LASER RADIATION
AVOID EYE OR SKIN EXPOSURE TO
DIRECT OR SCATTERED RADIATION
CLASS 4 LASER PRODUCT

# Open Heat Sink High Power 1.5 μm Broad Area Laser Diode GD20483

*Preliminary*

## General Description

The GD20483 high power Fabry-Perot laser diode is designed as a source with a high brightness mounted on an open heat sink (un-encapsulated).

Source wavelengths are ranging from 1480 to 1495 nm, but the source is designed so that a tuning of ± 5 nm is possible by changing the current or the heat sink temperature.

The laser die is flip-chip mounted on an open heat sink with a low thermal resistance as result. The high efficiency of the multiple quantum well structure leads to a low junction temperature and extended lifetime and increased reliability. The open heat sink must be attached to a larger heat sink that provides dissipation of thermal energy.

An anti-reflection coating is applied to the front facet and a high-reflection coating is applied to the rear facet in order to maximize the optical output power.

The laser diode is a multiple quantum well laser with InGaAsP epilayers grown on InP by MOVPE. The source is a partly coherent gain-guided broad area emitter with closely spaced stripes. This results in a more uniform emission across the emitting aperture (see Figure 1). The aperture is approximately 100 microns wide. The laser operates in multiple longitudinal modes. The radiation is nearly Gaussian in the plane perpendicular to the junction. In the plane parallel to the laser diode junction the radiation exhibits a complex pattern typical for a broad area emitter.

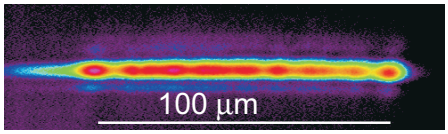
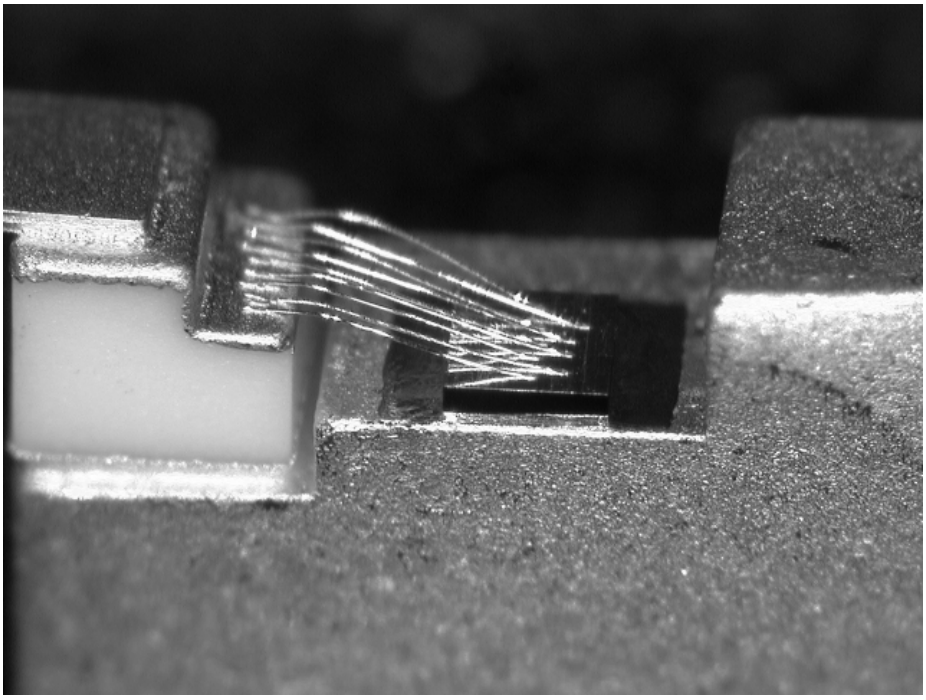



***Figure 1.*** *Emission from front facet.*



## Features

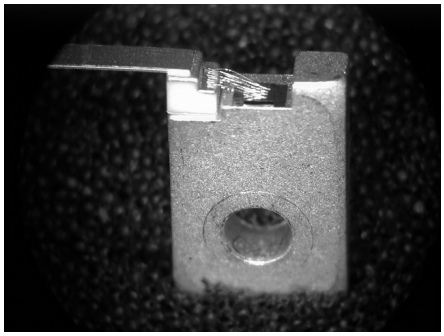
- More than 500 mW CW output power from front facet.
- 100 microns aperture.
- Continuous wave, Fabry-Perot.
- Mean wavelength: 1480 - 1495 nm.
- Other wavelengths between 1400 and 1550 nm are possible, please consult factory
- Open heat sink mounting (un-encapsulated).
- High reliability.
- High brightness.

## Applications

- Solid-state pumping.
- External cavity configurations.

## Caution

The laser die and bonding wires will be damaged if touched.
Take care when handling.



## *Package Outline*

- The standard *SML-1* heat sink consists of a gold plated copper-tungsten stub with a recess in which the laser die is soldered. The heat sink must be attached to a cooling device by a 2 mm screw.
- The laser cathode is wire-bonded to a gold plated ceramic block. This block has a spring for the cathode connection.
- The stub is used for the anode connection.

