

SLD3237VF, SLD3237VFR

400 mW Output Blue-Violet Semiconductor Laser Diodes Support BDXL™



To respond to the increasing popularity of HD and 3D content, Sony has now developed the industry's first 400 mW pulsed optical output laser diode, the SLD3237VF. This high-output blue-violet laser diode supports high-speed recording for the new "BDXL™" large-capacity standard, which increases the Blu-ray disc recording capacity to 128 GB.

The increased output of this new device makes 4×-speed recording on 4-layer BDXL-R media possible.

At the same time, Sony has also developed the SLD3237VFR 350 mW pulsed optical output laser diode, which is provided in a 3.8 mm diameter package, and has initiated sales in IT related applications such as slim factor drives.

* For mass production as of September 2010.

- Maximum optical output of 400 mW supports BDXL™ (in pulse drive mode)
- Guaranteed high-temperature operation of 85 °C and 90 °C (SLD3237VF/SLD3237VFR, respectively)
- Lineup includes a 3.8 mm diameter compact package product for slim drives

BDXL™

* BDXL™ is a trademark of the Blu-ray Disc Association.

Maximum Optical Output of 400 mW Supports BDXL™ (in Pulse Drive Mode)

To support increasingly higher speed multiples in Blu-ray disc media recording, Sony has released a series of blue-violet laser diodes with optical outputs of 65, 125, 170, 200, and 330 mW (the SLD3232VF through SLD3236VF). The SLD3236VF, which provides the highest optical output of these devices, 330 mW, supports Blu-ray disc recording at up to 8× speed on 2-layer media. Sony has now developed the 400 mW pulsed optical output SLD3237VF and has started mass production of this device as the industry's first 400 mW blue-violet laser diode. This increase in optical output makes possible both 4×-speed recording on 4-layer media (BDXL-R), which supports large capacities up to 128 GB, and 12×-speed recording on 2-layer media.

To achieve mass production of blue-violet laser diodes in the 400 mW class, it is necessary to prevent the melting of the laser device end surface by a phenomenon known as catastrophic optical damage (COD). In the newly-developed SLD3237VF, Sony adopted newly developed and optimized materials and structure of the coating on the laser device emission facet. This made it possible to achieve the high output of 400 mW optical output in pulsed operation.

Guaranteed High-Temperature Operation Up to 85 °C (SLD3237VF)

During operation at an optical output of 400 mW, the heat generated by the laser device itself increases. As a result, guaranteed operation at even higher temperatures than before is now required. To assure reliability at high-temperature operation, it was necessary to improve the crystal quality of the gallium nitride crystal, which is the laser diode structural material. To resolve this issue, Sony designed a new MOCVD (metal-organic chemical vapor deposition) system and optimized the crystal growth conditions. As a result, Sony achieved high reliability during pulsed optical output operation at 400 mW even at the high temperature of 85 °C. While the technique of increasing the chip size to improve the heat dissipation of the laser chip is often adopted as a means of achieving high-temperature operation, in this product, improving the crystal quality allowed Sony to succeed not only in achieving high-temperature operation, but also to narrow the size of the laser chip. In addition to shrinking the size of the chip, Sony also developed processes and process equipment

that achieve high production efficiency in the wafer process. This will allow Sony to respond to the increasing demand for Blu-ray semiconductor laser diodes.

Lineup Includes a 3.8 mm Diameter Compact Package Product for Slim Drives

We expect to see increasing demand for slim factor Blu-ray disc drives that support data recording for IT applications. To respond to these market demands, in addition to the existing 5.6 mm diameter package SLD3237VF, we are also releasing the SLD3237VFR, which is provided in a 3.8 mm diameter package that is optimal for compact drives. Since the environmental temperature can be especially high in IT applications, not only does the SLD3237VFR feature a miniature package, but it also achieves operation at even higher temperatures, in particular supporting 350 mW pulsed optical output operation at up to 90 °C.

V O I C E

Development of the SLD3237VF and SLD3237VFR involved the introduction of many new elements, both in manufacturing equipment and technology and there were many difficulties. However, from the first stages of development we received cooperation from many people in a variety of groups, from the manufacturing department and the semiconductor business group analysis team to the technology development division. This allowed us to create even better products. Based on the technological foundations created for these products, we plan to proceed with development of even higher output laser diode products.

