.30

*For quantities over 5 pieces, please call a local office for pricing.

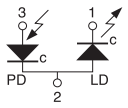
ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
L980P030	$ 81.60	$ 71.40	$ 52.70	Thorlabs 980nm, 30mW

λ = 980nm P = 50mW, Single Mode Thorlabs L9805E2P5

Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_o	50mW
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	30V
Operation Case Temperature	T_C	-10 to +60°C
Storage Temperature	T_{stg}	-40 to +85°C

Pin Description
1 laser cathode
2 common case
3 monitor diode anode



PIN CODE 5A

5.6mm PACKAGE

- Structure: Index-Guided, Single Transverse Mode
- Lasing Wavelength: 980nm Typ.
- Output Power: 50mW CW
- Package: 5.6mm, TO-18

Optical-Electrical Characteristics (T_C=25°C, P=50mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	10mA	15mA	30mA
Operation Current	I_{op}	–	95mA	120mA
Operation Voltage	V_{op}	–	1.5V	1.7V
Lasing Wavelength	λp	970nm	980nm	983nm
Slope Efficiency	hs	0.5mW/mA	0.7mW/mA	1mW/mA
Beam Divergence (//)	θ//	7°	8°	12°
Beam Divergence (⊥)	θ⊥	30°	33°	38°
Monitor Current	I_m	–	0.75mA	1.0mA

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
L9805E2P5	£ 139.20	€ 205,50	¥ 2,110.60

*For quantities over 5 pieces, please call a local office for pricing.

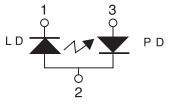
ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
L9805E2P5	$ 221.00	$ 193.40	$ 142.75	Thorlabs 980nm, 50mW

λ = 980nm P = 100mW, Multimode Thorlabs L980P100

Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_o	100mW
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	30V
Operating Temperature	T_{op}	-10 to 50°C
Storage Temperature	T_{stg}	-40 to 85°C

Pin Description
1 laser cathode
2 common case
3 monitor diode anode



PIN CODE 5A

CAUTION: ELECTROSTATIC SENSITIVE

5.6mm PACKAGE

- 5.6mm Package
- Index-Guided MQW Structure
- Emitter Size: 1 x 40µm
- Multimode

Optical-Electrical Characteristics (T_C=25°C, P=100mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	35mA	50mA	70mA
Operation Current	I_{op}	100mA	200mA	300mA
Operation Voltage	V_{op}	1.8V	2.0V	2.5V
Slope Efficiency	ηs	0.5mW/mA	0.7mW/mA	0.9mW/mA
Lasing Wavelength	λp	965nm	980nm	995nm
Beam Divergence (//)	θ//	8°	10°	12°
Beam Divergence (⊥)	θ⊥	25°	30°	40°
Astigmatism	A_s	–	11µm	–
Monitor Current	I_m	0.5mA	2mA	3mA

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
L980P100	£ 62.40	€ 92,20	¥ 946.40

*For quantities over 5 pieces, please call a local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
L980P100	$ 99.10	$ 86.70	$ 61.00	Thorlabs 980nm, 100mW

Collimation Packages

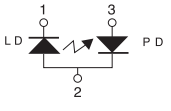
See Page 1010

λ = 980nm P = 200mW, Single Mode Thorlabs L980P200J

Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power	P_o	200mW
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	20V
Operating Temperature	T_{op}	-20 to 40°C
Storage Temperature	T_{stg}	-40 to 80°C

Pin Description
1 laser cathode
2 common case
3 monitor diode anode



PIN CODE 9A

CAUTION: ELECTROSTATIC SENSITIVE

- 9.0mm Package
- High Efficiency
- Single Transverse Mode
- Patented Device Structure

Optical-Electrical Characteristics (T_C=25°C, P=200mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	-	55mA	120mA
Operating Current	I_{op}	-	290mA	390mA
Operating Voltage	V_{op}	-	1.5V	2.0V
Slope Efficiency	ηs	0.75mW/mA	0.85mW/mA	-
Lasing Wavelength	lp	970nm	980nm	990nm
Beam Divergence (//)	θ//	4°	7°	10°
Beam Divergence (⊥)	θ⊥	25°	30°	35°
Monitor Current	I_m	0.1mA	–	10mA

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
L980P200J	£ 308.70	€ 455,70	¥ 4,679.50

*For quantities over 5 pieces, please call a local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
L980P200J	$ 490.00	$ 428.75	$ 316.55	Thorlabs 980nm,200mW

Benchtop Drivers
Platform Drivers
OEM Drivers
Laser Diode Mounts
Laser Diodes
Pigtailed Lasers
Laser Modules
Accessories

Fiber Coupled Laser Sources

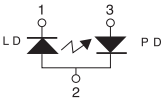
See Page 566

λ = 980nm P = 300mW, Single Mode Thorlabs L980P300J

CAUTION: ELECTROSTATIC SENSITIVE

- 9.0mm Package
- High Efficiency
- Single Transverse Mode
- Patented Device Structure

Pin Description
1 laser cathode
2 common case
3 monitor diode anode



PIN CODE 9A

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
L980P300J	£ 368.60	€ 544,10	¥ 5586.80

*For quantities over 5 pieces, please call a local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
L980P300J	$ 585.00	$ 511.90	$ 396.83	Thorlabs 980nm,300mW

Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power	P_o	300mW
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(LD)}$	20V
Operating Temperature	T_{op}	-20 to 40°C
Storage Temperature	T_{stg}	-40 to 80°C

Optical-Electrical Characteristics (T_C=25°C, P=300mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	-	90mA	135mA
Operating Current	I_{op}	-	440mA	540mA
Operating Voltage	V_{op}	-	1.5V	2.0V
Slope Efficiency	ηs	0.75mW/mA	0.85mW/mA	-
Lasing Wavelength	λp	970nm	980nm	990nm
Beam Divergence (//)	θ//	4°	7°	10°
Beam Divergence (⊥)	θ⊥	25°	30°	35°
Monitor Current	I_m	0.1mA	–	10mA

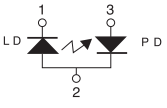
λ = 1060nm P = 100mW, Single Mode Thorlabs L1060P100J

CAUTION: ELECTROSTATIC SENSITIVE

HIGH POWER 100mW

- 9.0mm package
- High Efficiency
- Single Transverse Mode
- Patented Device Structure

Pin Description
1 laser cathode
2 common case
3 monitor diode anode



PIN CODE 9A

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
L1060P100J	£ 474.80	€ 700,90	¥ 7197.80

*For quantities over 5 pieces, please call a local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
L1060P100J	$ 753.70	$ 659.50	$ 486.90	Thorlabs 1060nm, 100mW

Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power	P_o	100mW
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(LD)}$	20V
Operating Temperature	T_{op}	-20 to 40°C
Storage Temperature	T_{stg}	-40 to 80°C

Optical-Electrical Characteristics (T_C=25°C, P=100mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	-	40mA	80mA
Operating Current	I_{op}	-	170mA	220mA
Operating Voltage	V_{op}	-	1.3V	2.0V
Slope Efficiency	ηs	0.7mW/mA	0.8mW/mA	-
Lasing Wavelength	λp	1040nm	1060nm	1080nm
Beam Divergence (//)	θ//	4°	6°	10°
Beam Divergence (⊥)	θ⊥	28°	33°	38°
Monitor Current	I_m	0.5mA	–	5mA

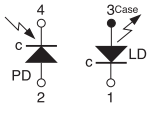
λ = 1310nm P = 10mW DFB, Mitsubishi ML725B11F

CAUTION: ELECTROSTATIC SENSITIVE

1310nm DFB LASER

- 5.6mm Package
- Well Suited for Light Source in Long-Distance Digital Transmission Systems
- Hermetically Sealed Device
- High-Side Mode Suppression Ratio (typical 40dB)
- DFB (Distributed Feedback)

Pin Description
1 laser cathode
2 monitor diode anode
3 case/laser anode
4 monitor diode cathode



PIN CODE 5D

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
ML725B11F	£ 151.10	€ 223,10	¥ 2291.00

*For quantities over 5 pieces, please call a local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
ML725B11F	$ 239.90	$ 209.90	$ 155.00	Mitsubishi 1310nm 10mW DFB Laser

Absolute Maximum Ratings (T_C=25°C)

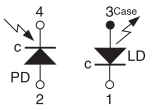
CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_o	10mW
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	20V
Operation Case Temperature	T_C	-40 to +85C
Storage Temperature	T_{stg}	-40 to +100°C

Optical-Electrical Characteristics (T_C=25°C, P=5mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	–	6mA	12mA
Operation Current	I_{op}	–	16mA	30mA
Operation Voltage	V_{op}	–	1.1V	1.5V
Lasing Wavelength	λp	1290nm	1310nm	1330nm
Beam Divergence (FWHM)	θ//	–	25°	35°
	θ⊥	–	30°	40°
Monitor Current	Im	0.05mA	0.2mA	–
Side Mode Suppression Ratio	SMSR	35dB	40dB	–

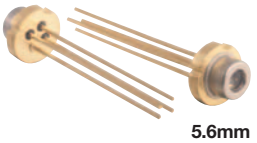
λ = 1310nm P = 10mW, Single Mode Mitsubishi ML725B8F

- 5.6mm Package
- Single Transverse Mode
- InGaAsP MQW Fabry-Perot Structure



PIN CODE 5D

Pin Description
1 laser cathode
2 monitor diode anode
3 case/laser anode
4 monitor diode cathode



5.6mm PACKAGE

CAUTION: ELECTROSTATIC SENSITIVE

Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_o	10mW
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	20V
Operation Case Temperature	T_C	-40 to +85C
Storage Temperature	T_{stg}	-40 to +100°C

Optical-Electrical Characteristics (T_C=25°C, P=5mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	–	5mA	15mA
Operation Current	I_{op}	–	20mA	35mA
Operation Voltage	V_{op}	–	1.1V	1.5V
Lasing Wavelength	λp	1290nm	1310nm	1330nm
Beam Divergence	θ//	–	25°	–
(FWHM)	θ⊥	–	30°	–
Monitor Current	I_m	0.1mA	0.5mA	–

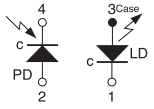
ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
ML725B8F	£ 54.90	€ 81,10	¥ 832.80

*For quantities over 5 pieces, please call our local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
ML725B8F	$ 87.20	$ 76.30	$ 56.35	Mitsubishi 1310nm 10mW Laser Diode

λ = 1550nm P = 6mW, Single Mode Mitsubishi ML925B45F

- 5.6mm Package
- MQW Active Layer
- Low Threshold Current
- Low Operating Current



PIN CODE 5D

Pin Description
1 laser cathode
2 monitor diode anode
3 case/laser anode
4 monitor diode cathode

NEW THIS YEAR

5.6mm PACKAGE

Laser Diode Banks

See Page 444

Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_o	6mW
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	20V
PD Forward Current	I_{FD}	2mA
Operation Case Temperature	T_C	-40 ~ +85C
Storage Temperature	T_{stg}	-40 ~ +100°C

