

SLD1138VL

The DVD market continues to grow rapidly.

Sony continues to aggressively push the envelope of development possibilities in the key device for DVD players, the 650 nm band semiconductor laser diode and to respond to the needs of this market.

Now, after two years have passed since Sony released the SLD1134VL, the industry's first DVD playback self-excited oscillation low-noise semiconductor laser diode, Sony has added the new lower power consumption SLD1138VL to the Sony lineup.

This is an environmentally friendly laser diode that achieves an operating current 33% lower than the corresponding conventional product.

- Self-excited oscillation semiconductor laser diode
- Operating current 33% lower than the conventional type (SLD1134VL)
- Low loss waveguide structure adopted for stable self-excited oscillation

Self-Excited Oscillation Semiconductor Laser Diode

The noise characteristic is one of the most important semiconductor laser diode characteristics. The 650 nm band laser diodes used in the DVD player pickup must have even lower noise levels than the 780 nm band laser diodes used in CD players. In optical disc systems, the reflected light that returns from the disc surface with irregular intensity, the so-called "return light", disrupts the operation of the laser and generates noise. Normally, a 300 to 700 MHz RF superposing circuit is used to work around this noise. However, this approach has the following problems:

- The high-frequency module has a large current consumption.
- High levels of electromagnetic interference are generated.

To resolve these problems, in 1998 Sony released the SLD1134VL, which adopts a laser structure called the "self-excited oscillation type". This obviates the need for an RF superposing circuit. With this structure, while the laser diode itself is operated with DC drive, it turns the output light on and off at a frequency in the 300 MHz to 1 GHz range. This repeated on/off operation is caused by a saturable optical absorption layer which is formed on both sides of the optical emission point during current insertion.

The SLD1138VL Achieves Low Power Consumption

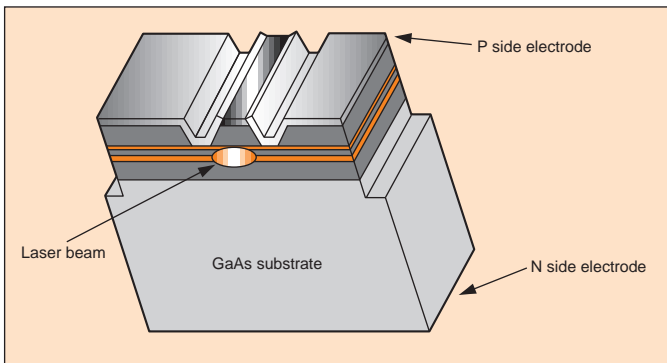
Along with the growth of the DVD market, the number of DVD products has increased and the types of products available have become more diverse as well. This has resulted in increasingly numerous and diverse requirements on the semiconductor laser diodes used. In particular, lower power consumption, higher guaranteed operating temperatures, and the ability to support higher speed drives are now strongly desired. The development of this product targeted lower power consumption as its goal. In achieving this goal, if Sony had merely made the shorter cavity length, the volume of the saturable optical absorption layer would be reduced, self-excited oscillation would become weaker, and noise would be increased. To avoid this, Sony introduced a low-loss waveguide structure, and achieved both improved self-excited oscillation and lower operating current in the SLD1138VL. As a result, the SLD1138VL succeeds in reducing the operating current by 33% over the conventional SLD1134VL.