Table 1 SLD3237VF Blu-ray Disc Recording Semiconductor Laser Diode Main Specifications

Item	Conditions		Rating or characteristic value
Actual maximum ratings			
Optical output, P_o	DC CW	—	200 mW
	Pulse	Width 30 ns Duty 50 %	400 mW
Operating temperature	—		0 to 85 °C
Electrical and optical characteristics ($T_c = 25\text{ °C}$)			
Threshold current, I_{th}	CW		39 mA
Operating current, I_{op}	CW, $P_o = 150\text{ mW}$		130 mA
Operating voltage, V_{op}	CW, $P_o = 150\text{ mW}$		5.0 V
Wavelength, λ_p	CW, $P_o = 150\text{ mW}$		405 nm
Differential efficiency, η_D	CW, $P_o = 5\text{ to }150\text{ mW}$		1.6 mW/mA
Radiation angle	Parallel	CW, $P_o = 150\text{ mW}$	9.0°
	Perpendicular	CW, $P_o = 150\text{ mW}$	19.0°

Table 2 SLD3237VFR Blu-ray Disc Recording Semiconductor Laser Diode Main Specifications

Item	Conditions		Rating or characteristic value
Actual maximum ratings			
Optical output, P_o	DC CW	—	200 mW
	Pulse	Width 30 ns Duty 50 %	350 mW
Operating temperature	—		0 to 90 °C
Electrical and optical characteristics ($T_c = 25\text{ °C}$)			
Threshold current, I_{th}	CW		38 mA
Operating current, I_{op}	CW, $P_o = 150\text{ mW}$		135 mA
Operating voltage, V_{op}	CW, $P_o = 150\text{ mW}$		4.9 V
Wavelength, λ_p	CW, $P_o = 150\text{ mW}$		405 nm
Differential efficiency, η_D	CW, $P_o = 5\text{ to }150\text{ mW}$		1.5 mW/mA
Radiation angle	Parallel	CW, $P_o = 150\text{ mW}$	9.0°
	Perpendicular	CW, $P_o = 150\text{ mW}$	19.0°

Figure 1 SLD3237VF L-I and V-I Characteristics (in Pulse Drive Mode)

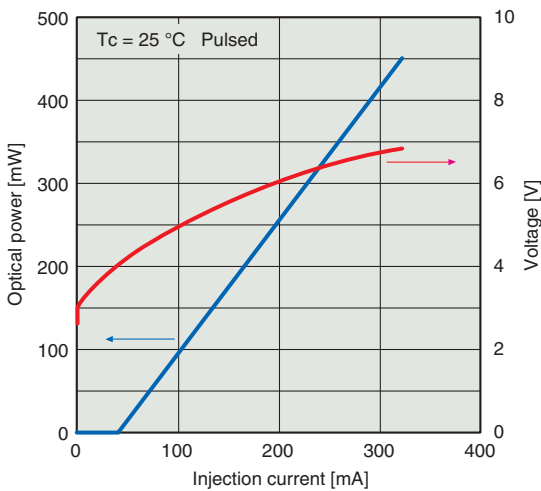


Figure 2 SLD3237VF L-I Temperature Characteristics

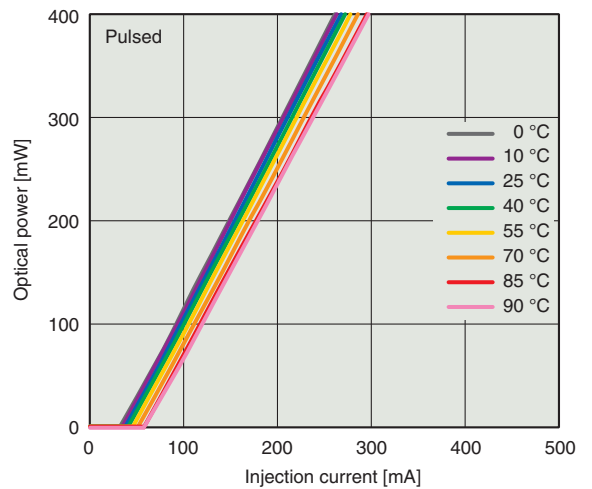


Figure 3 SLD3237VF and SLD3237VFR Far-Field Pattern