Optical-Electrical Characteristics (T_C=25°C, P=5mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	3mA	10mA	20mA
Operation Current	I_{op}	10mA	30mA	50mA
Operation Voltage	V_{op}	–	1.1V	1.5V
Slope Efficiency	ηs	0.15mW/mA	0.25mW/mA	0.5mW/mA
Lasing Wavelength	λp	1520nm	1550nm	1580nm
Spectral Width(RMS)	Δλ	–	1.5nm	3nm
Beam Divergence (//)	θ//	–	25°	–
Beam Divergence (⊥)	θ⊥	–	30°	–
Rise and Fall Time	tr / tf	–	0.3ns	0.7ns
Monitoring Output	I_m	0.1mA	0.5mA	1mA
PD Dark Current	I_D	–	_	0.1μA
PD Capacitance	C_t	–	10pF	20pF

ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
ML925B45F	£ 37.50	€ 55,40	¥ 569.20

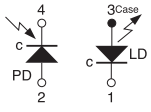
*For quantities over 5 pieces, please call a local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
ML925B45F	$ 59.60	$ 52.15	$ 36.50	Mitsubishi 1550nm, 6mW

λ = 1550nm P = 10mW DFB, Mitsubishi ML925B11F

1550nm LASER

Pin Description
1 laser cathode
2 monitor diode anode
3 case/laser anode
4 monitor diode cathode



PIN CODE 5D

5.6mm PACKAGE

CAUTION: ELECTROSTATIC SENSITIVE

- 5.6mm Package
- InGaAsP MQW, DFB (Multiple Quantum Well Distributed Feedback) Structure
- Fast Response Time (Rise and Fall Time 0.2ns-Typical, 0.4ns Maximum)
- Side Mode Suppression Ratio 40dB Typical (30dB Min.) @ 5mW

Absolute Maximum Ratings (T_C=25°C)

CHARACTERISTIC	SYMBOL	RATING
Optical Output Power (CW)	P_o	10mW
LD Reverse Voltage	$V_{R(LD)}$	2V
PD Reverse Voltage	$V_{R(PD)}$	20V
Operation Case Temperature	T_C	-40 to +85C
Storage Temperature	T_{stg}	-40 to +100°C

Optical-Electrical Characteristics (T_C=25°C, P=5mW)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.
Threshold Current	I_{th}	–	8mA	15mA
Operation Current	I_{op}	–	25mA	40mA
Operation Voltage	V_{op}	–	1.1V	1.5V
Lasing Wavelength	λp	1530nm	1550nm	1570nm
Beam Divergence	θ//	–	25°	35°
(FWHM)	θ⊥	–	35°	45°
Monitor Current	I_m	0.05mA	0.2mA	–
Side Mode Suppression Ratio	SMSR	35dB	40dB	_

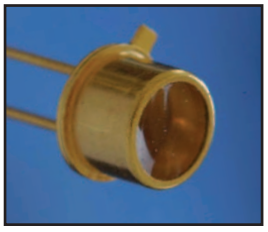
ITEM #	£* 1-5 PCS	€* 1-5 PCS	RMB* 1-5 PCS
ML925B11F	£ 459.80	€ 678,70	¥ 6,969.60

*For quantities over 5 pieces, please call a local office for pricing.

ITEM #	PRICE 1-5 PCS	PRICE 6-10 PCS	PRICE 11-20 PCS	DESCRIPTION
ML925B11F	$ 729.80	$ 644.09	$ 545.00	Mitsubishi 1550nm, 10mW

Laser Diode Technologies

λ = 1512 to 2004nm, P = 0.4 to 0.7mW VERTILAS VCSELs



Tunable single mode VCSEL (models covering the wavelength range from 1512nm to 2004nm)
Thorlabs offers a family of VCSEL Laser Diodes that are ideally suited for Tunable Diode Laser Absorbtion Spectroscopy (TDLAS) gas detection and monitoring, industrial process control, air quality monitoring, and exhaust testing. These unique VCSEL diodes, manufactured by VERTILAS, allow new applications in the fields of gas absorption spectroscopy and high speed data communications. The Buried Tunnel Junction (BTJ) technology eliminates the overheating problem often attributed to VCSEL diodes. These BTJ structures have improved thermal conductivity and reduced device thickness. Consequently, the BTJ VCSELs exhibit a reduced temperature dependency on the threshold current.

The BTJ-VCSELs offer excellent single frequency performance (see Figure 1) at power levels around 1mW. Due to their ability to use current for wavelength modulation instead of temperature (see Figure 2), these VCSELs allow direct wavelength modulation rates of up to 4GHz. This makes the BTJ VCSELs an ideal light source for optical sensing applications in the near infrared, especially where fast wavelength modulation is required.

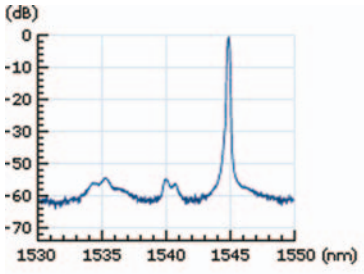


Figure 1: Output spectrum of the BTJ VCSEL laser diodes

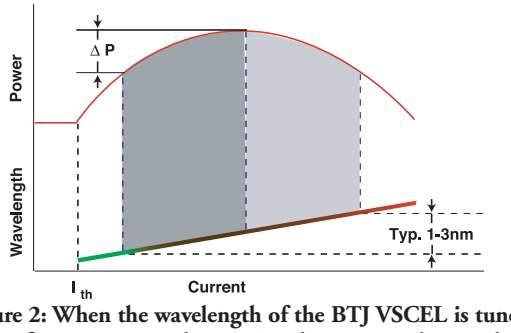


Figure 2: When the wavelength of the BTJ VSCEL is tuned over a few nanometers by varying the current, the wavelength shift is almost linear (tuning coefficient of a few nanometers per mA). The optical power variation ΔP is of the order 10-30%.

WAVELENGTH*	ABSORBING ELEMENT	WAVELENGTH*	ABSORBING ELEMENT
1512nm	NH_3	1790nm	NO
1577nm	H_2S	1877nm	H_2O
1580nm	CO	1742nm	HCl

*Other wavelengths available upon request

Electrical / Optical Characteristics at T_o = 25°C

PARAMETER	CONDITION	SYMBOL	UNITS	RATINGS		
				MIN	TYP	MAX
Maximum Optical Power: 1512, 1577, 1580nm	T_o	Pmax	mW	0.5	0.7	1.1
1654, 1742, 1790nm	T_o	Pmax	mW	0.3	0.5	0.9
1877, 2004nm	T_o	Pmax	mW	0.25	0.4	0.5
Maximum Tuning Coefficient	T_o	Δλ/ΔI	nm/mA	0.6	0.7	0.8
Maximum Current Tuning	T_o	Δλ	nm	2	3	4
Temperature Tuning Coefficient		Δλ/ΔT	nm/°C	0.08	0.11	0.15
Threshold Current	T_o	Ith	mA	0.4	0.7	1.5
Side Mode Suppression Ratio	transverse + polarization modes at Pmax	SMSR	dB	25	30	50
Beam Divergence	FWHM	FWHM	degree	14	16	20

- Single Mode Output
- High Optical Output: 0.4-0.7mW Typ.
- Low Power Consumption
- Wide Tuning Range: 2-4nm
- Fast Modulation via Current: Up to 10kHz
- Data Sheet for Each Laser
- Small Package Size:
  - T0-46 Housing
  - T0-5 w/ TEC & Thermistor
- Open Housing (No Window)

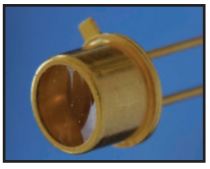
Tunable Single Mode VCSELs

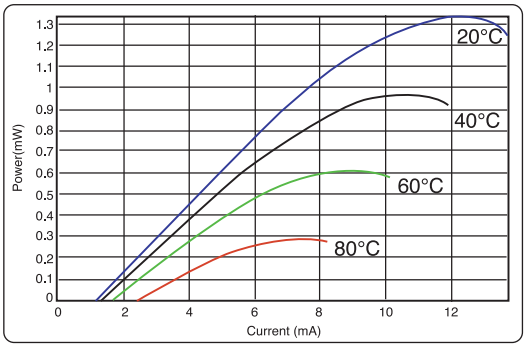
ITEM #	$	£	€	RMB	DESCRIPTION
VCL1512	$ 480.00	£ 302.40	€ 446,40	¥ 4,584.00	VCSEL Laser Diode 1512nm, TO-46
VCT1512	$ 864.00	£ 544.30	€ 803,50	¥ 8,251.20	VCSEL Laser Diode 1512nm, TO-5, w/ TEC
VCL1577	$ 480.00	£ 302.40	€ 446,40	¥ 4,584.00	VCSEL Laser Diode 1577nm, TO-46
VCT1577	$ 864.00	£ 544.30	€ 803,50	¥ 8,251.20	VCSEL Laser Diode 1577nm, TO-5, w/ TEC
VCT1580	$ 864.00	£ 544.30	€ 803,50	¥ 8,251.20	VCSEL Laser Diode 1580nm, TO-5, w/ TEC
VCL1742	$ 1,440.00	£ 907.20	€ 1.339,20	¥ 13,752.00	VCSEL Laser Diode 1742nm, TO-46
VCT1742	$ 1,824.00	£ 1,149.10	€ 1.696,30	¥ 17,419.20	VCSEL Laser Diode 1742nm, TO-5, w/ TEC
VCL1790	$ 1,440.00	£ 907.20	€ 1.339,20	¥ 13,752.00	VCSEL Laser diode 1790nm, TO-46
VCT1790	$ 1,824.00	£ 1,149.10	€ 1.696,30	¥ 17,419.20	VCSEL Laser Diode 1790nm, TO-5, w/ TEC
VCL1877	$ 1,632.00	£ 1,028.20	€ 1.517,80	¥ 15,585.60	VCSEL Laser Diode 1877nm, TO-46
VCT1877	$ 2,016.00	£ 1,270.10	€ 1.874,90	¥ 19,252.80	VCSEL Laser Diode 1877nm, TO-5, w/ TEC

λ = 1550nm, P = 1.1mW VERTILAS VCSELs

- Single Mode
- High Optical Output: 1.1mW typ.
- Low Power Consumption
- Very Fast Modulation via Current: up to 4GHz
- Data Sheet for each Laser
- Small Package Size:
  - T0-46 Housing
  - T0-5 with TEC & Thermistor
- Operation Temperature: -20°C to 70°C

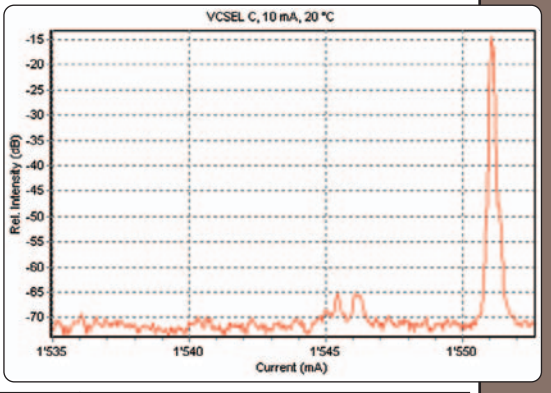
*Other configurations available upon request: multimode, temperature control, different housings, windows, and coatings. Please call for details.





