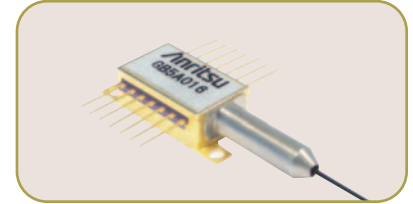
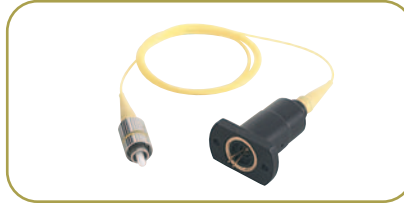
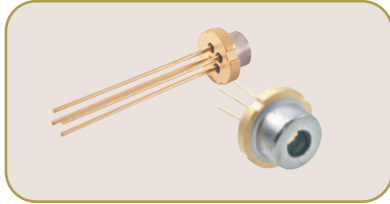


# LASER DIODE OVERVIEW

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

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

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

DFB  
DFB  
DFB

**PIN CODES**

Style A

Style B

Style C

Style D

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

Benchtop Drivers

Platform Drivers

OEM Drivers

Laser Diode Mounts

Laser Diodes

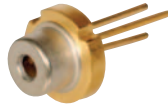
Pigtailed Lasers

Laser Modules

Accessories

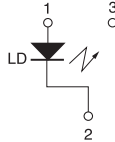
All laser diodes are extremely electrostatic sensitive; see page 496 for our selection of antistatic products.

### $\lambda = 658\text{nm}$ P = 80mW, Single Mode Mitsubishi ML120G21



#### Pin Description

- 1 laser anode
- 2 laser cathode
- 3 no connection



- 5.6mm Package
- Low Aspect Ratio( $\theta_{\perp}/\theta_{//}$ ): 1.8 (typ.)
- Low Astigmatic Distance:  $1\mu\text{m}$  (typ.)

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

| ITEM #     | £*<br>1-5 PCS | €*<br>1-5 PCS | RMB*<br>1-5 PCS |
|------------|---------------|---------------|-----------------|
| ML120G21** | £ 44.00       | € 64.90       | ¥ 666.60        |

\*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            |
|------------|------------------|-------------------|--------------------|------------------------|
| ML120G21** | \$ 69.80         | \$ 61.05          | \$ 47.57           | Mitsubishi 658nm, 80mW |

\*\*Not Compatible with TCLDM9

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

| 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 $75^\circ\text{C}$  |
| Storage Temperature         | $T_{stg}$ | -40 to $100^\circ\text{C}$ |

\*Note: Pulse width  $\leq 50\text{ns}$ , duty = 50%

#### Optical-Electrical Characteristics ( $T_C=25^\circ\text{C}$ , 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                  | $\eta_s$         | -          | 0.95mW/mA   | -          |
| Peak wavelength                   | $\lambda_p$      | 654nm      | 658nm       | 662nm      |
| Beam divergence angle ( $//$ )    | $\theta_{//}$    | $7^\circ$  | $9.5^\circ$ | $12^\circ$ |
| Beam divergence angle ( $\perp$ ) | $\theta_{\perp}$ | $14^\circ$ | $17^\circ$  | $20^\circ$ |

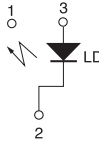
Note: All data is presented as typical unless otherwise specified.

### $\lambda = 658\text{nm}$ P = 90mW, Single Mode Hitachi HL6535MG



#### Pin Description

- 1 no connection
- 2 laser cathode
- 3 laser anode



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

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

| ITEM #   | £*<br>1-5 PCS | €*<br>1-5 PCS | RMB*<br>1-5 PCS |
|----------|---------------|---------------|-----------------|
| HL6535MG | £ 42.70       | € 63.10       | ¥ 648.00        |

\*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         |
|----------|------------------|-------------------|--------------------|---------------------|
| HL6535MG | \$ 67.85         | \$ 59.35          | \$ 47.00           | Hitachi 658nm, 90mW |

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

| CHARACTERISTIC                  | SYMBOL                | RATING                    |
|---------------------------------|-----------------------|---------------------------|
| Optical Output Power (CW)       | $P_o$                 | 90mW                      |
| Pulse Optical Output Power (CW) | $P_{o(\text{pulse})}$ | 240mW <sup>1</sup>        |
| LD Reverse Voltage              | $V_{R(LD)}$           | 2V                        |
| CW Operating Temperature        | $T_{opr}(CW)$         | -10 to $75^\circ\text{C}$ |
| Storage Temperature             | $T_{stg}$             | -40 to $85^\circ\text{C}$ |

#### Optical-Electrical Characteristics ( $T_C=25^\circ\text{C}$ , 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 <sup>1</sup> | -          |
| Lasing Wavelength         | $\lambda$        | 652nm       | 658nm              | 662nm      |
| Beam Divergence (FWHM)    | $\theta_{//}$    | $7.5^\circ$ | $10^\circ$         | $12^\circ$ |
|                           | $\theta_{\perp}$ | $15^\circ$  | $17^\circ$         | $19^\circ$ |
| Operating Voltage         | $V_{op}$         | -           | 2.6V               | 3.0V       |

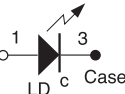
Note 1: 240mW (pulse), PW=50ns, duty = 40%

### $\lambda = 660\text{nm}$ P = 45mW, Single Mode Mitsubishi ML101J8



#### Pin Description

- 1 laser anode
- 2 no connection
- 3 laser cathode/case



- 5.6mm Package
- AlGaInP Structure
- Single Transverse Mode
- 45mW CW or 60mW Pulsed (Pulse Width  $< 1\mu\text{s}$  and Duty Less Than 50%)

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

| ITEM #  | £*<br>1-5 PCS | €*<br>1-5 PCS | RMB*<br>1-5 PCS |
|---------|---------------|---------------|-----------------|
| ML101J8 | £ 63.10       | € 93.20       | ¥ 956.90        |

\*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            |
|---------|------------------|-------------------|--------------------|------------------------|
| ML101J8 | \$ 100.20        | \$ 87.65          | \$ 70.08           | Mitsubishi 660nm, 45mW |

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

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

#### Optical-Electrical Characteristics ( $T_C=25^\circ\text{C}$ , 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      | $\lambda$        | 655nm | 660nm       | 666nm |
| Beam Divergence (FWHM) | $\theta_{//}$    | -     | $8.5^\circ$ | -     |
|                        | $\theta_{\perp}$ | -     | $22^\circ$  | -     |

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

#### Anamorphic Prism Pair



See Page 796