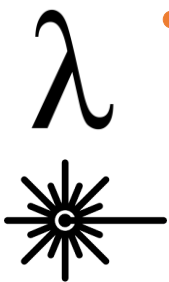
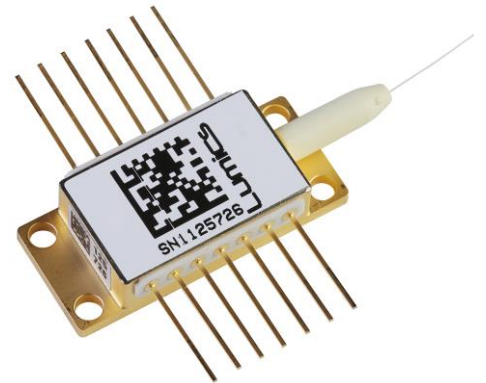




Single Mode Laser Module 14-pin Butterfly

The Lumics single-mode laser modules contain an optimized GaAs or InP substrate-based quantum well high-power laser diode. This industry standard 14-pin butterfly package includes a TEC with thermistor and photodiode (PD) power monitor. It has been designed for customer specific applications and is available with special FBG's and fibers. The extremely stringent reliability requirements are achieved through Lumics' proprietary patented innovative chip technology. This includes careful design, exactly defined manufacturing and extensive testing. Each laser diode module is individually serialized for traceability and is shipped with a specified set of test data. All devices are RoHS compliant.



- 808nm 250mW
 - 850nm 200mW
 - 1064nm 450mW
 - 1080nm 300mW
 - 1550nm 150mW
- ...and many others



The power level is defined for ex-fiber measurements and does not depend on the type of fiber: single-mode (SM fiber) or polarization maintaining (PM fiber).



Reliability

In-house manufacturing allows to secure a highly optimized performance of the laser diode chips which is crucial for the reliability of the whole laser module. The experimentally checked mean-time-to-failure (MTTF) ultimately depends on wavelength and power. But for all Lumics products it exceeds by far the industry defined level of 10,000 hours. As it has been mentioned above the reasons for this outstanding performance are the proprietary design of the epitaxial structure and the processed wafer as well as the patented technology of facet coating. Environmental tests equivalent to Telcordia GR-468-CORE and MIL-STD-833E have been passed.

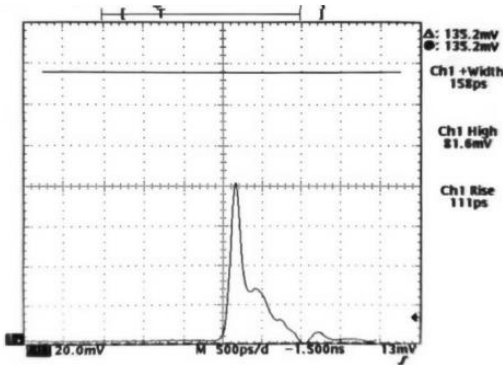
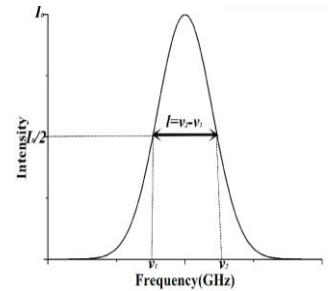


Lumics

We manufacture diode lasers.

Wavelength Stabilization

High-power laser diodes are usually based on a Fabry-Pérot resonator which has no selectivity for wavelength. In this case the output spectrum of the laser diode can vary with operating temperature and current, and can change with operation time, too. Also for some applications a chip to chip variation can hardly be accepted. To overcome these problems a resonator can be formed with a fiber Bragg grating (FBG) which has a narrow reflection spectrum. In this case the operating wavelength is locked by the FBG as well as the spectrum width. Lumics offers FBG options for all available wavelengths.



**158 ps Pulse Width, 0.4 A, P_{op}= 230 mW
Lumics LU1064M450**

Courtesy of Analog Modules Inc.

Close-to-Chip FBG for Short Nano-Sec Pulsing

Some customers require both options for their application (e.g. Distributed Temperature Sensing – DTS) – i.e. pulse operation plus wavelength stabilization simultaneously. With the standard wavelength stabilization option the FBG is placed in a ~1000mm distance from the chip. This is absolutely fine for CW operation but could result in a problem for nanoseconds pulse widths. Indeed, to establish lasing the light must travel several (3-5) times through the resonator. In case of a 1000mm distance the round-trip time is ~10ns. For nanosecond pulses the electrical pump ends much earlier than the light reaches the FBG. To solve this issue Lumics offers devices with an FBG placed close to the chip. With this option the distance to the FBG is ~40mm and the round trip for light in this resonator takes only ~0.5ns. Thus, during an electrical pulse of 2 or 3ns the light travels through the resonator several times and the FBG-defined operating wavelength dominates in the lasing spectrum.

- **Own chip fab in Berlin/Germany**
- **Patented facet passivation of laser chips**
- **>23 years experience in diode laser technology**



Conclusion

Lumics offers high-power (up to 500mW) single-mode laser diodes in the 7xx-15xx nm spectral range for different applications (sensing, analytical instruments, pumping, seeding, etc.). The industry standard package (14-pin butterfly) includes TEC with thermistor

and PD monitor. Chips and packages have special options for pulse operation with rise time below 1ns. Wavelength stabilization with FBG is available for all offered wavelengths for both CW and short nano-sec pulse operations.

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