Two-Wavelength (Near Infrared/Red)
Laser Diode for DVD, CD, and CD-R Playback

SLD6161RL

Laser diodes are continuing to evolve with integration as the keyword. The SLD6161RL integrates a 650 nm and a 780 nm laser on a single chip to implement a single pickup that supports DVD, CD, and CD-R playback. This is a monolithic integrated two-wavelength laser.
The precision of the position between the two lasers is controlled by the high precision of Sony's photolithography technology, and thus this device can contribute significantly to a reduction of the number of parts required, a reduction in the number of process steps, and to increased end product reliability.
Additionally, the use of Sony's unique gain guide TAPS structure means that no RF mixing circuit is required for either wavelength and the device can operate at temperatures up to 70°C.

- **Two-wavelength (650 and 780 nm) monolithic laser diode**
- **Gain guide TAPS* structure**
- **Industry standard Ø 5.6 mm 4-pin package**
- **High optical source position and beam angle precision**
- **No RF mixing circuits are required**
- **High reliability and operation at 70°C guaranteed**

* TAPS: Tapered Stripe

It is safe to say that the history of semiconductor devices, especially silicon-based semiconductor devices, has been the history of integration technology. The oscillation wavelength (the color of the light) of LEDs (light emitting diodes) and laser diodes are essentially determined by the structural material used. Therefore, if different wavelengths are required, in most cases either separate devices are used or else hybrid integration, in which separate devices are combined in a single package, is used. In optical disc applications, these approaches have the problem that adequate optical source position and beam angle precision cannot be obtained. As a result, most optical disc applications must provide multiple optical systems. The monolithic integrated two-wavelength laser now developed by Sony is the first step in bringing integration to multi-wavelength laser diodes in addition to the single-wavelength multi-beam lasers, which have already been achieved.

VOICE

Integration has finally arrived in the world of laser diodes, an area where the use of independent devices was the most common. Sony has now achieved the integration of different material families on a single chip, a technology that only a few years ago was thought to be too difficult for use in commercial products. In the future we will continue to develop high added-value and user-friendly products.

Industry Standard Ø 5.6 mm 4-Pin Package

The 3-pin Ø 5.6 mm can is the standard package commonly used for the laser diode in DVD and CD optical disc applications. While integrated devices such as the laser diode coupler (see Sony Cx-News, Vol. 18) provide many advantages, such as reducing the number of components and simplifying end product structure, there is still strong demand for the industry standard Ø 5.6 mm can package, which provides good generality. Therefore, the SLD6161RL is provided in a Ø 5.6 mm 4-pin package. (See figure 1.)

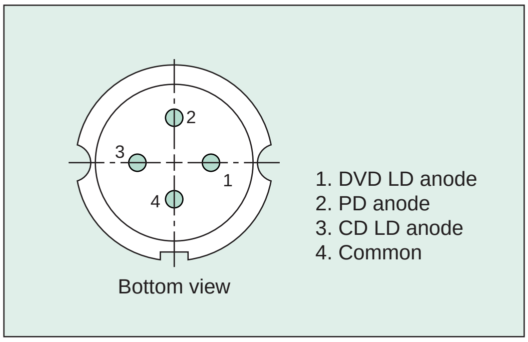
High Optical Source Position and Beam Angle Precision

There are stringent requirements on the precision of both the optical source position and the beam angle produced in multi-beam lasers in optical disc applications. Sequential crystal growth based on the MOCVD technique is used with both the AlGaAs family material laser (780 nm for CD players) and the AlGaInP family material laser (650 nm for DVD players), and a beam spacing of 120 ±1 µm is achieved by forming both devices on a single chip and using photolithography technology. (See figures 2 and 3.) The achievement of this precision in both the optical source position and the beam angle produced allows a single optical system to be used, and contributes significantly to reducing the number of components required, reducing the number of assembly and adjustment steps, and to increasing reliability.

