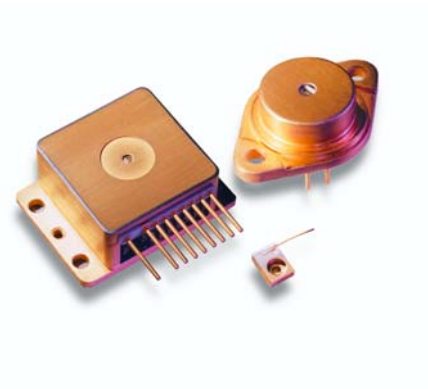
0.5 to 4.0 W, 798 to 800/808 to 812 nm Diode Lasers

2300 Series



Key Features

- 0.5, 1.2, 2.0 and 4.0 W CW power
- 50, 100, 200 and 500 µm apertures
- High-efficiency MOCVD quantum well design
- TEC option for wavelength control
- Open heatsink and window packages
- High reliability

Applications

- Solid-state laser pumping
- Medical/ophthalmic
- Free-space communication
- Beacons/illumination

The 2300 series diode lasers offer high continuous wave (CW) optical power and high brightness with unsurpassed reliability. The small emitting aperture, combined with low beam divergence, makes the 2300 series one of the highest-brightness CW diode lasers available in the industry today.

The 2300 series consists of partially coherent broad area emitters with relatively uniform emission over the emitting aperture. Operation is multi-longitudinal mode with a spectral envelope width of approximately 2 nm FWHM. The far field beam divergence in the plane perpendicular to the P/N junction is nearly Gaussian, while the lateral beam profile exhibits a multiple-transverse mode pattern typical of broad area emitters. Emitting apertures for 2300 variants range from 50 to 500 µm, giving CW power output capability of up to 4 W with superlative reliability. For still higher-power 100 and 200 µm aperture devices, please see the 2400 series products.

The high efficiency of the quantum well structure, combined with low thermal resistance epi-down chip mounting, provides minimum junction temperature at high optical power. Low junction temperature and low thermal resistance packages extend lifetime and increase reliability.

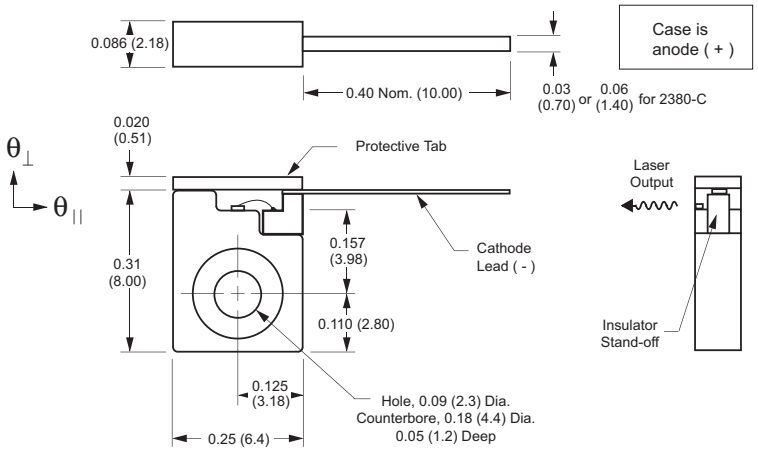
Convenient package options such as open heatsink and window packages with internal TEC and MPD allow easy integration into user systems.

2

Dimensions Diagram

(Specifications in inches [mm] unless otherwise noted.)
Standard Tolerances
inches: x.xx = ±0.02 mm: x.x = ±0.5
x.xxx = ±0.010 x.xx = ±0.25

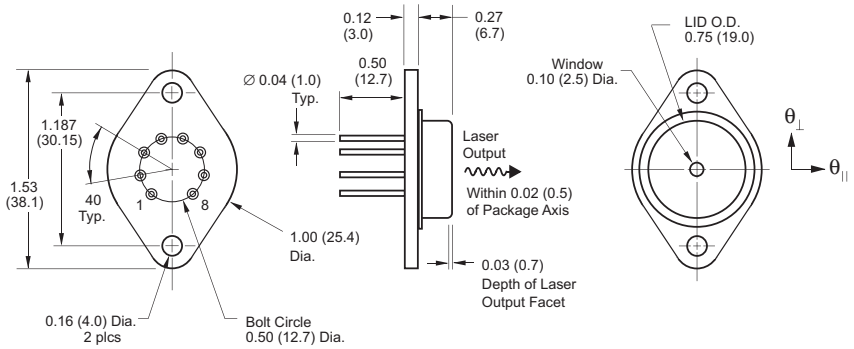
Package Style: Open Heatsink (C)



