JDS Uniphase

Product Bulletin

2 to 4 W, 920 & 980 nm High-brightness Laser Diodes

SDL-6300 Series

Laser diodes in the 910 to 980 nm wavelength range are required as optical pumps for Er+ and Yb+ doped solid-state lasers such as double-clad fiber lasers. The new 6370 series InGaAs CW laser diodes from JDS Uniphase provide reliable continuous wave (CW) power at 2 W from a 100 µm aperture, while the state-of-the-art 6380 series laser diodes provide unprecedented brightness and reliability at 4 W from the same aperture to power a new generation of emerging products. The fiber-coupled version of this device provides 2.5 W from a 100 µm fiber into 0.16 NA. These multiple-transverse mode, high-brightness laser diode products will also find use in medical and materials processing systems.

The SDL-6370 and SDL-6380 are both fabricated using an MOCVD-grown strained quantum well active region. The 6380 is an entirely new epitaxial design that simultaneously optimizes power, brightness, efficiency and reliability. The product's inherently high efficiency, together with JDS Uniphase's unique low thermal resistance assembly, minimizes junction temperature rise, thereby increasing device operating lifetime. JDS Uniphase's own device, packaging and screening technologies ensure the highest reliability available in the industry.

The SDL-6370 or 6380 is offered in JDS Uniphase's standard, high-reliability A-block package. The 6380-L2 is a low-cost, rugged, fiber-coupled package, available with the option of an SMA-type connector or mounting plate.

Key Features

- Up to 4 W CW output power
- 2.5 W CW fiber-coupled power
- 910 to 930 and 960 to 980 nm wavelengths
- 100 µm aperture

Applications

- Optical pumps for Er/Yb doped solid-state lasers and amplifiers
- Materials processing
- Medical

Electro-optical Performance

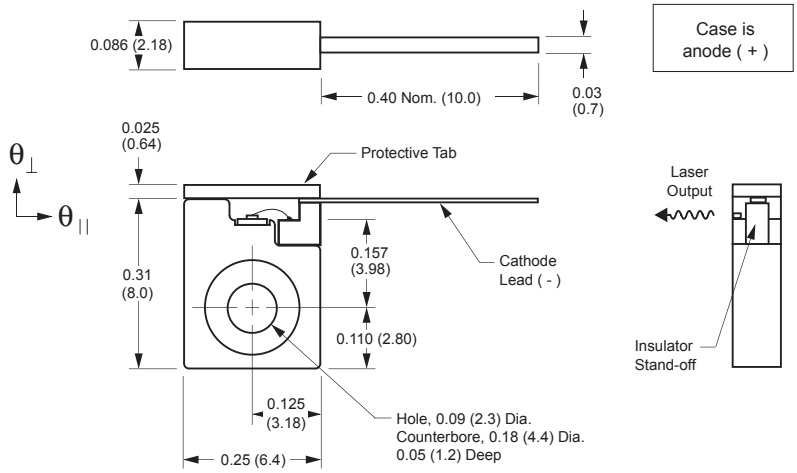
Laser Characteristics	Symbol	SDL-6370-A Min.	SDL-6370-A Typ.	SDL-6370-A Max.	SDL-6380-A Min.	SDL-6380-A Typ.	SDL-6380-A Max.	SDL-6380-L2 Min.	SDL-6380-L2 Typ.	SDL-6380-L2 Max.	Units
CW output power	P_o	–	–	2.0	–	–	4.0	–	–	2.5	W
Numerical aperture	NA	–	–	–	–	–	–	–	–	0.16	-
Peak wavelength	λ_p	910	–	930	910	–	930	910	–	930	nm
	λ_p	960	–	980	960	–	980	–	–	–	nm
Spectral width	$\Delta\lambda$	–	–	6	–	–	5	–	–	6	nm FWHM
Slope efficiency	$\eta_D=P_o/(I_{op}-I_{th})$	0.75	0.85	–	0.80	0.9	–	0.6	0.7	–	W/A
Conversion efficiency	$\eta=P_o/(I_{op}V_{op})$	–	40	–	–	45	–	–	30	–	%
Emitting dimensions	W x H	–	100 x 1	–	–	100 x 1	–	–	–	–	µm
FWHM beam divergence											
Parallel to junction	$\theta_{//}$	–	14	–	–	12	–	–	–	–	degrees
Perpendicular to junction	$\theta_{\perp}$	–	35	–	–	28	–	–	–	–	degrees
Exiting fiber	θ	–	–	–	–	–	–	–	12	–	degrees
Threshold current	I_{th}	–	0.3	0.4	–	0.4	0.5	–	0.4	0.5	A
Operating current	I_{op}	–	2.6	2.8	–	4.8	5.5	–	4.0	5.0	A
Operating voltage	V_{op}	–	1.8	–	–	1.8	–	–	1.8	–	V
Series resistance	R_s	–	0.15	–	–	0.1	–	–	0.1	–	Ω
Thermal resistance	R_{th}	–	12	–	–	8	–	–	10	–	°C/W
Recommended case temperature[5]	T_C	-20	–	40	-20	–	40	20	–	30	°C
Fiber Characteristics											
Fiber core diameter	–	–	–	–	–	–	–	–	104	–	µm
Fiber numerical aperture	NA	–	–	–	–	–	–	–	0.22	–	
Fiber cladding	–	–	–	–	–	–	–	–	125	–	µm
Fiber buffer	–	–	–	–	–	–	–	–	250	–	µm
Connector Option											
Fiber sheath (when connector ordered)	–	–	–	–	–	–	–	–	900	–	µm
Connector type	–	–	–	–	–	–	–	–	SMA	–	
Absolute Maximum Ratings											
Reverse voltage	V_{rl}	–	–	2	–	–	2	–	–	2	V
Case operating temperature[5]	T_{op}	-20	–	50	-20	–	50	20	–	40	°C
Storage temperature range[5]	T_{stg}	-40	–	80	-40	–	80	0	–	55	°C
Lead soldering temperature	T_{ls}	–	–	250	–	–	250	–	–	250	°C (5 sec.)