Electrical / Optical Characteristics at T_o = 25°C

PARAMETER	CONDITION	SYMBOL	UNITS	RATINGS		
				MIN	TYP	MAX
Operating Wavelength	T_o	λ0	nm	1540	1550	1560
Maximum Optical Power	T_o	Pmax	mW	0.7	1.1	1.5
Threshold Current	T_o	I_{th}	mA	0.6	1.1	1.8
Cut Off Frequency		f_{3db}	GHz	2	3	4
Side Mode Suppression Ratio	transverse and polarization modes at Pmax	SMSR	dB	25	30	50
Beam Divergence	Full width at half maximum	FWHM	degree	12	15	18
Differential Resistance	T_o	Rdiff	W	40	60	80



Tunable Single Mode VCSELs

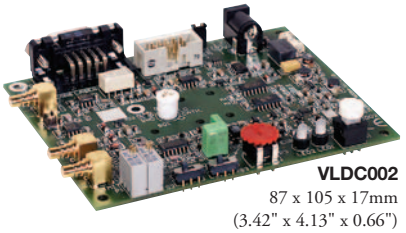
ITEM #	$	£	€	RMB	DESCRIPTION
VCL1550	$ 300.00	£ 189.00	€ 279,00	¥ 2,865.00	VCSEL Laser Diode 1550nm, TO-46
VCT1550	$ 624.00	£ 393.10	€ 580,30	¥ 5,959.20	VCSEL Laser Diode 1550nm TO-5, w/ TEC

OEM VCSEL Diode Drivers with Current Modulator: 1Hz to ≥10kHz

With and Without Temperature Control for VCSEL Diodes

OEM VCSEL Diode Drivers

- Output Current: 0 – 25mA
- Compliance Voltage: >5V
- Integrated Current Modulator: 1Hz to ≥10kHz
- Temperature Control: 10 – 40°C (VITC002 only)
- Adjustable Hardware Current Limit
- Monitor Current Output
- Laser Diode Socket on Board
- Open Output Detection and Safety Interlock
- Complete with Universal Input 5VDC



VLDC002
87 x 105 x 17mm
(3.42" x 4.13" x 0.66")

VITC002
87 x 145 x 17mm
(3.42" x 5.71" x 0.66")

These Laser Diode Controllers are ideally suited for powering the expanded selection of Vertilas VCSEL diodes presented on pages 488 and 489. The Vertilas VCSEL diodes can be plugged directly into the onboard sockets. Any other VCSEL diodes with grounded laser anode can be operated using a shielded DB9 cable.

These controllers are designed to supply the low drive current typical of a VCSEL. Special attention has been paid to ensuring an extremely clean low noise drive current to prevent damage to highly sensitive VCSEL Diodes.

An integrated current modulation feature allows high-speed sweeping of the wavelength of the VCSEL for spectroscopy applications. Alternatively, an analog input enables external modulation of the wavelength. An adjustable upper limit on the modulation current protects the laser diode from accidental damage when using either of these features.

A temperature window indicator LED shows when the diode leaves a desired operation temperature range, thus providing an indication that an unwanted wavelength shift may have occurred (VITC002 only). Two other features, an open circuit detector and an interlock, both enhance the safe operation of a sensitive VCSEL diode.

LDC200C Series Benchtop Laser Controller (20mA to 2A)

See Page 414

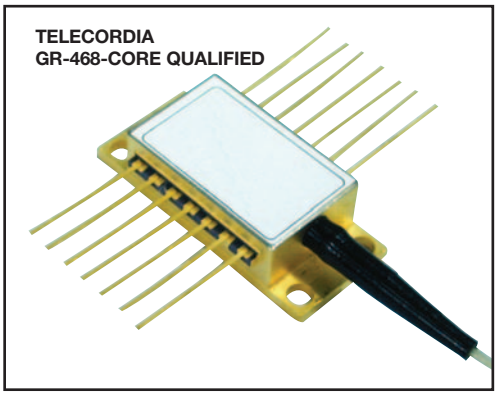
ITEM #	$	£	€	RMB	DESCRIPTION
VLDC002	$ 360.00	£ 226.80	€ 334,80	¥ 3,438.00	VCSEL Driver w/o Temp. Controller, VCL Series Socket on Board
VITC002	$ 420.00	£ 264.60	€ 390,60	¥ 4,011.00	VCSEL Driver w/ Temp. Controller, VCT Series Socket on Board

Benchtop Drivers
Platform Drivers
OEM Drivers
Laser Diode Mounts
Laser Diodes
Pigtailed Lasers
Laser Modules
Accessories

980nm Fiber Bragg Grating Stabilized 200mW Pump Laser

The PL980P200 consists of a field-proven 980nm quantum-well laser chip in a 14-pin butterfly package with an integrated thermoelectric cooler and monitor photodiode.

This 200mW module is designed to operate as a pump source for erbium-doped fiber amplifiers (EDFAs). The package includes a fiber Bragg grating, which ensures the wavelength stability of this high-power pump laser. The main application for this laser is the construction of EDFAs for use in WDM systems, pre-amps for broadband CATV networks, and metro networks.



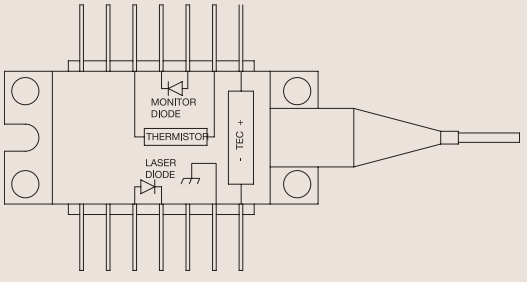
Features

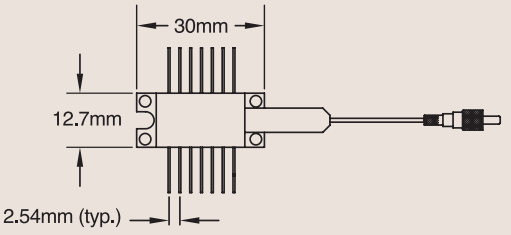
- 200mW at Fiber Output
- Fiber Bragg Grating Wavelength Stabilized
- Internal Thermoelectric Cooler
- Photodiode Back Facet Monitor
- Epoxy/Flux-Free Design
- Single Mode Fiber Pigtail With FC/APC Connector
- Compact, Low-Profile 14-Pin Butterfly Package
- Telecordia GR-468-CORE Qualified
- FC/APC Fiber Connector With HI1060 Fiber

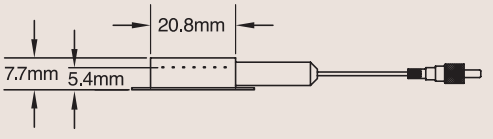
Applications

- Optical Amplifier System
- EDFAs
- DWDM EDFAs
- CATV Networks
- Metro Area Network

Pin Connection (Top View)







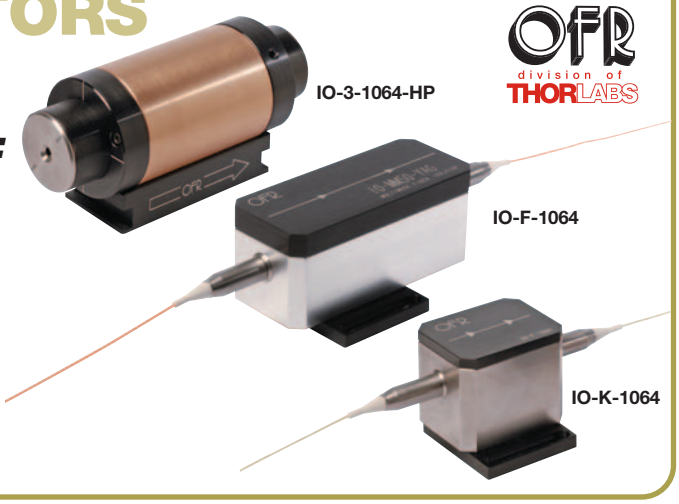
COMPATIBLE WITH LM14S2 BUTTERFLY MOUNT USING TYPE 1 ADAPTER CARD
SEE PAGE 460

OPTICAL ISOLATORS

OFR, a Division of Thorlabs, Offers a Wide Selection of Isolators:

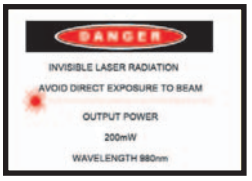
- **High-Power and Low-Power**
- **Free-Space and Fiber-Coupled**
- **Polarization Independent and Polarization Dependent**
- **Custom Isolators Available Upon Request**

See page 671 for More Details



980nm Fiber Bragg Grating Stabilized Pump Laser (cont.)

OPERATING OUTPUT POWERS	OPERATING CURRENT (MAX)
200mW	360mA



CAUTION: ELECTROSTATIC SENSITIVE

See Our Selection of Laser Safety Signs on Page 502

Absolute Maximum Rating (T_s = 25°C, T_{case} = 0 to 70°C)

PARAMETER	CONDITIONS	MIN	TYPICAL	MAX	UNITS
Case Storage Temp.		-40	–	85	°C
Case Operating Temp.		-20	–	75	°C
Soldering Temp.	10sec.	–	–	260	°C
LD Forward Drive Current	P_o ≤200mW , P_o > 200mW	–	–	400, 600	mA

Spectral Characteristics (T_s = 25°C, T_{case} = 0 to 70°C)

PARAMETER	CONDITIONS	MIN	TYPICAL	MAX	UNITS
Center Wavelength (λc)	to Kink Power (Pk) @ 25°C	974	980	985	nm
Power-In-Band (Integration band ±1nm)	to Kink Power (Pk) @ 25°C	90	95	–	%
Spectral Width (ΔλFWHM)	to Kink Power (Pk) @ 25°C	–	–	1	nm
Side Mode Suppression Ratio	to Kink Power (Pk) @ 25°C	20	–	–	dB
Spectral Shift vs.Temp. (Δλ/ΔT)	T_S = 25°C Tgrating 0°C to 70°C	–	–	0.01	nm/°C
Spectral Stability vs.Time (Δλ/Δt)	to Kink Power (Pk) @ 25°C, t =1min	–	0.1	0.3	nm

Photodetector Characteristics (T_s = 25°C, T_{case} = 0 to 70°C)

PARAMETER	CONDITIONS	MIN	TYPICAL	MAX	UNITS
Photodetector Dark Current (ID)	V_R = 5V, T_{case} = 25°C	–	–	10	nA
Photodetector Responsivity (d Ipd/d P)	–	1.0	3.0	20.0	µA/mW
Photodetector Capacitance (Cp)	V_R = 5V	–	6	–	pF

