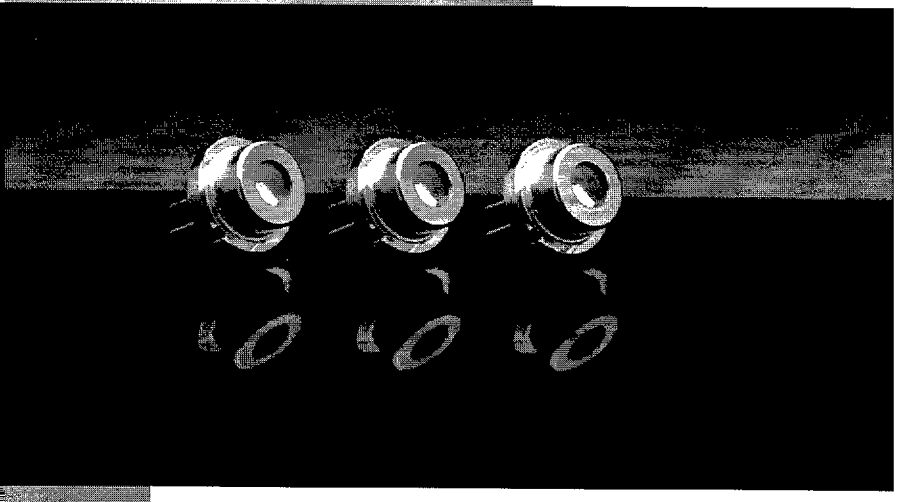
SDL 5300 SERIES



LOW COST 100 / 50 mW CW SINGLE MODE GaAlAs LASER DIODES

Key Features

Diffraction Limited Beam

TEM_{00} Single Transverse Mode

50, 100 mW cw Power

1 x 3 µm Source Size

High Reliability

Low Cost

High power in a diffraction limited, single spatial mode beam is provided by the low cost SDL-5300 series laser diodes. The index guided laser emits cw power up to 100 mW in the 780 to 850 nm wavelength range.

High resolution applications including optical data storage, printing, and point-to-point communication require diffraction limited sources. Faster writing, wider dynamic range and better signal-to-noise ratio may be achieved with the high power SDL-5311-G1.

This advanced laser diode combines a quantum well structure and a real-refractive index single lasing waveguide to provide high power, low astigmatism, narrow spectral width and a gaussian far field. The SDL-5311-G1 or SDL-5301-G1 are capable of cw operation or modulation rates greater than 2 GHz. Low astigmatism, low divergence and 1 x 3 µm emitter dimensions allow high energy concentration into diffraction limited spots.

The unique diode structure features high reliability with long operating life and very low early failure rate.

The three-pin 9 mm package includes a monitor photodiode and anti-reflection coated glass window.

SDL®

Specifications

(Typical values at 25 °C and 0.6 NA collection optics)

Model Number	CW Output Power (mW)	Differential Quantum Efficiency (mW/mA)	Total Conversion Efficiency (%)	Emitting Dimensions W x H (µm)	Beam Divergence $\theta_\perp, \theta_{||}$ (deg FWHM)	Threshold Current (mA)	Operating Current (mA)
SDL-5311-G1	**100**	**0.75 (50%)**	**30**	**3.0 x 1.0**	**30, 9**	**35**	**170**
SDL-5301-G1	**50**	**0.75 (50%)**	**30**	**3.0 x 1.0**	**30, 9**	**35**	**100**

Notes

1. Other features include:
   a. Duty factor of 100%.
   b. Thermal tuning of the wavelength of the SDL-5300 Series can be achieved by varying the temperature while the device is below the lasing threshold. This will result in a wavelength change of 0.3 nm per deg.
   c. Temperature coefficient of threshold current can be modeled as:
   $I_{TH2} = I_{TH1} \exp [(T_2 - T_1)/T_o]$
   where T_o is a device constant of about 110°K.
   d. Temperature coefficient of operating current is approximately 0.5% - 0.7% per °C.

2. Modulation bandwidth of the SDL-5300 Series is approximately 1 GHz.

3. Forward Voltage is typically: $V_f = 1.5\ V + I_{op} \times R_s$

4. Wavelength range of the SDL-5300 Series is 780 - 850 nm. Wavelength selection options of 790 ±20 nm or 830 ±20 nm are available.

5. The SDL-5300 series is single spatial mode (TEM_{00}) to specified power. Multiple longitudinal (temporal) mode operation is probable.