1. Measured at:
   SDL-6370-A 2 W, 25 °C, 0.6 NA collection optics
   SDL-6380-A 4 W, 25 °C, 0.6 NA collection optics
   SDL-6380-L2 2.5 W, 25 °C, 0.16 NA collection optics
2. Features common to all products:
   a. Temperature coefficient of wavelength is approximately 0.27 to 0.3 nm/°C.
   b. Temperature coefficient of threshold current can be modeled as: $I_{TH2} = I_{TH1} \exp[(T_2 - T_1)/T_0]$ where T_0 is a device constant of about 100 °K.
   c. Temperature coefficient of operating current is approximately 0.5 to 0.7% per °C.
3. Forward voltage is typically: $V_f = 1.4\ V + I_{op} \times R_s$.
4. 6380-L2 is available with mounting plate option.
5. Noncondensing.

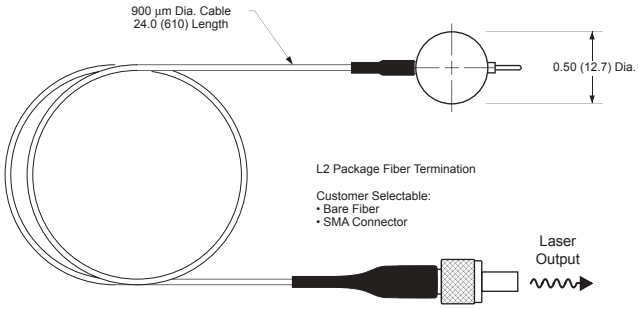
Package Dimensions (inches [mm])

Standard Tolerances
inches: x.xx = ±0.02 mm: x.x = ±0.5
x.xxx = ±0.010 x.xx = ±0.25

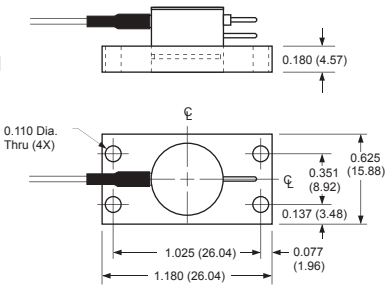
A
Open Heatsink
Package

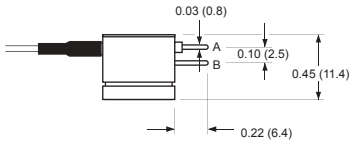


L2
High-Brightness
Fiber-Coupled
Package



L2 Package with Optional Mounting Plate





Electrical Connection	
Pin	Description
A	Laser cathode (–)
B	Laser anode (+), case

User Safety

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 or 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 power supplies are used, the laser diode should be connected with the main power on and the output voltage at zero. The current should be increased slowly while the laser diode output power and the drive current are monitored.

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.

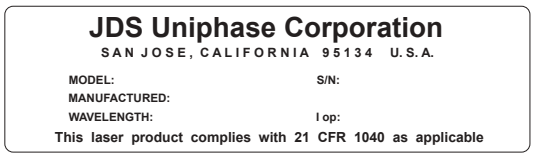
A proper heatsink for the laser diode on a thermal radiator will greatly enhance laser life. Firmly mount the laser on a radiator with a thermal impedance of less than 0.5 °C/W for increased reliability.

ESD PROTECTION – Electrostatic discharge is the primary cause of unexpected laser diode failure. Take extreme precaution to prevent ESD. Use wrist straps, grounded work surfaces and rigorous antistatic techniques when handling laser diodes.

21 CFR 1040.10 Compliance

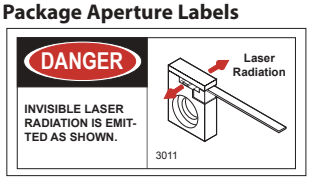
Because of the small size of these devices, each of the labels shown is attached to the individual shipping container. They are illustrated here to comply with 21 CFR 1040.10 as applicable under the Radiation Control for Health and Safety Act of 1968.

Serial Number Identification Label

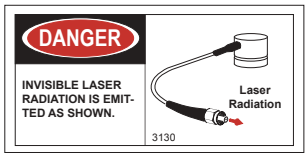


Output Power Danger Label

Package Aperture Labels



A Package Diodes



L2 Package Diodes

Ordering Information

For more information on this or other products and their availability, please contact your local JDS Uniphase account manager or JDS Uniphase directly at 1-800-498-JDSU (5378) in North America and +800-5378-JDSU worldwide or via e-mail at jdsu.sales@jdsu.com.

JDS Uniphase

North America toll-free: 1-800-498-JDSU (5378)
Worldwide toll-free: +800-5378-JDSU
www.jdsu.com

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