Fiber Specification (T_s = 25°C, T_{case} = 70°C)

PARAMETER	CONDITIONS	MIN	TYPICAL	MAX	UNITS
Fiber Type	Single Mode Fibers	–	–	–	–
Fiber Bend Radius	–	25	–	–	mm
Pigtail Length After Grating	–	0.75	–	–	m
Module to Grating Distance	–	–	2	–	m

Thermistor Characteristics (T_s = 25°C, T_{case} = 0 to 70°C)

PARAMETER	CONDITIONS	MIN	TYPICAL	MAX	UNITS
Thermistor Resistance (R_{th})	$T_{submount}$ = 25° C	9.5	–	10.5	k

Thermoelectric Cooler Characteristics (T_s = 25°C, T_{case} = 70°C)

PARAMETER	CONDITIONS	MIN	TYPICAL	MAX	UNITS
TEC Current	ΔT = 50°C	–	0.75	1.8	A
TEC Voltage	ΔT = 50°C	–	2	3.2	V

L-I Characteristics (T_s = 25°C, T_{case} = 0 to 70°C)

PARAMETER	CONDITIONS	MIN	TYPICAL	MAX	UNITS
Threshold Current	–	–	50	–	mA
LD Operating Voltage (T = 25°C)	T_{case} = 0 to 70°C, for all power	–	1.6	2.5	V
Kink Power Margin	–	15	–	–	%
Optical Power Stability (ΔP/ Δt)	–	–	–	0.5	%
Laser Operating Temp. (TL)	@ Rated Power (P_o)	–	25	–	°C

Butterfly Laser Mount

Thorlabs offers an extensive selection of laser diodes and TEC Controllers. The LM14S2 Universal 14-pin Butterfly Laser Mount shown here is fully compatiable with all of these products as well as all standard butterfly laser diodes.

LM14S2
89 x 89 x 32mm

See Page 460

ITEM #	$	£	€	RMB	DESCRIPTION
PL980P200	$ 1,156.00	£ 728.30	€ 1.075,10	¥ 11,039.80	980nm Fiber Bragg Grating Stabilized Pump Laser, P= 200mW

For quantities over 5, please call our local office for pricing.

Benchtop Drivers
Platform Drivers
OEM Drivers
Laser Diode Mounts
Laser Diodes
Pigtailed Lasers
Laser Modules
Accessories

LASER RADIATION
AVOID DIRECT EYE EXPOSURE
CLASS 3R LASER PRODUCT
600-700nm <5mw
IEC 60825-1 EDITION 1.2 2001-08

INVISIBLE LASER RADIATION
AVOID EXPOSURE TO BEAM
CLASS 3B LASER PRODUCT
700-800nm <500mw
IEC 60825-1 EDITION 1.2 2001-08

CLASS 1
LASER
PRODUCT

Fiber Pigtailed Laser Diodes

Thorlabs offers a full line of fiber pigtailed laser diodes using either single mode or multimode fibers. Our high-quality alignment process ensures maximum efficiency.

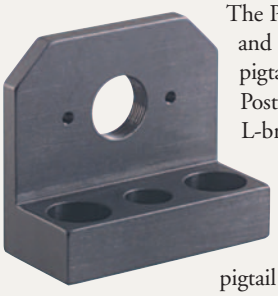
Single mode pigtails provide coherent fiber-coupled output from a laser diode. Multimode pigtails deliver higher power from the diode; however, they do not maintain coherence. Please see the beam profile images (below) to choose the correct fiber for a specific application.

CAUTION:
ELECTROSTATIC
SENSITIVE

Features

- Choice of Single Mode or Multimode Fibers
- Assorted Wavelengths from Visible to Near IR
- Single Mode Pigtails have 8° Angle Cleaved Fiber at Laser Diode End for Minimizing Intensity Noise
- FC/PC and SMA Fiber Connectors (Custom Available Upon Request)
- DFB Pigtails With In-Line Single Stage Isolator
- Pigtailing Service of Customer Supplied Diodes Available

Bracket for Fiber Pigtail



The PTLB1 is designed to mount easily and conveniently a LPS or LPM Series pigtail to either a breadboard or a TR Post. The universal design allows the L-bracket to be used with both imperial or metric components. The PTLB1 has a 13/32-40 tap through the center of the mounting area, allowing the end user to plug the pigtail into an SR9 (ESD protection and strain relief cable). The PTLB1 makes the mounting of pigtails easy for most applications.

ITEM #	$	£	€	RMB	DESCRIPTION
PTLB1	$22.00	£13.90	€20,50	¥ 210.10	Fiber Pigtail L-Bracket

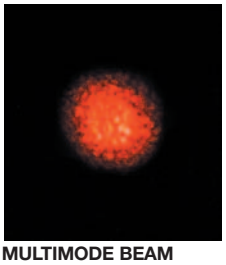
IMPORTANT NOTES AND WARRANTY INFORMATION ON LASER DIODES/LASER PIGTAILS

Laser diodes have extremely long lifetimes. However, most failures occur from mishandling or operating the lasers beyond their maximum ratings. Laser diodes are highly static sensitive. Thorlabs cannot guarantee the lasers after their sealed package has been opened. We will be happy to extend a full refund or credit for any lasers returned in their original sealed package within 30 days of purchase.

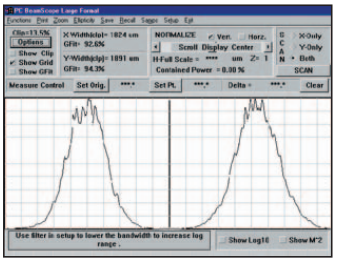
ITEM #	λ	$	£	€	RMB	MODE	Pmin	Ptyp	Pmax	PIN CODE
LPS-635-FC	635nm	$ 446.00	£ 281.00	€ 414,80	¥ 4,259.30	SM	2.0mW	2.5mW	3.5mW	9A
LPM-635-SMA	635nm	$ 394.00	£ 248.20	€ 366,40	¥ 3,762.70	MM	6.0mW	7.5mW	8.5mW	9A
LPS-660-FC	660nm	$ 446.00	£ 281.00	€ 414,80	¥ 4,259.30	SM	6.0mW	7.5mW	9.0mW	5C
LPM-660-SMA	660nm	$ 359.00	£ 226.20	€ 333,90	¥ 3,428.50	MM	18.0mW	22.5mW	25.5mW	5C
LPS-675-FC	670nm	$ 446.00	£ 281.00	€ 414,80	¥ 4,259.30	SM	2.0mW	2.5mW	3.5mW	9A
LPS-785-FC	785nm	$ 419.00	£ 264.00	€ 389,70	¥ 4,001.50	SM	5.0mW	6.25mW	7.5mW	5C
LPS-830-FC	830nm	$ 494.00	£ 311.20	€ 459,40	¥ 4,717.70	SM	8.0mW	10.0mW	12.0mW	9C
LPS-1310-FC	1310nm	$ 446.00	£ 281.00	€ 414,80	¥ 4,259.30	SM	2.0mW	2.5mW	3.0mW	5D
LPS-1550-FC	1550nm	$ 534.00	£ 336.40	€ 496,60	¥ 5,099.70	SM	1.2mW	1.5mW	1.8mW	5D
LPS-1550DFB-FC	1550nm	$1,711.00	£1,077.90	€1.591,20	¥16,340.10	SM	1.2mW	1.5mW	1.8mW	5D

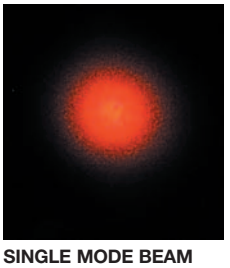
DFB

[1]62.5µm core Graded Index Fiber wavelength can vary from 665nm to 680nm.

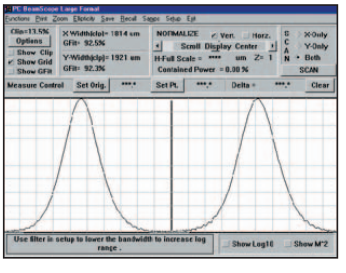


MULTIMODE BEAM





SINGLE MODE BEAM



LDM Series Laser Diode Modules — Blue or Red

The LDM Series Laser Diode Modules are self-contained laser diode modules, available at wavelengths of 405nm and 635nm. These user-friendly devices provide collimated output beams and include provisions for attaching our SM1 Series optics packages to allow focusing of the collimated beam.

Containing both a constant current laser diode drive system and a TEC stabilized temperature controller, each module offers an extremely stable CW output. The output power can be controlled via a user-accessible adjustment pot, a beam shutter, or an enable switch. The enable switch is separated from the power switch, allowing the TEC controller to maintain temperature while the laser is disabled.

The LDM Series has all of the required safety features including a keylock power switch, remote interlock connection, beam shutter, and Laser ON indicator.

Operating from a 9VDC power supply, included with the module, each module can be mounted to any optical table using one of our C1502, C1503, KM200V, or VC3 V-groove mounts.

LDM635
Shown in a KM200V, See Page 198 for the Mount.

LDM405 Specifications

PARAMETER	MIN	TYPICAL	MAX
Wavelength (nm)	395	405	415
Beam Diameter (mm)*	–	3.0 x 5.0	–
Power (mW)	0	–	4 (Adjustable)
TEC Temperature	–	25°C	–

*Measured 3m from module. Beam shape is elliptical.

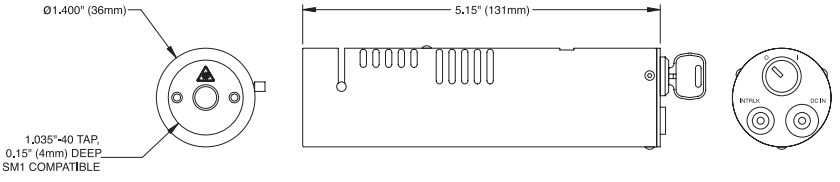
LDM635 Specifications

PARAMETER	MIN	TYPICAL	MAX
Wavelength (nm)	625	635	645
Beam Diameter (mm)*	-	3.0 x5.0	-
Power (mW)	0	–	4 (Adjustable)
TEC Temperature	–	25°	–

*Measured 3m from module. Beam shape is elliptical.

Features

- 405nm or 635nm Wavelengths
- Temperature Stabilized
- Adjustable Output Power
- IEC60825-1/CDRH Compliant
- Collimated Output Beam
- Beam Shutter
- SM1 Compatible



ITEM#	$	£	€	RMB	DESCRIPTION
LDM405	$ 3,570.00	£ 2,249.10	€ 3.320,10	¥ 34,093.50	405nm, 4.5mW Blue Laser Module
LDM635	$ 564.00	£ 355.30	€ 524,50	¥ 5,386.20	635nm, 4.5mW Red Laser Module

Laser Diode Kit

- S2011 Laser Kit Comes Complete With Laser Module, Mount, and Power Supply
  - S2011 Power Supply: 110VAC, 50-60Hz
  - S2011-EC Power Supply: 220VAC 50-60Hz
- Plug-and-Play Ready
- Ideal as a General Purpose Alignment Aid

The S2011 utilizes the CPS196 laser module, which features a focusable output beam. The laser diode wavelength is 635nm, and the output power is 4.5mW.