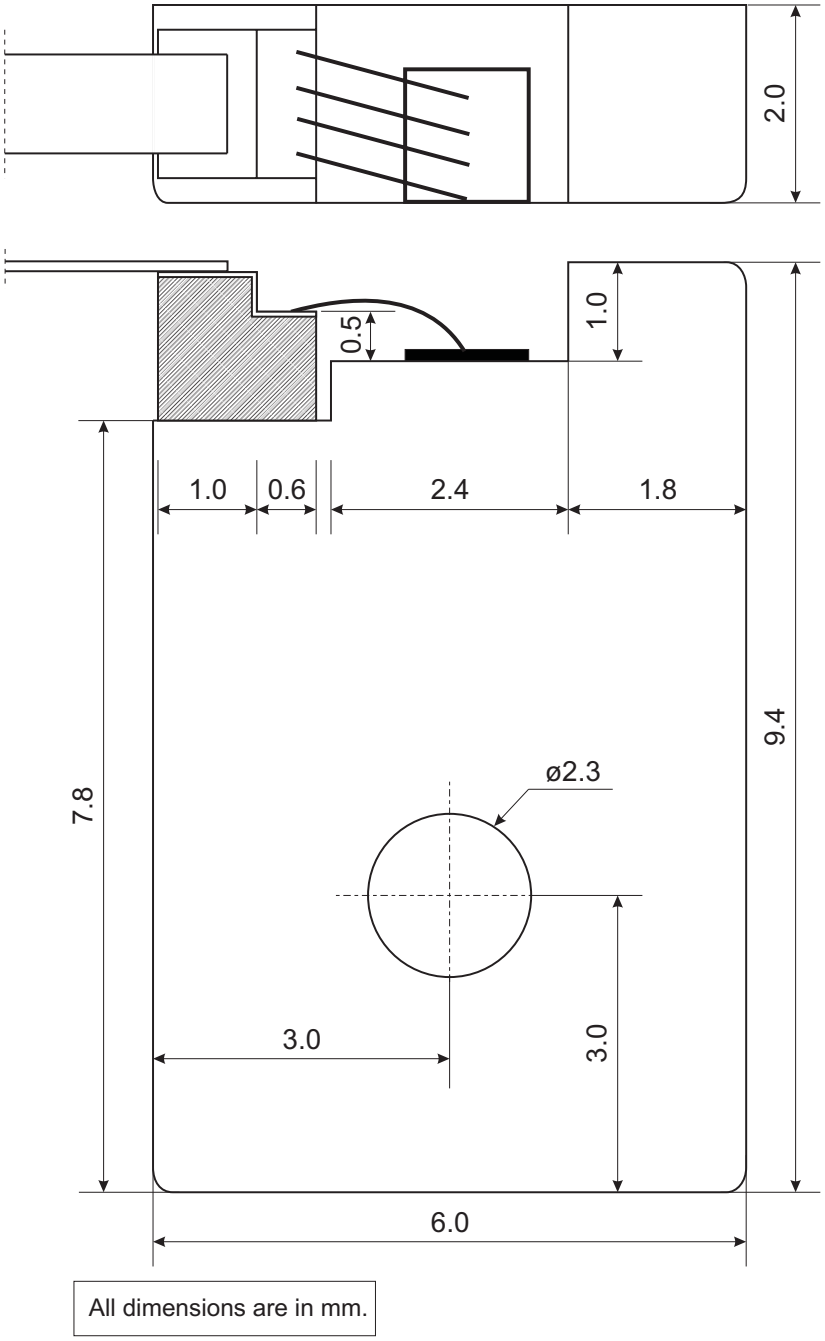



***Figure 2.*** *The standard SML-1 heat sink.*

## *Pin List*

| Mnemonic: | Type: | Description: |
|---|---|---|
| Spring | DC | DC bias, laser cathode (-) |
| GND | DC | Case ground, laser anode (+) |

## *Maximum Ratings*

These are the limits beyond which the component may be damaged.
$T_{case}$ = 25 °C unless otherwise specified.

| Symbol: | Parameter: | Conditions: | MIN.: | MAX.: | UNIT: |
|---|---|---|---|---|---|
| $I_{op}$ | Laser forward current | | | +4500 | mA |
| $V_{rev}$ | Laser reverse voltage | | | 2.5 | V |
| $T_{case}$ | Operating case temperature | | -20 | +70 | ºC |
| $T_S$ | Storage temperature | | -40 | +85 | ºC |

## *Electrical DC Characteristics*

$T_{case}$ = 25°C unless otherwise specified.

| Symbol: | Parameter: | Conditions: | MIN.: | TYP.: | MAX.: | UNIT: |
|---|---|---|---|---|---|---|
| $I_{th}$ | Threshold current | | 500 | 600 | 700 | mA |
| $I_{op}$ | Operating current | | 2000 | 3000 | 4000 | mA |
| $V$ | Laser forward voltage | $I_{op}$ = 3000 mA | 1.2 | 1.4 | 1.5 | V |