Package Style: TO-3 Window (H1)

Pinout

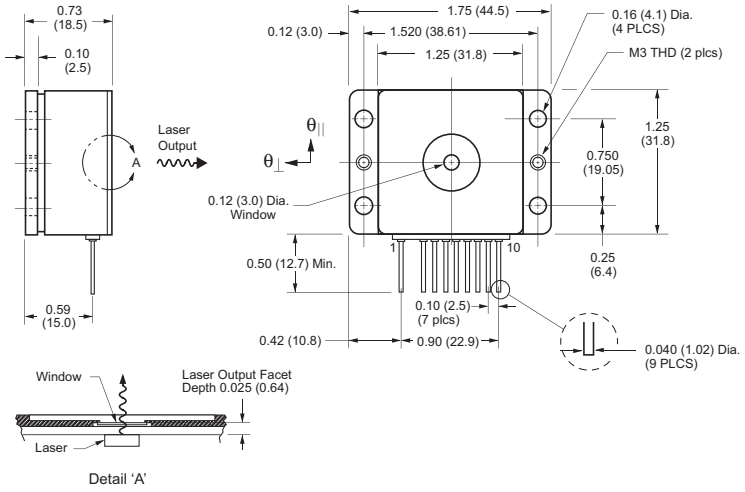
Pin	Description
1	TEC (+)
2	Thermistor (1)
3	Thermistor (2)
4	Laser cathode (–)
5	Laser anode (+), case
6	Monitor photodiode anode
7	Monitor photodiode cathode
8	TEC (–)



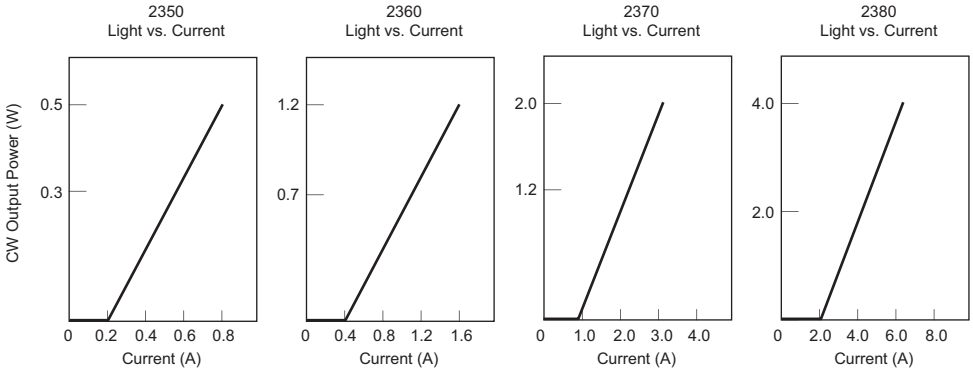
Package Style: High Heat Load Window (P1)

Pinout

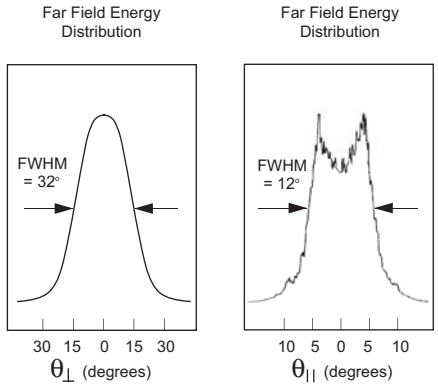
Pin	Description
1	TEC (-)
2.	-
3.	Case
4.	Laser anode (+)
5.	Thermistor (2)
6.	Thermistor (1)
7.	Laser cathode (-)
8.	Monitor photodiode anode
9.	Monitor photodiode cathode
10.	TEC (+)