Included in the kit are the post, post holder, base, and LDS1 power supply shown in the picture.

Complete as Shown in Photograph.

ITEM #	METRIC ITEM#	$	£	€	RMB	DESCRIPTION
S2011	S2011-EC	$ 328.00	£ 206.60	€ 305,00	¥ 3,132.40	635nm, 4.5mW Laser Diode Kit

Benchtop Drivers
Platform Drivers
OEM Drivers
Laser Diode Mounts
Laser Diodes
Pigtailed Lasers
Laser Modules
Accessories

CPS Series Laser Modules — 635 to 808nm

These laser modules are designed for demanding industrial applications. The CPS Series features welded stainless steel construction or lightweight aluminum packages engineered to withstand large temperature variations. Most modules maintain "Optical to Mechanical" alignment of better than 15mrad. All modules are compatible with our LDS1 power supply as well as our AD8F and our AD11F mounting adapters, which can be found on page 496.

Laser Module Specifications

CPS180
635nm/1mW

- **Welded S.S. Housing:** Ø11.00mm x 55mm
- **Beam Diameter:** 4mm (round)
- **Axis Deviation:** 10mrad max.
- **Collimation:** 0.3mrad
- **Operating Temperature:** -10 to 50°C
- **Operating Current:** 60mA max.
- **Operating Voltage:** -5VDC (nominal)
- **Safety Class:** Class 3R

CPS182
635nm/4.5mW

- **Aluminum Housing:** Ø11.00mm x 42mm
- **Beam Diameter:** 4mm x 0.6mm
- **Axis Deviation:** 15mrad max.
- **Divergence:** 0.6mrad (⊥) / 1.8mrad (//)
- **Operating Temperature:** -10 to 60°C
- **Operating Current:** 55mA typ.
- **Operating Voltage:** -5VDC (nominal)
- **Safety Class:** Class 3R

CPS184
650nm/4.5mW

- **Aluminum Housing:** Ø8.00mm x 42mm
- **Beam Diameter:** 4.4mm x 1.2mm
- **Axis Deviation:** 15mrad max.
- **Divergence:** 0.6mrad (⊥) / 1.8mrad (//)
- **Operating Temperature:** -10 to 60°C
- **Operating Current:** 55mA typ.
- **Operating Voltage:** -5VDC (nominal)
- **Safety Class:** Class 3R

CPS186
670nm/4.5mW

- **Aluminum Housing:** Ø8.00mm x 42mm
- **Beam Diameter:** 4.4mm x 1.2mm
- **Axis Deviation:** 15mrad max.
- **Divergence:** 0.6mrad (⊥) / 1.8mrad (//)
- **Operating Temperature:** -10 to 60°C
- **Operating Current:** 55mA typ.
- **Operating Voltage:** -5VDC (nominal)
- **Safety Class:** Class 3R

CPS192
780nm/4.5mW

- **Aluminum Housing:** Ø8.00mm x 42mm
- **Beam Diameter:** 4.4mm x 1.7mm
- **Axis Deviation:** 15mrad max.
- **Divergence:** 0.6mrad (⊥) / 1.8mrad (//)
- **Operating Temperature:** -10 to 60°C
- **Operating Current:** 45mA typ.
- **Operating Voltage:** -5VDC (nominal)
- **Safety Class:** Class 3B

CPS196
635nm/4.5mW
FOCUSABLE

- **Aluminum Housing:** Ø11.00mm x 46mm
- **Focal Range:** 50mm to infinity
- **Axis Deviation:** 15mrad max.
- **Divergence:** 0.6mrad (⊥) / 1.8mrad (//)
- **Operating Temperature:** -10 to 40°C
- **Operating Current:** 55mA typ.
- **Operating Voltage:** -5VDC (nominal)
- **Safety Class:** Class 3R

CPS198
670nm/4.5mW
FOCUSABLE

- **Aluminum Housing:** Ø11.00mm x 46mm
- **Focal Range:** 50mm to infinity
- **Axis Deviation:** 15mrad max.
- **Divergence:** 0.6mrad (⊥) / 1.8mrad (//)
- **Operating Temperature:** -10 to 40°C
- **Operating Current:** 55mA typ.
- **Operating Voltage:** -5VDC (nominal)
- **Safety Class:** Class 3R

CPS808
808nm/10mW

- **Welded S.S. Housing:** Ø11.00mm x 50mm
- **Beam Diameter:** 4.5mm x 3mm
- **Axis Deviation:** 20mrad max.
- **Divergence:** 0.8mrad (⊥) / 0.4mrad (//)
- **Operating Temperature:** -10 to 50°C
- **Operating Current:** 140mA max.
- **Operating Voltage:** -5VDC (nominal)
- **Safety Class:** Class 3B

ITEM #	$	£	€	RMB	DESCRIPTION
CPS180	$ 121.50	£ 76.50	€ 113,00	¥ 1,160.30	635nm / 1mW Laser Module
CPS182	$ 91.70	£ 57.80	€ 85,30	¥ 875.70	635nm / 4.5mW Laser Module
CPS184	$ 102.00	£ 64.30	€ 94,90	¥ 974.10	650nm / 4.5mW Laser Module
CPS186	$ 102.00	£ 64.30	€ 94,90	¥ 974.10	670nm / 4.5mW Laser Module
CPS192	$ 102.00	£ 64.30	€ 94,90	¥ 974.10	780nm / 4.5mW Laser Module
CPS196	$ 147.30	£ 92.80	€ 137,00	¥ 1,406.70	635nm / 4.5mW Laser Module
CPS198	$ 124.60	£ 78.50	€ 115,90	¥ 1,189.90	670nm / 4.5mW Laser Module
CPS808	$ 262.70	£ 165.50	€ 244,30	¥ 2,508.80	808nm/ 10mW Laser Module
LDS1	$ 81.40	£ 51.30	€ 75,70	¥ 777.40	5V DC Power Supply

LDS1 Power Supply
5VDC @ 250mA
Compatible with our complete line of CPS laser modules.

110/120VAC
210/240VAC
50/60Hz

Accessories Selection Guide

Pages 496-503

CPS Laser Module Mounting Accessories

- A Variety of Mounting Adapters
- Compatible Kinematic Mount

See Page 496

Static Guard Products

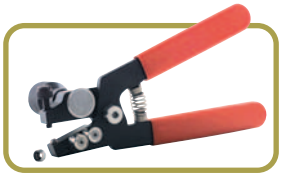
- Grounding Wrist Strap
- ESD Heel Grounder
- ESD Table Mat 2' x 4'

See Page 496

Viewing Cards and Alignment Disks

- 4 Card Types Available
- 3 Wavelength Ranges: IR, VIS, & UV

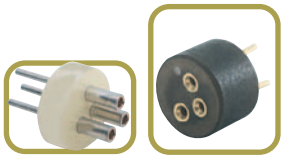
See Page 497



Can Opener for Laser Diodes

- Removes Caps From Standard Laser Packages
- Allows Closer Access to the Laser Chip

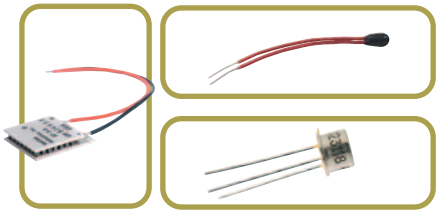
See Page 498



Laser Diode Sockets

- For 5.6mm Laser Diodes
- For 9mm Laser Diodes

See Page 498



Thermal Management Accessories

- Ideal Solution for Heat Pumping Applications
- Choice of NTC Thermistors, Platinum RTDs, and IC Temperature Transducers
- Selection of Miniature Cartridge and Foil Resistive Heaters

See Page 499

Cable Management Accessories

- Retention & Organization Products
- Labeling Products

See Pages 500-501

Laser Safety Signs

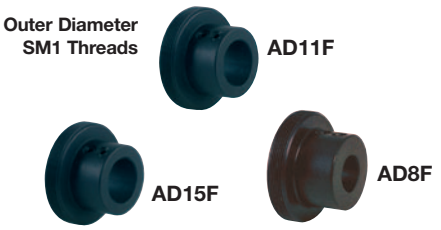
- Complies with ANSI Z136.1 Standard
- Illuminated Light Box
- Choice of Warning and Danger Messages

See Page 502

Benchtop Drivers
Platform Drivers
OEM Drivers
Laser Diode Mounts
Laser Diodes
Pigtailed Lasers
Laser Modules
Accessories

CPS Laser Module Mounting Adapters

These adapters are ideal for mounting our CPS Series Laser Modules in our kinematic mount. The two angular controls of the kinematic mount provide an easy means of precisely directing the output of the module. The AD15F can be used to mount our selection of laser collimation tubes.



ITEM #	$	£	€	RMB	DESCRIPTION	SIZE
AD8F*	$ 27.50	£ 17.30	€ 25,60	¥ 262.60	Adapter for Ø8mm Modules to SM1 Thread	Ø8mm
AD11F*	$ 27.80	£ 17.50	€ 25,90	¥ 265.50	Adapter for Ø11mm Modules to SM1 Thread	Ø11mm
AD15F*	$ 29.90	£ 18.85	€ 27,80	¥ 285.50	Adapter for LT Series Tubes to SM1 Thread	Ø5/8"
KM100T*	$ 60.20	£ 37.90	€ 56,00	¥ 574.90	Kinematic Mount for Laser Module Adapters	–

*Imperial and Metric Compatible

COMPATIBLE KINEMATIC MOUNT

The KM100T is an ideal companion product for the AD series adapters. This mount provides fine pointing control via two 1/4"-80 adjustment screws.

Antistatic/ESD Products

The ESD05 Heel Grounder provides protection for people on the move by offering a ground via a proper flooring surface. Wearing the conductive ribbon inside the shoe or sock assures proper electrical contact with the user. The ribbon connects to the conductive rubber to complete the circuit between the operator and the flooring. A rugged surface-mounted 1MΩ resistor is standard and visible. The ESD05 Heel Grounder features a hook-and-loop closure with 35mm cup design. These devices should be worn on both feet to ensure consistent grounding. Thorlabs' Grounding Wrist Straps safely remove static charges from individuals who handle laser diodes, amplified photodetectors, and other static-sensitive devices. The WS02 fabric strap, available in one size, includes a 6-foot coiled cord and alligator clip to allow for ground connection. The ground cord has a built-in 1MΩ resistor for user safety, and the strap works with our Static Control Table Mat to protect against static discharge. Two premium expandable metal bands are offered as well. The flexibility of the strap provides durability and comfort, allowing for extended use. It includes an alligator clip, which fits over the installed banana jack on the ground cord (sold separately). Two sizes are available: medium (5.5") and large (6.5"). The Thorlabs' Static Control 2' x 4' Table Mats protect sensitive optoelectronic components from electrostatic discharge.

