

# LASER DIODE OVERVIEW

Benchtop Drivers

Platform Drivers

OEM Drivers

Laser Diode Mounts

Laser Diodes

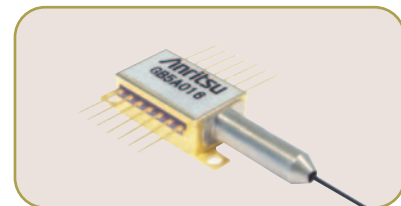
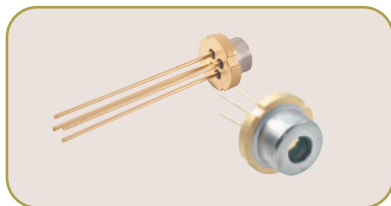
Pigtailed Lasers

Laser Modules

Accessories

- 5.6mm, 9mm, and VCSEL Laser Diodes
- DFB C and L-Band Butterfly Laser Pigtailed

- Fiber Bragg Stabilized Pump Laser Diodes
- Fiber Pigtailed Laser Diodes



## 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 (manufactured by either Thorlabs or our customers) are assembled at our extensive pigtailling 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 pigtailed, 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)
- Pigtailling of Customer-Supplied Diodes Available
- DFB Pigtailed Include In-Line Isolator

## DFB Laser C-and L-Band Butterfly Laser Pigtailed

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 ( $\pm 0.5$ nm)
- Built-In Optical Isolator (30dB)
- Built-In Cooler and Thermistor

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

## 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 <sup>1,2</sup> | 635             | 3      | 5.60         | 5A       | 466  |
| HL6312G <sup>1,2</sup>  | 635             | 5      | 9.00         | 9A       | 467  |
| HL6335G                 | 635             | 5      | 9.00         | 9A       | 467  |
| DL3148-025              | 635             | 6      | 5.60         | 5A       | 467  |
| HL6320G <sup>1,2</sup>  | 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 <sup>1</sup>   | 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  |

<sup>1</sup> Single Mode - Longitudinal

<sup>2</sup> Single Mode - Transverse

# Laser Diode Selection Guide

| ITEM#                     | WAVELENGTH (nm) | P (mW) | PACKAGE (mm) | PIN CODE  | PAGE |
|---------------------------|-----------------|--------|--------------|-----------|------|
| HL6535MG <sup>1</sup>     | 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 <sup>1,2</sup>    | 670             | 5      | 9.00         | 9A        | 473  |
| HL6724MG <sup>1,2</sup>   | 670             | 5      | 5.60         | 5A        | 474  |
| DL3149-057                | 670             | 7      | 5.60         | 5A        | 474  |
| HL6714G <sup>1,2</sup>    | 670             | 10     | 9.00         | 9A        | 474  |
| LPS-675-FC                | 675             | 2.5    | Pigtailed    | 9A        | 492  |
| FLD6A2TK                  | 685             | 35     | 5.60         | OPEN      | 475  |
| HL6738MG <sup>1,2</sup>   | 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         | 5A        | 477  |
| HL7851G <sup>1,2</sup>    | 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 <sup>1,2</sup>    | 830             | 40     | 9.00         | 9C        | 480  |
| DL7032-001 <sup>1,2</sup> | 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 <sup>2</sup>    | 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  |
| ML725B8F <sup>2</sup>     | 1310            | 10     | 5.60         | 5D        | 487  |
| ML925B45F                 | 1550            | 6      | 5.60         | 5D        | 487  |
| ML925B11F                 | 1550 DFB        | 6      | 5.60         | 5D        | 492  |
| LPS-1550-FC               | 1550            | 1.5    | Pigtailed    | 5D        | 492  |
| LPS-1550DFB-FC            | 1550DFB         | 1.5    | Pigtailed    | 5D        | 492  |

1 Single Mode - Longitudinal

2 Single Mode - Transverse

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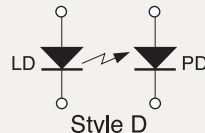
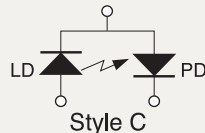
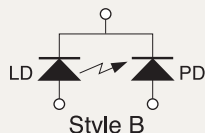
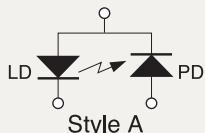
All laser diodes are extremely electrostatic sensitive; see page 496 for our selection of antistatic products.