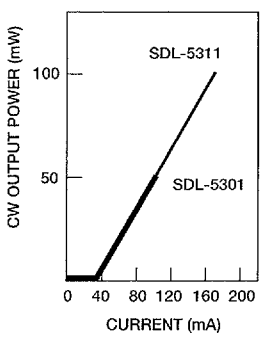
6. **Monitor Photodiode**

Sensitivity:	0.1 to 20 µA/mW
Capacitance:	6 pf
Breakdown Voltage:	25 V
Operating Voltage:	10 V

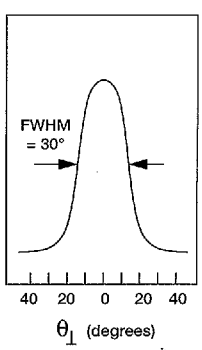
7. Definition of Part Numbers:
SDL-53 X X - G1
1 - Monitor Photodiode (MPD)
0 - 50 mW cw
1 - 100 mW cw

Optical Characteristics

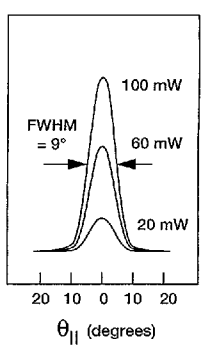
LIGHT vs. CURRENT CHARACTERISTICS



FARFIELD ENERGY DISTRIBUTION



FARFIELD ENERGY DISTRIBUTION



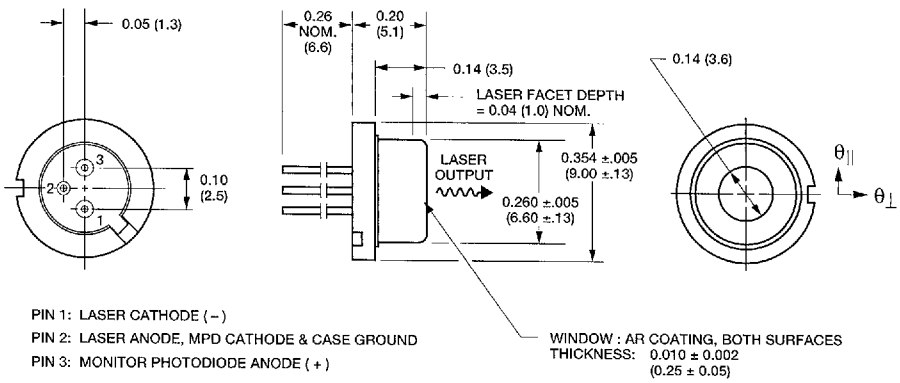
Absolute Maximum Ratings

Series Resistance (Ω)	Thermal Resistance (°C/W)	Recommended Case Temperature (°C)	CW Output Power (mW)	Reverse Voltage (volts)	Case Operating Temperature (°C)	Storage Temperature Range (°C)	Lead Soldering Temperature (°C for 5 sec)
4.0	60	-20 to 30	105	3	-20 to 50	-55 to 80	250
4.0	60	-20 to 30	55	3	-20 to 50	-55 to 80	250

Package Specifications [Dimensions in inches (mm) except where indicated]

SDL Standard Tolerances: (unless otherwise specified) **inches:** x.xx = ±0.02, x.xxx = ±0.010 **mm:** x.x = ±0.5, x.xx = ±0.25

G1 SOT-148 WINDOW PACKAGE



SDL-5300 SERIES

Safety And Operating Considerations

The laser light emitted from this laser diode is invisible and may be harmful to the human eye. Avoid looking directly into the laser diode, into the collimated beam along its optical axis when the device is in operation.

CAUTION: THE USE OF OPTICAL INSTRUMENTS WITH THIS PRODUCT WILL INCREASE EYE HAZARD.

Operating the laser diode outside of its maximum ratings may cause device failure or a safety hazard. Power supplies used with the component must be employed such that the maximum peak optical power cannot be exceeded. CW laser diodes may be damaged by excessive drive current or switching transients. When using power supplies, the laser diode should be connected with the main power on and the output voltage at zero. The current should be increased slowly while monitoring the laser diode output power and the drive current.

Device degradation accelerates with increased temperature and therefore careful attention to minimize the case temperature is advised. For example, life expectancy will decrease by a factor of four if the case is operated at 50°C rather than 30°C.

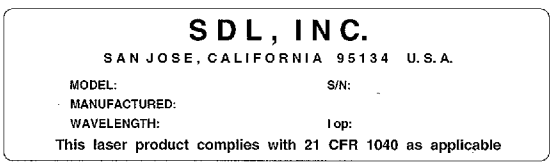
A proper heat sink for the laser diode on a thermal radiator will greatly enhance laser life. Firmly mount the laser on a radiator having a thermal impedance of less than 2.0 °C/W for increased reliability.

ESD PROTECTION — Electro-static discharge is the primary cause of unexpected laser diode failure. Take extreme precaution to prevent ESD. Use wrist straps, grounded work surfaces, and rigorous anti-static techniques when handling laser diodes.

21 CFR 1040.10 Compliance

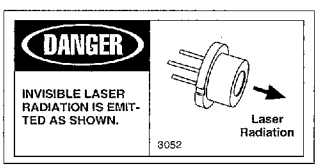
Because of the small size of these devices, each of the labels shown is attached to the individual shipping container. They are illustrated here to comply with 21 CFR 1040.10 as applicable under the radiations control for health and safety act of 1968.

SERIAL NUMBER IDENTIFICATION LABEL



OUTPUT POWER DANGER LABEL

PACKAGE APERTURE LABEL



"G1" PACKAGE DIODES