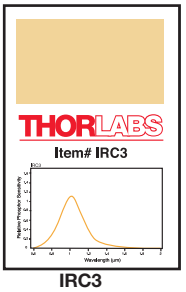
ITEM #	$	£	€	RMB	DESCRIPTION
WS02*	$ 11.95	£ 7.50	€ 11,10	¥ 114.10	Grounding Wrist Strap with 6' Coiled Cord, One Size
WS03	$ 24.95	£ 15.70	€ 23,20	¥ 238.30	Metal Expansion Band ESD Wrist Strap, Large
WS04	$ 24.95	£ 15.70	€ 23,20	¥ 238.30	Metal Expansion Band ESD Wrist Strap, Medium
WS05	$ 12.00	£ 7.60	€ 11,20	¥ 114.60	12' Grounding Cord
ESD05*	$ 11.50	£ 7.20	€ 10,70	¥ 109.80	ESD Fabric Heel Grounder
TM2448	$ 77.00	£ 48.50	€ 71,60	¥ 735.40	Static Control Table Mat 2' x 4' x 3/32"

*One Size Fits All

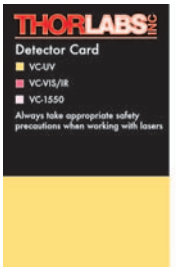
IR, VIS, and UV Viewing Cards

- Detects Radiation as Low as 1nW/cm²
- Always Ready for Use With No Optical Charging
- Free of Hazardous Reflections
- IR, VIS, & UV Wavelength Ranges
- 2.125"x1.250" Typical Active Viewing Area

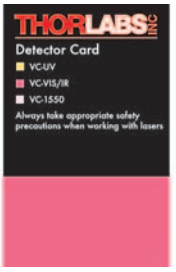
Thorlabs' viewing cards, about the size of a credit card, contain a special sensor area that can easily locate IR, VIS, and UV light beams and their focal points. All are mounted on durable clear plastic, allowing for easy handling and carrying.



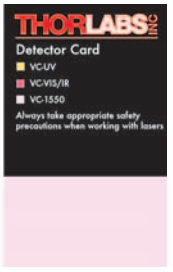
IRC3



UV CARD

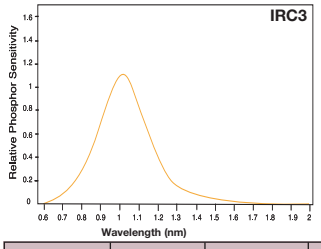


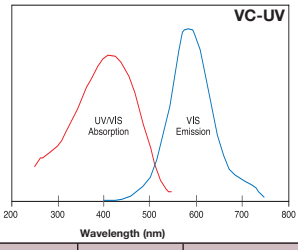
VIS/IR CARD BANDS

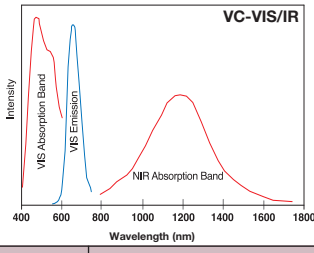


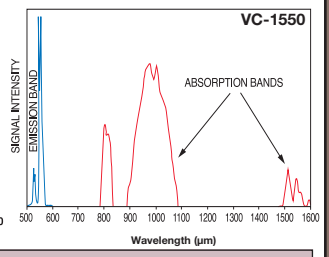
FOR S, C, & L

The VC-1550 is designed for wavelengths of 790-840nm, 870-1070nm, and 1500-1590nm. It features a sensor area of 1.8" x 1.0". The VC-VIS/IR is enhanced for the IR absorption band of 800-1700nm, and the VC-UV covers the 250-525nm ultraviolet absorption band. Each of these cards is 3.3" x 2.1" in size. The IRC3 is a smaller card with dimensions of 2.4" x 1.79", and it is designed for the 700-1400nm wavelength range. It requires room light charging, and features a sensor area of 1.5" x 0.75".







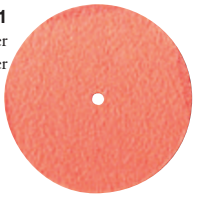


ITEM #	$	£	€	RMB	WAVELENGTH (nm)	DESCRIPTION
VC-1550	$ 72.00	£ 45.40	€ 67,00	¥ 687.60	1550	Viewing Card, Enhanced for S-, C-, & L-Bands
VC-VIS/IR	$ 72.00	£ 45.40	€ 67,00	¥ 687.60	400-640 & 800-1700	IR & Visible Viewing Card
VC-UV	$ 72.00	£ 45.40	€ 67,00	¥ 687.60	250-525	UV Viewing Card
IRC3	$ 113.00	£ 71.20	€ 105,10	¥1,079.20	700-1400	Phosphorous IR Viewing Card (Requires Room Light Charging)

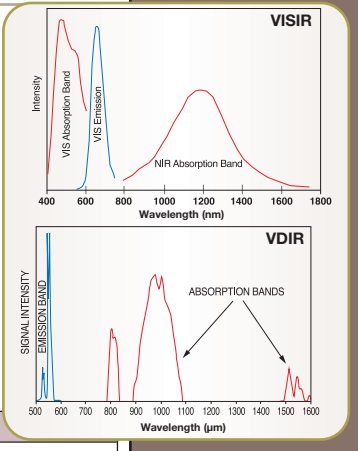
IR Alignment Disks

- Ideal Alignment Aid
- Used With Our 1/2" and 1" Optical Component Holders
- 1mm Central Hole Allows Partial Beam Transmission

VISIR1
Ø1" Outer Diameter



VISIR05
Ø1/2" Outer Diameter



VISIR1 SHOWN WITH LMR1 & POST (Sold Separately)

These IR alignment disks are ideally used as drop-in tools to simplify active alignment of IR and visible setups. Available as Ø1/2" or Ø1" drop-in disks, these disks align beams to the optical axis of our mounts or lens tubes. They are made of slow-fading phosphor that is active in the 800-1700nm range.

ITEM#	SIZE	$	£	€	RMB	DESCRIPTION
VISIR05	1/2"	$ 19.40	£ 12.20	€ 18,00	¥ 185.30	1/2" IR Alignment Disk, 400-640nm & 800-1700nm
VISIR1	1"	$ 29.60	£ 18.60	€ 27,50	¥ 282.70	1" IR Alignment Disk, 400-640nm & 800-1700nm
VDIR05	1/2"	$ 19.00	£ 12.00	€ 17,70	¥ 181.50	1/2" Enhanced Alignment Disk, 790-840nm, 870-1070nm & 1500-1590nm
VDIR1	1"	$ 29.00	£ 18.30	€ 27,00	¥ 277.00	1" Enhanced Alignment Disk, 790-840nm, 870-1070nm & 1500-1590nm

IR Viewing/Alignment Disk


SM1A8

IR Viewing Surface

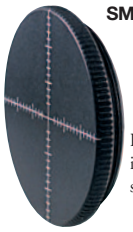
RMSIR

Rubber O-Ring holds IR viewing surface in place (SM1A8)

- Slow Fading, Constant Emission for Viewing CW Beams
- Ideal Alignment Aids
- Threaded for Use Within the SM1 Series & the Thorlabs Cage Assemblies (See Page 221)
- RMS Threaded IR Disk (800-1700nm Active Range)

ITEM#	SIZE	$	£	€	RMB	DESCRIPTION
RMSIR	0.8"	$ 80.00	£ 50.40	€ 74,40	¥ 764.00	RMS IR Alignment Disk, 800-1700nm
SM1A8	1"	$ 76.50	£ 48.20	€ 71,10	¥ 730.60	IR/Viewing Alignment Disk

Alignment Disks



SM1A7

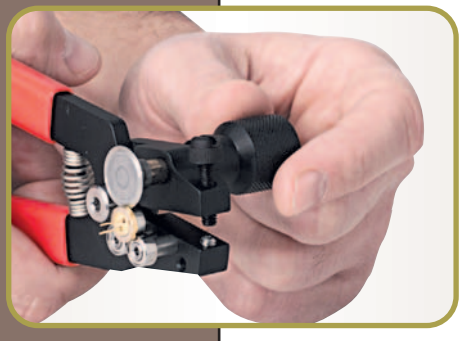
Rear boss threads into any SM1 series tubes

SM05A7
Rear boss threads into any SM05 series tubes

The SM1A7 and SM05A7 alignment disks provide a useful aid when building optical assemblies from our SM series of products. The SM05A7 is threaded to fit into any product with SM05 internal threads whereas the SM1A7 is threaded to fit into any product with SM1 threads.

ITEM#	SIZE	$	£	€	RMB	DESCRIPTION
SM05A7	1/2"	$ 21.50	£ 13.50	€ 20,00	¥ 205.30	SM1 Alignment Disk
SM1A7	1"	$ 24.00	£ 15.10	€ 22,30	¥ 229.20	SM05 Alignment Disk

Can Opener for Laser Diodes

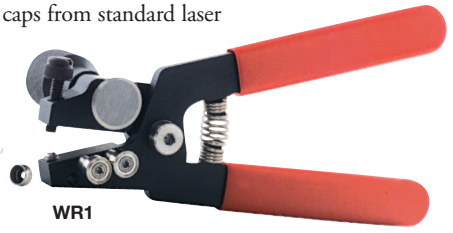


This simple, manually operated can opener removes the cap from most transistor-style laser diode packages.

The WR1 Works With These Diode Packages:

- T0-18, T0-46
- 5.6mm, 9mm
- T0-3
- May Work With Other Housing Types

The WR1 is a simple hand-held device designed to remove the caps from standard laser packages. Many applications, such as fiber pigtailing, can be optimized by having closer access to the laser chip. To operate, simply place a diode onto the two rollers at the front of the device, lightly apply pressure with the rubber covered grips, and turn the blade actuator. The precision-ground, hardened steel blade will easily cut through the wall of the diode cap, safely removing it.



WR1

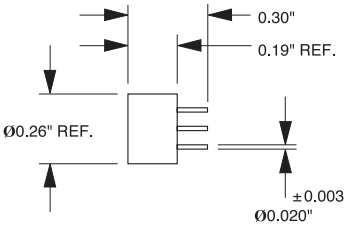
ITEM #	$	£	€	RMB	DESCRIPTION
WR1	$ 129.00	£ 81.30	€ 120,00	¥ 1,232.00	Laser Diode Can Opener

Laser Diode Socket for 5.6mm & 9mm Lasers

- Gold-Plated BeCu Contacts
- 3 Pins on a Circle (Ø0.079" for 5.6mm Lasers, Ø0.1" for 9mm Lasers)

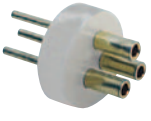
S8060

Fits Standard 5.6 & 9mm Laser Diode Packages

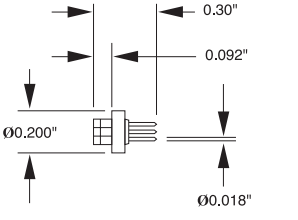


Thorlabs offers a range of laser diode sockets that provide compatibility with our wide selection of 5.6mm to 9mm laser diode packages. The S8058, S8060, and S8060-4 are available with gold-plated BeCu contacts, and the S7060R is a 5.6mm socket that meets RoHS compliance. Colors may vary and include white, off white, black, or tan.