V O I C E

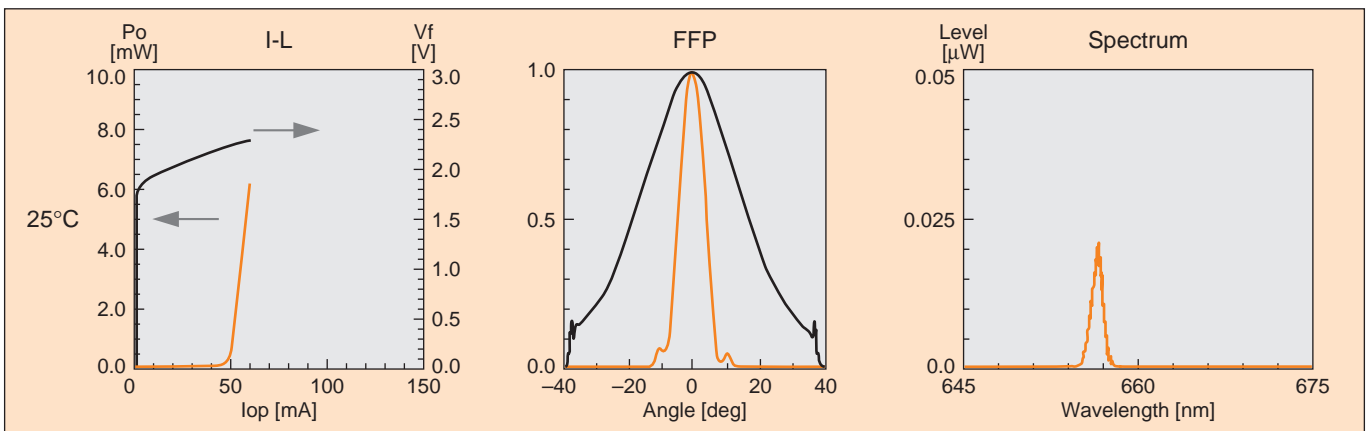
Although self-excited oscillation semiconductor laser diodes are fascinating, they harbor many difficulties. I think that the reason we were able to complete this product despite these difficulties was the accumulated knowledge and technology we acquired during the development of the SLD1134VL. We also learned a great deal in this project as well. We plan to take advantage of this knowledge and aim for even higher performance in future DVD laser development projects. You can expect exciting new products from Sony in the future.



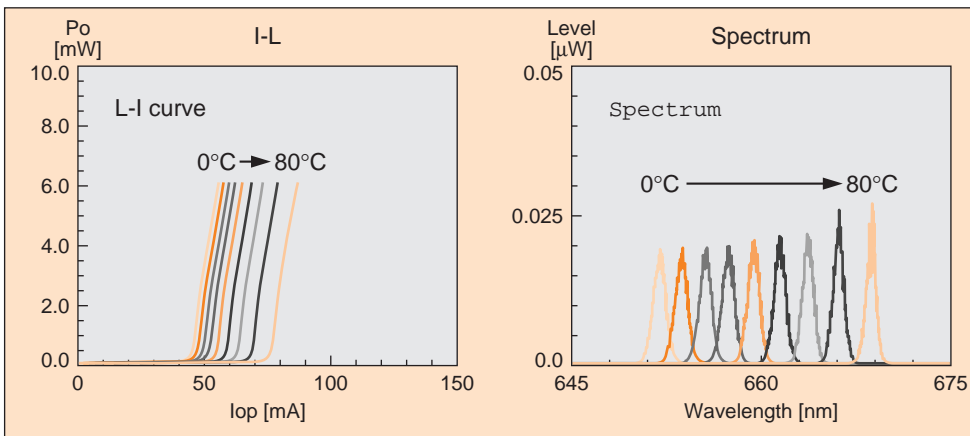
New
Products



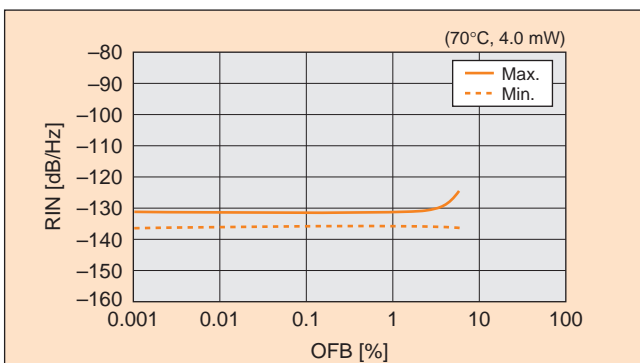
■ Figure 1 SLD1138VL Chip Structure



■ Figure 2 SLD1138VL Representative Characteristics



■ Figure 3 L-I Curve and Spectrum Temperature Characteristics



■ Figure 4 Relative Intensity Noise (RIN)

■ Table 1 SLD1138VL Main Characteristics

Item	Symbol	Typical value	Unit
Threshold current	I_{th}	45	mA
Operating current	I_{op}	50	mA
Operating voltage	V_{op}	2.3	V
Oscillation wavelength	λ_p	655	nm
Differential efficiency	ηD	0.6	W/A
Radiation angle	$\theta_{//}$	8.5	deg
	θ_{\perp}	35	deg

Condition: $T_c = 25^\circ\text{C}$, $P_o = 4\text{ mW}$