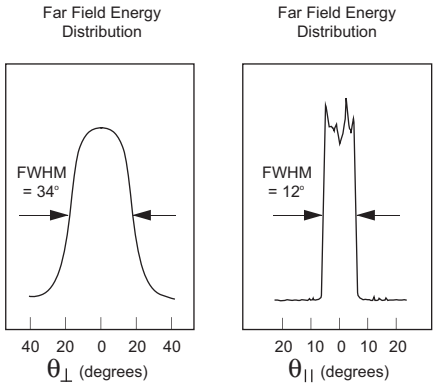
Typical Optical Characteristics

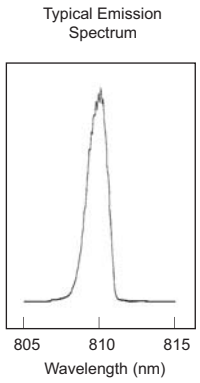


2350, 2360 and 2370 Laser Emission



2380 Laser Emission





Available Configurations

2350 Series	2360 Series	2370 Series	2380 Series
2350-C	2360-C	2370-C	2380-C
2352-H1	2362-P1	2372-P1	2382-P1

Electro-optical Specifications

Parameter	Symbol	2350 Series			2360 Series			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
Laser Characteristics								
CW output power	P_o	–	–	0.5	–	–	1.2	W
Center wavelength	λ_c	808 (±3)	–	810 (±3)	798 (±3)	–	800 (±3)	nm
		–	–	–	808 (±3)	–	812 (±3)	nm
Spectral width	$\Delta\lambda$	–	2	–	–	2	–	nm
Slope efficiency	$\eta D = P_o/(I_{op}-I_{th})$	0.7	0.9	–	0.7	0.9	–	W/A
Conversion efficiency	$\eta = P_o/(I_{op}V_{op})$	–	30	–	–	30	–	%
Emitting dimensions	W x H	–	50 x 1	–	–	100 x 1	–	µm
FWHM beam divergence								
Parallel to junction	$\theta_{//}$	–	12	–	–	12	–	degrees
Perpendicular to junction	$\theta_{\perp}$	–	32	–	–	32	–	degrees
Threshold current	I_{th}	–	0.2	0.25	–	0.4	0.6	A
Operating current	I_{op}	–	0.8	0.85	–	1.6	1.8	A
Operating voltage	V_{op}	–	(note[5])	–	–	(note[5])	–	
Series resistance	R_s	–	0.5	0.7	–	0.25	0.5	Ω
Thermal resistance	R_{th}	–	12	–	–	10	–	°C/W
Recommended case temperature	T_c	-20	–	30	-20	–	30	°C
Absolute Maximum Ratings								
Reverse voltage	V_{rl}	–	–	3	–	–	3	V
Case operating temperature	T_{op}	-20	–	50	-20	–	50	°C
Storage temperature range	T_{stg}	-40	–	80	-40	–	80	°C
Lead soldering temperature	T_{is}	–	–	250 (5 sec.)	–	–	250 (5 sec.)	°C
Monitor Photodiode[1]								
Sensitivity	–	0.1	–	10.0	0.1	–	10.0	µA/mW
Capacitance	–	–	6	–	–	6	–	pF
Breakdown voltage	V_{bd}	–	25	–	–	25	–	V
Operating voltage	V_{op}	–	10	–	–	10	–	V
Thermoelectric Cooler[1]								
Drive current								
P1 package	I_{TE}	–	3.5	–	–	3.5	–	A
H1 package	I_{TE}	–	1.4	–	–	NA	–	A
Drive voltage								
P1 package	V_{TE}	–	8.0	–	–	8.0	–	V
H1 package	V_{TE}	–	4.5	–	–	NA	–	V
Thermistor resistance	R_{therm}	–	10	–	–	10	–	kΩ

1. Not available on C package.
2. Typical values at 25 °C and 0.6 NA collection optics.
3. Features common to these products include:
   a. Duty factor of 100%.
   b. Temperature coefficient of wavelength is approximately 0.27 to 0.3 nm/°C.
   c. 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 160° K.
   d. Temperature coefficient of operating current is approximately 1% per °C.
4. Modulation bandwidth of CW diode lasers is approximately 1 GHz for C package diodes. P package diodes roll off at slightly lower frequencies due to inductance of pins and internal leads.
5. Forward voltage is typically:
   $V_f = 1.5\ V + I_{op} \times R_s$.