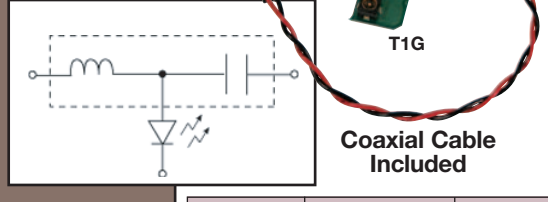
ITEM #	$	£	€	RMB	# OF PINS	DESCRIPTION
S7060R	$ 4.21	£ 2.70	€ 3,90	¥ 40.20	3	9mm Laser Diode Socket
S8060-4	$ 7.10	£ 4.50	€ 6,60	¥ 67.80	4	6mm & 9mm Socket
S8060	$ 5.82	£ 3.70	€ 5,40	¥ 55.60	3	9mm Laser Diode Socket
S8058	$ 8.78	£ 5.50	€ 8,20	¥ 83.80	4	9mm Laser Diode Socket



S7060R



Laser Diode Bias-T PCB



- Modulation Frequencies: 10kHz to 1GHz
- Impedance: 50Ω

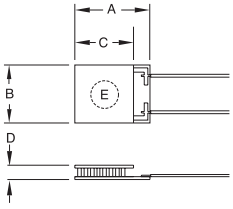
A bias-T makes it possible to superimpose a modulation current onto the laser diode DC-supply current. The T1G is a three-port bias-T that is useful for modulation frequencies in the range of 10kHz to 1GHz. The actual frequency range is determined by the properties of the impedance network surrounding the laser diode. The transmission line from the coaxial connecter (SMD) has a characteristic impedance of 50Ω. To protect the laser diode, there is a DC blocking capacitor and a reverse bias protection diode included.

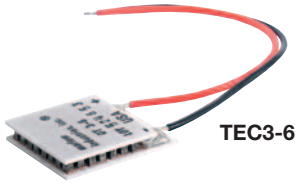
Item#	$	£	€	RMB	DESCRIPTION
T1G	$ 110.00	£ 69.30	€ 102,30	¥ 1,050.50	Laser Diode Bias-T PCB

TEC Elements

Our selection of thermoelectric coolers are an ideal solution for medium or large heat-pumping applications. These work well with our TED Series Temperature Controllers (see page 438).

ITEM #	I_{MAX}	TH=27°C Q_{MAX}	TH=27°C V_{MAX}	TH=27°C ΔT_{MAX}	TH=35°C Q_{MAX}	TH=35°C V_{MAX}	TH=35°C ΔT_{MAX}	TH=50°C Q_{MAX}	TH=50°C V_{MAX}	TH=50°C ΔT_{MAX}	AC RESISTANCE OHM @ 27°C	DIMENSIONS A	B	C	D	E
TEC3-2.5	2.5	6	3.6	65	6	3.8	68	6	4.1	73	1.2	.807"	.630"	.630"	.159"	–
TEC3-6	5.6	13	3.6	65	14	3.8	68	14	4.1	73	0.5	.965"	.787"	.787"	.158"	–
TEC1.4-6	6.0	6	1.8	65	–	–	–	7	1.9	75	0.3	.560"	. 560"	. 560"	.150"	Ø0.20"





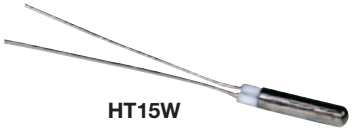
ITEM #	$	£	€	RMB	DESCRIPTION
TEC3-2.5	$ 28.70	£ 18.10	€ 26,70	¥ 274.10	2.5A TEC Element
TEC3-6	$ 29.00	£ 18.30	€ 27,00	¥ 277.00	5.6A TEC Element
TEC1.4-6	$ 39.27	£ 24.70	€ 36,50	¥ 375.00	6.0A TEC Element

Resistive Heaters

Our resistive heaters are part of Thorlabs' line of thermal management accessories. The HT10K is a resistive foil heater with pressure-sensitive adhesive backing and a 10kΩ NTC thermistor integrated directly onto the heater. The HT15W is a miniature 15W cartridge heater, which can be used for many applications requiring small areas to be heated. Both of these heaters are compatible with Thorlabs' TC200 Temperature Controller (see Page 970).

HT10K Specifications

- **Heater Resistance:** 19.7Ω
- **Sensor Type:** NTC10K Thermistor
- **Size:** 1" x 3"
- **Heating Capacity:** 10W/in^2 @ 70°C
- **Effective Heating Area:** 2.23in^2



HT15W Specifications

- **Heater Resistance:** 35Ω (Typ.)
- **Size:** Ø1/8" x 1/2" Long
- **Heating Capacity:** 15W @ 24V

ITEM #	$	£	€	RMB	DESCRIPTION
HT10K	$ 38.60	£ 24.30	€ 35,90	¥ 368.60	Foil Heater with 10kΩ Thermistor
HT15W	$ 37.10	£ 23.40	€ 34,50	¥ 354.30	15W Resistive Cartridge Heater

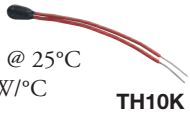
Thermistors & Temperature Transducers

The TH10K is a 10kΩ thermistor with 1°C accuracy for use in common TEC applications.

The AD590 is an IC temperature transducer that produces an output current proportional to absolute temperature.

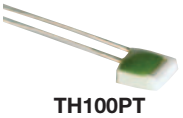
The TH100PT is a 100Ω RTD platinum thermistor with a positive linear temperature response.

TH10K Specifications



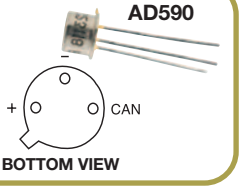
- **Temperature Accuracy:** ±1°C @ 25°C
- **Dissipation Constant:** 1.4mW/°C
- **Time Constant:** 15sec
- **Operating Range:** -50°C to +150°C
- **Temperature Coefficient:** -4.40%/°C @ 25°C

TH100PT Specifications



- **Rating:** 100Ω @ 0°C
- **Temperature Coefficient**: 3.85 x 10^{-3}/K
- **Accuracy:** Class B Tolerance (± 0.3°C @ 100Ω)
- **Operating Range:** -200 to 850°C

AD590 Specifications



- **Linear Current Output:** 1mA/K
- **Operating Range:** -55°C to +150°C
- **Power Supply Range:** 4 - 30V

ITEM #	$	£	€	RMB	DESCRIPTION
TH10K	$ 3.90	£ 2.50	€ 3,60	¥ 37.20	10kΩ Thermistor
AD590	$ 13.30	£ 8.40	€ 12,40	¥ 127.00	Temperature Transducer
TH100PT	$ 6.98	£ 4.40	€ 6,50	¥ 66.70	100Ω PlatinumTransducer

See Our TED Series Temperature Controllers on Page 438

Cable Management: Cables, Ties, and Clips

The CMS011 Cable Ties (supplied in bags of 100) are releasable and are typically used to bundle cable looms. They can also be combined with the CMS010 Cable Tie Bases (supplied in bags of 250), which allow the cable bundles to be secured on the optical table or work surface.

The CMS022 P-clips (supplied in bags of 10) offer an alternative method of securing cable looms up to 19mm (0.75") in diameter.

Features

- Useful Range of Cable Ties
- Bases and P-Clips to Assist in Keeping Cables and Fiber Optics Tidy and Secure

CMS011

CMS010

CMS022

CLEARANCE FOR 1/4"-20 (M6) SCREW

CMS011 Cable Tie Used with the CMS010 Base

ITEM #	$	£	€	RMB	DESCRIPTION
CMS011	$ 17.25	£ 10.90	€ 16,00	¥ 164.70	Releasable Cable Ties, 6mm (Qty. 100)
CMS010	$ 42.00	£ 26.50	€ 39,10	¥ 401.10	Cable Tie Bases (Qty. 250)
CMS022	$ 27.00	£ 17.00	€ 25,10	¥ 257.90	P-Clips, Black (Qty. 10)

Cable Identification Ties

The CMS021 Cable Identification Ties (supplied in bags of 100) enable electrical cables and fiber optics to be bundled and secured. They feature a 25mm x 7mm (1.0" x 0.27") surface to enable bundles up to 20mm (0.78") in diameter to be clearly labeled. A pen is included with each bag.

Features

- Tie and Identify Bundles of Cable in One Operation
- Easy Method to Clearly Label Any Cable or Bundle
- Fine-Tipped Pen Included

APPLICATION IDEA

CMS021
Sold in Quantities of 100

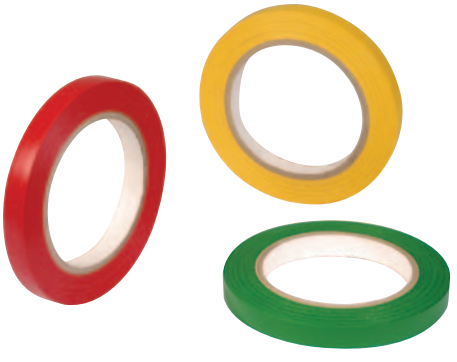
ITEM #	$	£	€	RMB	DESCRIPTION
CMS021	$ 28.00	£ 17.60	€ 26,00	¥ 267.40	Cable Identification Ties (Qty. 100)

Colored Vinyl Tape

Features

- 1/2" Wide Vinyl Tape
- 36 Yard Long Roll
- Available in Red, Green, and Yellow

Colored rolls of vinyl tape are ideal for color coding fibers, cables, tools, and samples. The semi-gloss finish can be written on with permanent marker, and the tape can be used in environments from 40°F to 170°F, although it is best to apply the tape at room temperature.



ITEM #	$	£	€	RMB	DESCRIPTION
VTR-050	$ 3.50	£ 2.20	€ 3,30	¥ 33.40	Red Vinyl Tape, 1/2" Wide
VTG-050	$ 3.50	£ 2.20	€ 3,30	¥ 33.40	Green Vinyl Tape, 1/2" Wide
VTY-050	$ 3.50	£ 2.20	€ 3,30	¥ 33.40	Yellow Vinyl Tape, 1/2" Wide

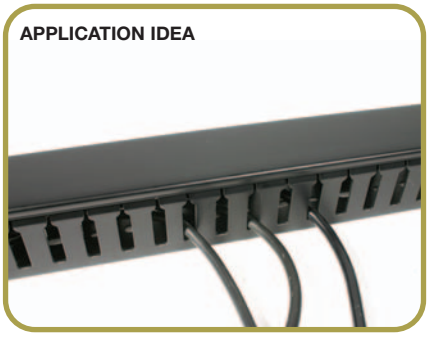
Fixed Trunking

This trunking provides a permanent solution to routing and securing of cables or fiber optics. It is supplied in lengths of 1m (3.2ft), with either a CMS001 (50 x 25mm or 1" x 2") or a CMS002 (50 x 50mm or 2" x 2") cross section and is ideal for use on optical tables or similar work surfaces.

