

High-Power Blue-Violet Laser Diode for Blu-ray Disc Drives Supports Two-Layer Discs and 2× to 4× Speed Recording

SLD3234VF SLD3234VFI

The market for Blu-ray Disc recording is expected to grow rapidly along with the increasing popularity of terrestrial digital broadcasting. The blue-violet laser diode is used as the light source for Blu-ray Disc drives, and developing high-power lasers that can support even higher recording densities and even higher recording speeds is becoming increasingly important. Sony has now developed the SLD3234VF and SLD3234VFI blue-violet laser diodes that support two-layer 2× to 4× speed recording. Compared to existing products, these laser diodes increase the maximum optical power output by 45 mW and are capable of providing 170 mW in pulse drive mode. They also achieve stable operation under environments with temperatures as high as 75°C.

- Maximum optical power output: 170 mW (in pulse drive mode)
- Package size reduced to a 3.8 mm diameter for use in slim drives
- Excellent high-temperature characteristics

■ Maximum Optical Power Output: 170 mW (in pulse drive mode)

Sony has already released the SLD3233VF (pulse drive mode maximum optical power output: 125 mW) blue-violet laser diode that supports two-layer 2× speed recording. However, even higher power levels are now required in blue-violet laser diodes to make higher recording densities and speeds possible. When aiming for higher output levels, what becomes an issue is catastrophic optical damage (COD) at the laser element end surface. In the newly-developed SLD3234VF and

SLD3234VFI of this release, Sony optimized the end surface film process and the end surface reflectivity. Also, by improving the electrode structure, Sony reduced heat generation in the vicinity of the optical generation area during high-power operation and minimized reductions in reliability due to COD. As a result, Sony was able to create blue-violet laser diodes that are capable of a maximum optical power output of 170 mW in pulse drive mode.

■ New 3.8 mm Diameter Miniature Package Supports Slim Drives

It is expected that there will be increasing demand for slim form factors in Blu-ray Disc drives. To respond to these market demands, Sony developed two products: the SLD3234VF, which is provided in a standard 5.6 mm diameter package, and the SLD3234VFI, which is provided in a 3.8 mm diameter package that supports slim drives. The SLD3234VFI achieves a miniaturization to less than one half the volume of the earlier 5.6 mm diameter products. Sony adopted a new package material and took full advantage of high-precision assembly technologies to prevent the degradation of laser characteristics and reliability caused by heat generation during high-power operation that is of concern due to package miniaturization. As a result, Sony achieved laser characteristics and reliability equivalent to the product in the existing package.

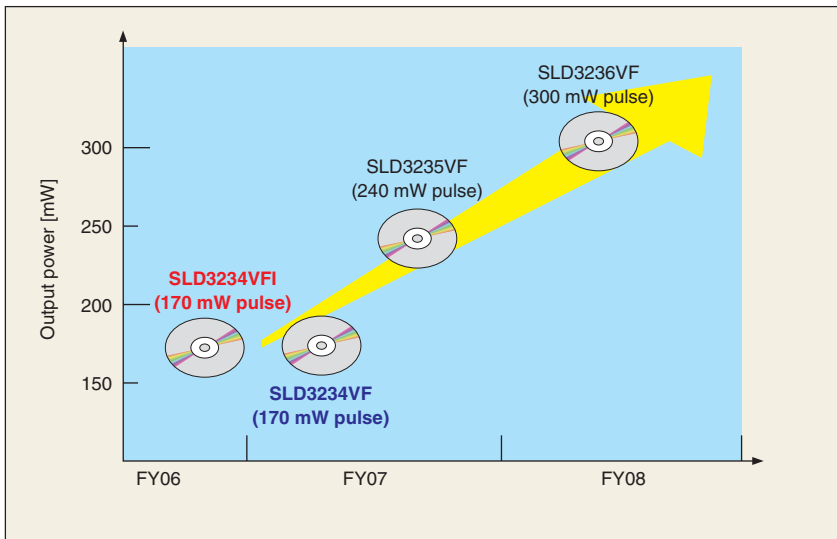
■ Excellent High-Temperature Characteristics

During recording, the heat generated by both the structural components and the laser diode itself becomes significant. Also, since hardware internal temperatures in IT applications can rise significantly, high reliability in high temperature environments is necessary in laser diodes. In the SLD3234VF and SLD3234VFI of this release, Sony introduced new structures in the areas surrounding the optical generation region to suppress temperature dependant changes in drive current. As a result, these devices achieve stable operation even under environments with temperatures as high as 75°C.

V O I C E

Interest in Blu-ray Discs is increasing rapidly due to the release of the PS3*1 and the increasing popularity of terrestrial digital broadcasting. The necessity of blue-violet laser diodes that can support even higher recording densities and speeds is becoming stronger day by day in proportion to this increasing interest. Although we had to clear many technological hurdles in moving to this higher power, our staff is working together to push forward our development efforts to respond to these and future market demands.