5

Electro-optical Specifications | **Continued**

Parameter	Symbol	2370 Series			2380 Series			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
Laser Characteristics								
CW output power	P_O	–	–	2	–	–	4	W
Center wavelength	λ_c	798 (±3)	–	800 (±3)	798 (±3)	–	800 (±3)	nm
		808 (±3)	–	812 (±3)	808 (±3)	–	812 (±3)	nm
Spectral width	$\Delta\lambda$	–	2	–	–	2	–	nm
Slope efficiency	$\eta D = P_O/(I_{op}–I_{th})$	0.7	0.9	–	0.7	0.9	–	W/A
Conversion efficiency	$\eta = P_O/(I_{op}V_{op})$	–	30	–	–	30	–	%
Emitting dimensions (note[6])	W x H	–	200 x 1	–	–	500 x 1	–	µm
FWHM beam divergence								
Parallel to junction	$\theta_{//}$	–	12	–	–	12	–	degrees
Perpendicular to junction	$\theta_{\perp}$	–	32	–	–	32	–	degrees
Threshold current	I_{th}	–	0.9	1.2	–	2.0	2.5	A
Operating current	I_{op}	–	3.1	3.4	–	6.3	6.8	A
Operating voltage	V_{op}	–	(note[5])	–	–	(note[5])	–	
Series resistance	R_s	–	0.12	0.2	–	0.08	0.1	Ω
Thermal resistance	R_{th}	–	8	–	–	4	–	°C/W
Recommended case temperature	T_c	-20	–	30	-20	–	30	°C
Absolute Maximum Ratings								
Reverse voltage	V_{rl}	–	–	3	–	–	3	V
Case operating temperature	T_{op}	-20	–	50	-20	–	50	°C
Storage temperature range	T_{stg}	-40	–	80	-40	–	80	°C
Lead soldering temperature	T_{is}	–	–	250 (5 sec.)	–	–	250 (5 sec.)	°C
Monitor Photodiode[1]								
Sensitivity	–	0.1	–	10.0	0.1	–	10.0	µA/mW
Capacitance	–	–	6	–	–	6	–	pF
Breakdown voltage	V_{bd}	–	25	–	–	25	–	V
Operating voltage	V_{op}	–	10	–	–	10V	–	V
Thermoelectric Cooler[1]								
Drive current	I_{TE}	–	3.5	–	–	3.5	–	A
Drive voltage	V_{TE}	–	8.0	–	–	8.0	–	V
Thermistor resistance	R_{therm}	–	10	–	–	10	–	kΩ

1. Not available on C package.
2. Typical values at 25 °C and 0.6 NA collection optics.
3. Features common to these products include:
   a. Duty factor of 100%.
   b. Temperature coefficient of wavelength is approximately 0.27 to 0.3 nm/°C.
   c. 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 160 °K.
   d. Temperature coefficient of operating current is approximately 1% per °C.
4. Modulation bandwidth of CW diode lasers is approximately 1 GHz for C package diodes. P package diodes roll off at slightly lower frequencies due to inductance of pins and internal leads.
5. Forward voltage is typically:
   $V_f = 1.5\ V + I_{op} \times R_s$.
6. The 2380 series near field consists of two active segments separated by an isolation space to produce specified aperture.

Ordering Information

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

Sample: 23-00002

Laser Chip: 50 µm Stripe
Package Style: Open Heat Sink with No MPD

Part Number	Wavelength	Power
23-00002	808 ± 3 nm	0.5 W
23-00003	809 ± 3 nm	0.5 W
23-00236	810 ± 3 nm	0.5 W

Laser Chip: 50 µm Stripe
Package Style: TO-3 with TEC and MPD

Part Number	Wavelength	Power
23-00006	808 ± 3 nm	0.5 W
23-00007	809 ± 3 nm	0.5 W
23-00237	810 ± 3 nm	0.5 W

Laser Chip: 100 µm Stripe
Package Style: Open Heat Sink with No MPD

Part Number	Wavelength	Power
23-00016	798 ± 3 nm	1.2 W
23-00017	799 ± 3 nm	1.2 W
23-00219	800 ± 3 nm	1.2 W
23-00019	808 ± 3 nm	1.2 W
23-00020	809 ± 3 nm	1.2 W
23-00201	810 ± 3 nm	1.2 W
23-00022	811 ± 3 nm	1.2 W
23-00015	812 ± 3 nm	1.2 W