Features

- Rigid and Lightweight
- Snap-On Lid Allows Easy Access
- 8mm Slot Width for Cable Exit
- Ideal for Use in Cabinets & Control Panels
- Manufactured from High-Impact PVC

APPLICATION IDEA



ITEM #	$	£	€	RMB	DESCRIPTION
CMS001	$ 9.25	£ 5.80	€ 8,60	¥ 88.30	50x25mm Black Trunking 1m (3.2ft)
CMS002	$ 12.50	£ 7.90	€ 11,60	¥ 119.40	50x50mm Black Trunking 1m (3.2ft)

Cable Trunking

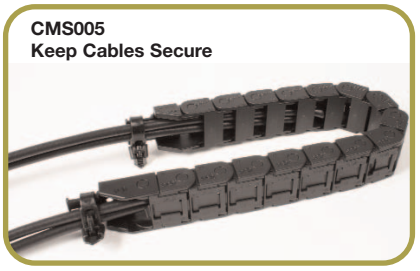
This trunking is for use in applications where cables are attached to a moving surface and need to be guided components. It is supplied in lengths suitable for 0.3m (1ft) or 1m (3.2ft) of travel, with the CMS005 or CMS006, respectively.

Organize Your Workspace

Features

- Easy Installation
- Easy to Shorten or Extend Length
- Smooth Running

CMS005



CMS005
Keep Cables Secure

ITEM #	$	£	€	RMB	DESCRIPTION
CMS005	$ 31.50	£ 19.80	€ 29,30	¥ 300.80	Flexible Chain Trucking for 0.3m (1') Travel
CMS006	$ 75.00	£ 47.30	€ 69,80	¥ 716.30	Flexible Chain Trucking for 1.0m (3.2') Travel

Slit Harness Wrap

Features

- Supplied in Reels of 5m (16.5ft)
- Insertion Tool Included

CMS015

This slit harness wrap simplifies the collection of cables and fiber optics. The insertion tool (supplied) enables the user to slide the wrap onto the cables quickly, with minimal effort. The harness wrap is reusable and easy to remove.

Organize Your Workspace

CMS015
Collect Cables Easily

ITEM #	$	£	€	RMB	DESCRIPTION
CMS015	$ 34.00	£ 21.40	€ 31,60	¥ 324.70	Slit Harness Wrap, 5m(16.5ft), Tool Included

Reusable Fabric (Hook-and-Loop) Cable Wrap

Features

- Allows Quick & Convenient Bundling of Cables & Fiber Optics
- Quick Release
- Easily Cut to Required Length
- Supplied in Reels of 5m (16.5ft)

This fabric, hook-and-loop cable wrap is ideal for bundling cables and fiber optics on the optical table or similar work-surface. It can be cut to the required length, thereby eliminating waste, and is quick and easy to install.

Organize Your Workspace

CMS020

ITEM #	$	£	€	RMB	DESCRIPTION
CMS020	$ 16.50	£ 10.40	€ 15,30	¥ 157.60	ReUsable Hook-and-Loop Cable Wrap

Multilayered Adhesive Mats

Features

- Rigid and Lightweight
- Snap-On Lid Allows Easy Access
- Manufactured From High-Impact PVC
- 8mm Slot Width for Cable Exit
- Ideal for Use in Cabinets & Control Panels

ESD20
Effective in Lab Areas

These Multilayered Adhesive Mats effectively capture dirt and dust from foot traffic and equipment wheels before entering a controlled environment. Each layer is numbered, which helps ensure one-sheet removal and identify the number of remaining applications. Low-profile construction reduces the risk of tripping and allows free movement of foot or wheel traffic.

ITEM #	$	£	€	RMB	DESCRIPTION
ESD20	$ 52.00	£ 32.80	€ 48,40	¥ 496.60	18" x 36" Adhesive Mat With 30 Sheets

Benchtop Drivers
Platform Drivers
OEM Drivers
Laser Diode Mounts
Laser Diodes
Pigtailed Lasers
Laser Modules
Accessories

Laser Safety Signs

Features

- Provides a Clear and Concise Indication That a Laser is in Use
- Four Signs Available
- Dimensions: 10"x12"x3" (254x305x76mm)

COMPLIES WITH ANSI-Z136.1

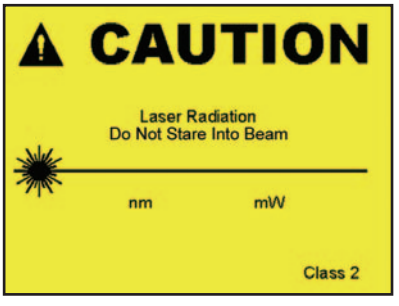
LSL10 shown with LSL10-3A

The LSL10 Laser Safety Box provides a clear and concise indication that a laser system is in use, stating the appropriate warning message and laser classification on one of four fully illuminated signs. Designed to meet ANSI Z136.1, the ANSI Standard for Safe Use of Lasers, the box operates from 110VAC or 220VAC and has safety interlock features that prevent the use of interlock-equipped laser systems unless the safety light is turned on.

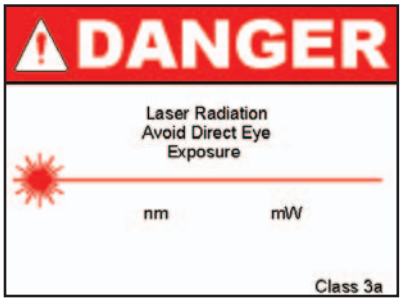
Measuring 10"x12", these illuminated signs are large enough to be read in all laboratories where safe laser operation is a must. The LSL10 signs are useful tools for any research or manufacturing facility.

The LSL10 accepts any one of the four optional signs available, covering Laser Classes 2 through 4. Each sign comes with a set of alpha-numeric labels to allow each user to customize according to specific wavelength and output power, as required by ANSI Z136.1 and other pertinent laser safety specifications.

This laser safety signs can be displayed on desktops, benchtops, or mounted to any wall. A convenient line cord latch prevents the AC line cord from disengaging from the unit.

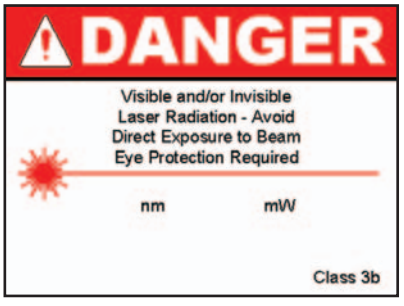


LSL10-2

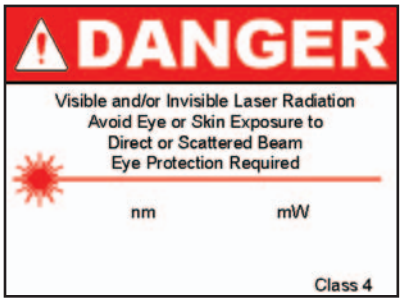


LSL10-3A

The LSL10 Series Caution and Danger Signs are purchased separately and can be used either alone or with the LSL10.



LSL10-3B



LSL10-4

ITEM#	$	£	€	RMB	DESCRIPTION
LSL10	$ 231.00	£ 145.50	€ 214,80	¥ 2,206.10	Lighted Laser Safety Box, 110VAC Input
LSL10-EC	$ 242.00	£ 152.50	€ 225,10	¥ 2,311.10	Lighted Laser Safety Box, 220VAC Input
LSL10-2	$ 44.10	£ 27.80	€ 41,00	¥ 421.20	Class 2 Laser Safety Sign
LSL10-3A	$ 44.10	£ 27.80	€ 41,00	¥ 421.20	Class 3A Laser Safety Sign
LSL10-3B	$ 44.10	£ 27.80	€ 41,00	¥ 421.20	Class 3B Laser Safety Sign
LSL10-4	$ 44.10	£ 27.80	€ 41,00	¥ 421.20	Class 4 Laser Safety Sign

Safety FIRST

CE CERTIFIED

Laser Goggles

LG10

LG9

LG8

LG7

LG6

LG5

LG4

LG3

LG2

LG1

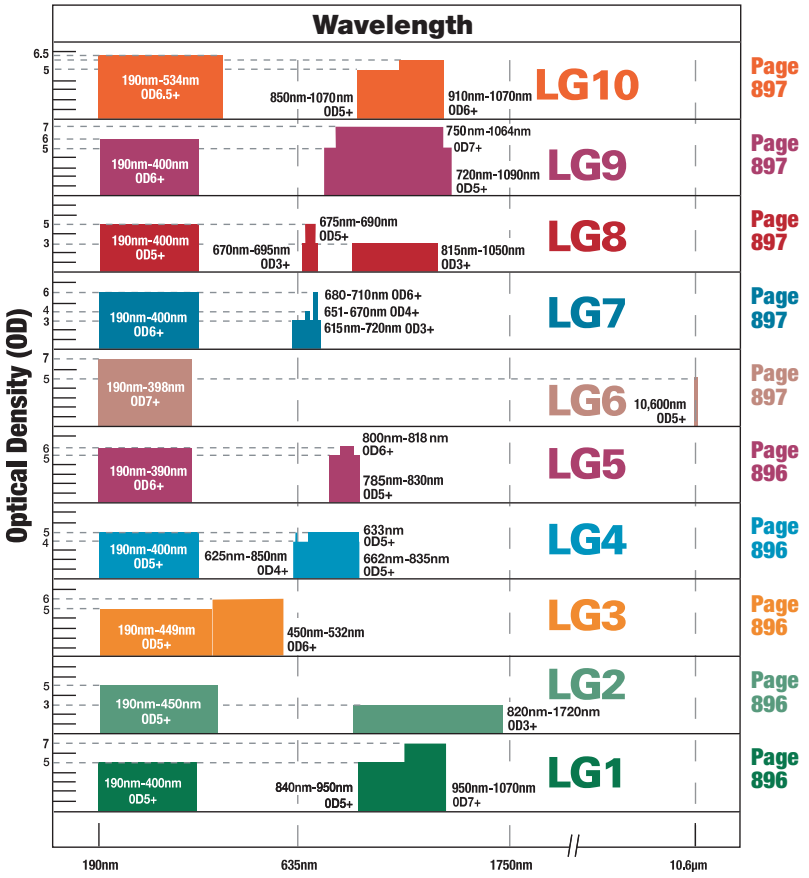
Choose From 10 Safety Goggles

Thorlabs offers a variety of laser safety glasses for the 190nm to 10.6µm range. These laser glasses are available in a comfortable frame style to avoid any inconvenience to the user in a lab environment. By passing a series of extensive tests, every pair of Thorlabs laser glasses received the CE certification mark, ensuring the protection for the end user from the wavelengths that have been specified for each of the glasses.

- A Variety of Laser Glasses that Protect From 190nm to 10.6µm
- Comfortable Frame Style
- All Laser Glasses are CE Certified
- Can be Used With Prescription Glasses

Optical Density = Log_{10} (1/T) or T= 10^{-OD}

Range for Laser Glasses



See Pages 896-897 for Details