DFB

DFB

DFB

## 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 Diode Technologies

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Laser Safety Goggles



See Page 895

## $\lambda = 654\text{nm}$ $P = 10\text{mW}$ , Single Mode Sharp GH06510B2A

### Absolute Maximum Ratings ( $T_c=25^\circ\text{C}$ )

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

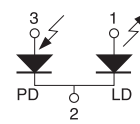
\*Case Temperature

### Optical-Electrical Characteristics ( $T_c=25^\circ\text{C}$ , $P=7\text{mW}$ )

| 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        | $\lambda_p$      | 640nm       | 654nm        | 660nm       |
| Divergence Parallel      | $\theta_{//}$    | 7 $^\circ$  | 8.5 $^\circ$ | 10 $^\circ$ |
| Divergence Perpendicular | $\theta_{\perp}$ | 24 $^\circ$ | 29 $^\circ$  | 33 $^\circ$ |
| Monitor Current          | $I_m$            | 0.08mA      | 0.2mA        | 0.4mA       |

### Pin Description

- 1 laser anode
- 2 common case
- 3 monitor diode anode



CAUTION:  
ELECTROSTATIC  
SENSITIVE

- 5.6mm Package
- Low Drive Current

### PIN CODE 5B

| ITEM #     | £*<br>1-5 PCS | €*<br>1-5 PCS | RMB*<br>1-5 PCS |
|------------|---------------|---------------|-----------------|
| GH06510B2A | £ 13.50       | € 20.00       | ¥ 205.30        |

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

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

## $\lambda = 655\text{nm}$ $P = 10\text{mW}$ , Single Mode ROHM RLD65MZT2



- 5.6mm Package
- Low Threshold Current: 25mA ( $T_c=25^\circ\text{C}$ )

### Absolute Maximum Ratings ( $T_c=25^\circ\text{C}$ )

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

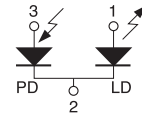
| ITEM #    | £*<br>1-5 PCS | €*<br>1-5 PCS | RMB*<br>1-5 PCS |
|-----------|---------------|---------------|-----------------|
| RLD65MZT2 | £ 12.70       | € 18.80       | ¥ 192.90        |

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

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

### Pin Description

- 1 laser anode
- 2 common case
- 3 monitor diode anode



CAUTION:  
ELECTROSTATIC  
SENSITIVE

### PIN CODE 5B

### Optical-Electrical Characteristics ( $T_c=25^\circ\text{C}$ , $P=5\text{mW}$ )

| 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             | $\lambda_p$                            | 645               | 655nm       | 660nm             |
| Divergence Parallel           | $\theta_{//}$                          | 7 $^\circ$        | 8 $^\circ$  | 10 $^\circ$       |
| Divergence Perpendicular      | $\theta_{\perp}$                       | 20 $^\circ$       | 27 $^\circ$ | 35 $^\circ$       |
| Slope Efficiency (mW/mA)      | $\eta_s$                               | 0.2               | 0.4         | 0.8               |
| Monitor Current               | $I_m$                                  | 0.1               | 0.2         | 0.5               |
| Parallel Deviation Angle      | $\Delta \phi_{//}$                     | -2 $^\circ$       | 0 $^\circ$  | +2 $^\circ$       |
| Perpendicular Deviation Angle | $\Delta \phi_{\perp}$                  | -3 $^\circ$       | 0 $^\circ$  | +3 $^\circ$       |
| Emission Point Accuracy       | $\Delta X$<br>$\Delta Y$<br>$\Delta Z$ | -80 $\mu\text{m}$ | 0           | +80 $\mu\text{m}$ |
| Peak Emission Wavelength      | $\lambda$                              | 645nm             | 655nm       | 660nm             |
| Astigmatism                   | $A_s$                                  | -                 | -           | 10 $\mu\text{m}$  |

## $\lambda = 658\text{nm}$ $P = 35\text{mW}$ , Single Mode Hitachi HL6501MG

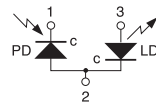
CAUTION:  
ELECTROSTATIC  
SENSITIVE



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

### Pin Description

- 1 monitor diode cathode
- 2 common case
- 3 laser anode



### PIN CODE 5C

### Absolute Maximum Ratings ( $T_c=25^\circ\text{C}$ )

| 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 $60^\circ\text{C}$ |
| Storage Temperature        | $T_{stg}$   | -40 to $85^\circ\text{C}$ |

### Optical-Electrical Characteristics ( $T_c=25^\circ\text{C}$ , $P=30\text{mW}$ )

| 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      | $\lambda_p$      | 645nm       | 658nm        | 665nm         |
| Beam Divergence (FWHM) | $\theta_{//}$    | 7 $^\circ$  | 8.5 $^\circ$ | 10.5 $^\circ$ |
|                        | $\theta_{\perp}$ | 18 $^\circ$ | 22 $^\circ$  | 26 $^\circ$   |
| Monitor Current        | $I_m$            | 0.05mA      | 0.2mA        | 1.5mA         |

| ITEM #   | £*<br>1-5 PCS | €*<br>1-5 PCS | RMB*<br>1-5 PCS |
|----------|---------------|---------------|-----------------|
| HL6501MG | £ 31.70       | € 46.70       | ¥ 479.90        |

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

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