Laser Chip: 100 µm Stripe
Package Style: High Heat Load with TEC and MPD

Part Number	Wavelength	Power
23-00025	798 ± 3 nm	1.2 W
23-00026	799 ± 3 nm	1.2 W
23-00202	800 ± 3 nm	1.2 W
23-00028	808 ± 3 nm	1.2 W
23-00029	809 ± 3 nm	1.2 W
23-00200	810 ± 3 nm	1.2 W
23-00031	811 ± 3 nm	1.2 W
23-00032	812 ± 3 nm	1.2 W

Laser Chip: 200 µm Stripe
Package Style: Open Heat Sink with No MPD

Part Number	Wavelength	Power
23-00049	798 ± 3 nm	2.0 W
23-00050	799 ± 3 nm	2.0 W
23-00203	800 ± 3 nm	2.0 W
23-00052	808 ± 3 nm	2.0 W
23-00053	809 ± 3 nm	2.0 W
23-00204	810 ± 3 nm	2.0 W
23-00055	811 ± 3 nm	2.0 W
23-00056	812 ± 3 nm	2.0 W

Laser Chip: 200 µm Stripe
Package Style: High Heat Load with TEC and MPD

Part Number	Wavelength	Power
23-00059	798 ± 3 nm	2.0 W
23-00060	799 ± 3 nm	2.0 W
23-00205	800 ± 3 nm	2.0 W
23-00062	808 ± 3 nm	2.0 W
23-00063	809 ± 3 nm	2.0 W
23-00206	810 ± 3 nm	2.0 W
23-00065	811 ± 3 nm	2.0 W
23-00066	812 ± 3 nm	2.0 W

Laser Chip: 500 µm Stripe
Package Style: Open Heat Sink with No MPD

Part Number	Wavelength	Power
23-00083	798 ± 3 nm	4.0 W
23-00084	799 ± 3 nm	4.0 W
23-00207	800 ± 3 nm	4.0 W
23-00086	808 ± 3 nm	4.0 W
23-00087	809 ± 3 nm	4.0 W
23-00208	810 ± 3 nm	4.0 W
23-00089	811 ± 3 nm	4.0 W
23-00090	812 ± 3 nm	4.0 W

Laser Chip: 500 µm Stripe
Package Style: High Heat Load with TEC and MPD

Part Number	Wavelength	Power
23-00091	798 ± 3 nm	4.0 W
23-00092	799 ± 3 nm	4.0 W
23-00210	800 ± 3 nm	4.0 W
23-00094	808 ± 3 nm	4.0 W
23-00095	809 ± 3 nm	4.0 W
23-00209	810 ± 3 nm	4.0 W
23-00097	811 ± 3 nm	4.0 W
23-00098	812 ± 3 nm	4.0 W

User Safety

Safety and Operating Considerations

The laser light emitted from this diode laser is invisible and may be harmful to the human eye. Avoid looking directly into the diode laser 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 diode laser 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 diode lasers may be damaged by excessive drive current or switching transients. When using power supplies, connect the diode laser with the main power on and the output voltage at zero. The current should be increased slowly while the diode laser 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 diode laser 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 diode laser failure. Take extreme precaution to prevent ESD. Use wrist straps, grounded work surfaces and rigorous antistatic techniques when handling diode lasers.

Labeling

21 CFR 1040.10 Compliance

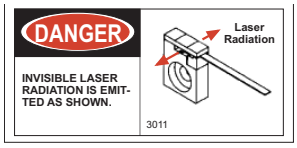
Because of the small size of these devices, each of the labels shown is attached to the individual shipping container. They are illustrated here to comply with 21 CFR 1040.10 as applicable under the Radiation Control for Health and Safety Act of 1968.

Serial Number Identification Label

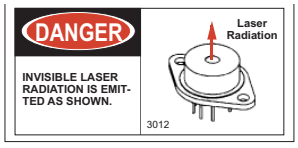
JDS Uniphase Corporation
SAN JOSE, CALIFORNIA 95134 U.S.A.

MODEL: S/N:
MANUFACTURED:
WAVELENGTH: I op:
This laser product complies with 21 CFR 1040 as applicable

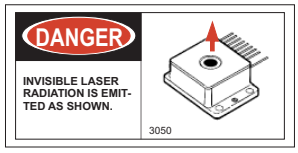
Package Aperture Labels



C Package Diodes



H1 Package Diodes



P1 Package Diodes

Output Power Danger Labels

2350

2360, 2370, 2380