## *Optical Characteristics*

$T_{CASE}$ = 25 °C unless otherwise specified, optical parameters are taken from front facet unless otherwise specified.

| Symbol: | Parameter: | Conditions: | MIN.: | TYP.: | MAX.: | UNIT: |
|---|---|---|---|---|---|---|
| *L* | Output power from front facet | $I = I_{op}$ | 500 | 525 | | mW |
| $L_{rear}$ | Output power from rear facet | $I = I_{op}$ | | | 100 | mW |
| | Optical power stability, front facet | $I = I_{op}$, $\Delta t$ = 60 s<br>$I = I_{op}$, $\Delta t$= 30 min | | | 0.25<br>0.25 | %<br>% |
| $\lambda_m$ | Mean wavelength (Note 1) | $I = I_{op}$ | 1480 | 1490 | 1495 | nm |
| | Mean wavelength spectral stability (standard deviation) | $I = I_{op}$, $\Delta t$ = 60 s<br>$I = I_{op}$, $\Delta t$= 30 min | | | 0.2<br>0.4 | nm<br>nm |
| | Spectral bandwidth (FWHM). Note 2 | $I = I_{op}$ | 5 | 10 | 15 | nm |
| | Spectral shift with temperature | $I = I_{op}$ | 0.3 | 0.7 | 0.9 | nm/ºC |
| | Far-field radiation, fast axis | perpendicular to junction | | 34 | | º |
| | Far-field radiation, slow axis | parallel to junction | | 8 | | º |

**Note 1:** For request on mean wavelength between 1400 and 1480 nm or between 1495 and 1550 nm: please consult factory.
**Note 2:** FHWM, Full Width at Half Maximum.

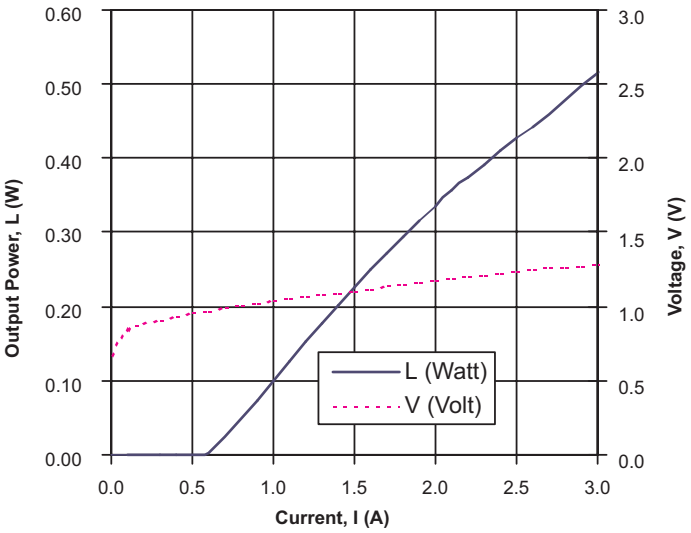



***Figure 3.*** *LIV Characteristics, CW. Light output power (L) is the full line. Voltage drop across the laser (V) is the dotted line.*

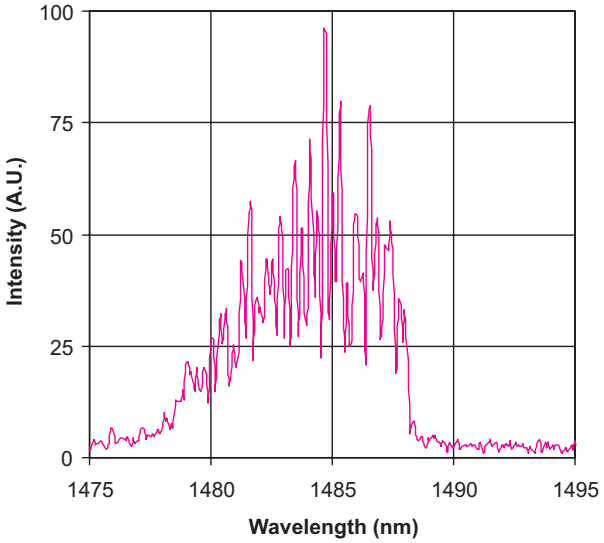



***Figure 4.*** *Spectrum from a laser with a mean wavelength of 1485 nm and a spectral bandwidth of approximately 6 nm. As an option a fine selection of the mean wavelength between 1480 and 1495 nm is possible.*

## *Safety and Operating Consideration*

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

Operating the laser diode outside of its maximum ratings may cause diode failure or a safety hazard. Power supplies used with the laser diode must be employed such that the maximum peak optical power cannot be exceeded. Laser diodes may be damaged by excessive drive or switching transients.

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

## *Ordering Information*

To order, please specify as shown below:

| **Product Name:** | **Package Type:** | **Option:** |
|---|---|---|
| **GD20483** | Open heat sink SML1 | Fine selection of wavelength between 1480 and 1495 nm. |



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