*1 PS3 is a trademark of Sony Computer Entertainment Inc.

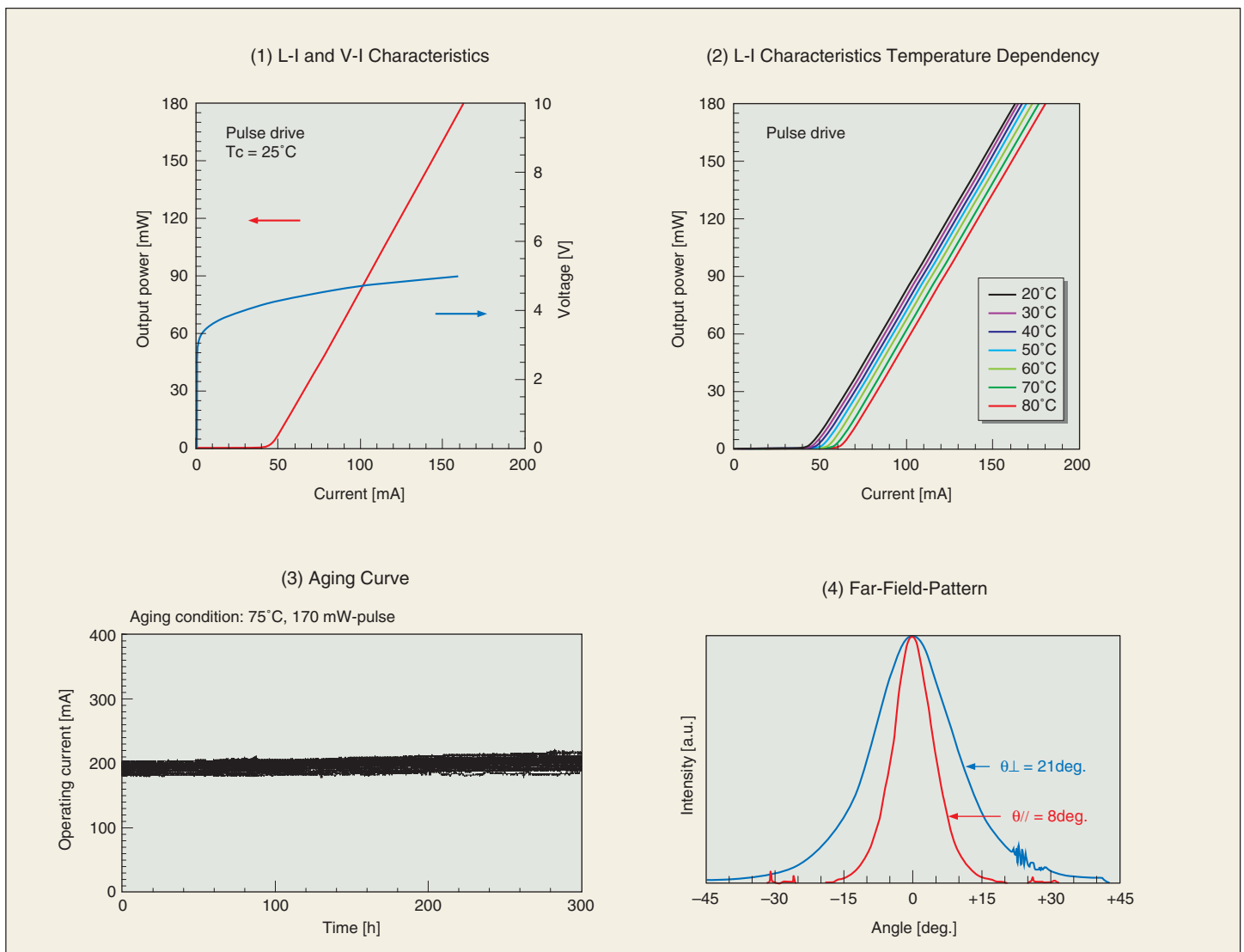


■ Figure 1 Blu-ray Disc Recording Laser Diode Development Trends

■ Table 1 Main Specifications

Item		Symbol	Typ.	Unit
Threshold current		I _{th}	40	mA
Operating current		I _{op}	90	
Operating voltage		V _{op}	5	V
Wavelength		λ _p	405	nm
Radiation angle	Parallel	θ _{//}	8	deg.
	Perpendicular	θ _⊥	21	
Differential efficiency		η _D	1.35	mW/mA

Condition: $T_c = 25^\circ\text{C}$
 $P_o = 65 \text{ mW@CW}$



■ Figure 2 Representative Characteristics