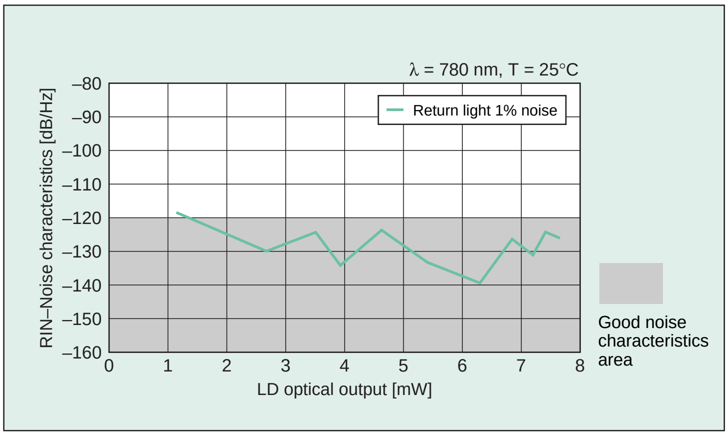
No RF Mixing Circuit Required and 70°C Operation Achieved

By adopting the Sony original TAPS structure gain guide type in either wavelength band, which has a proven track record in volume production, this device achieves low noise with no RF mixing circuit required, and also achieves 70°C operation. (See figures 4 and 5.) Future development plans in this area include, as variations on this product, an index guide type version that will support low operating current and high temperature operation, a pulsation type that will provide even more stable noise characteristics, and a high power type that will be able to write CD-R discs.

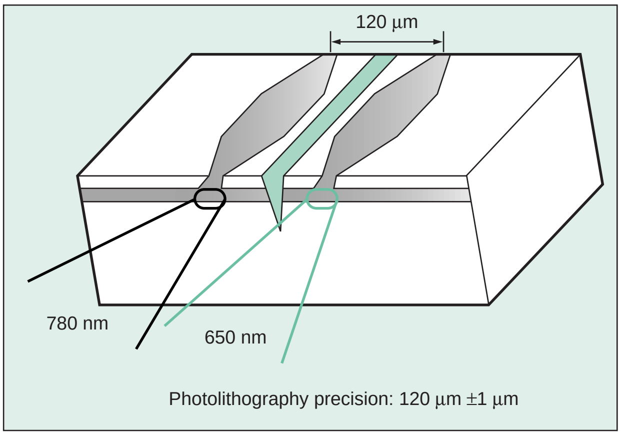
New Products



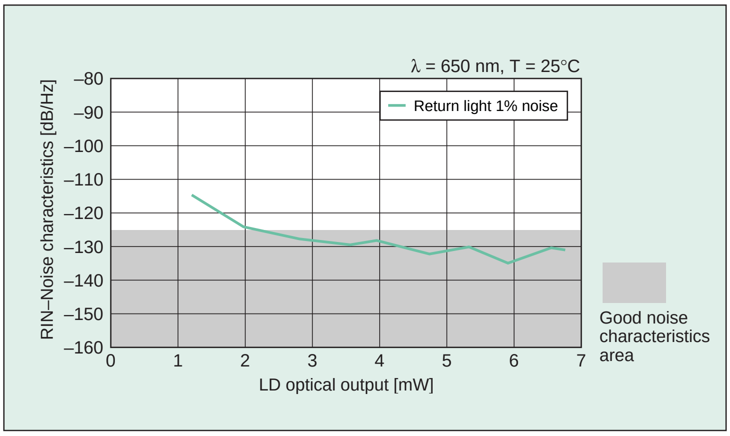
■ **Figure 1 Pin Configuration**



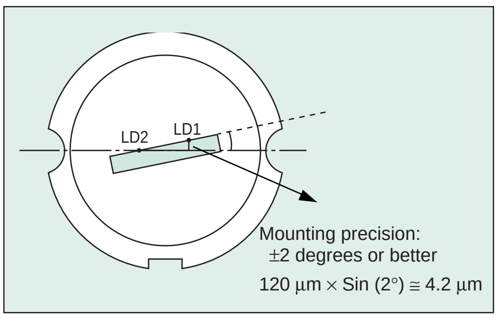
■ **Figure 4 LD Optical Output – Noise Characteristics <CD>**



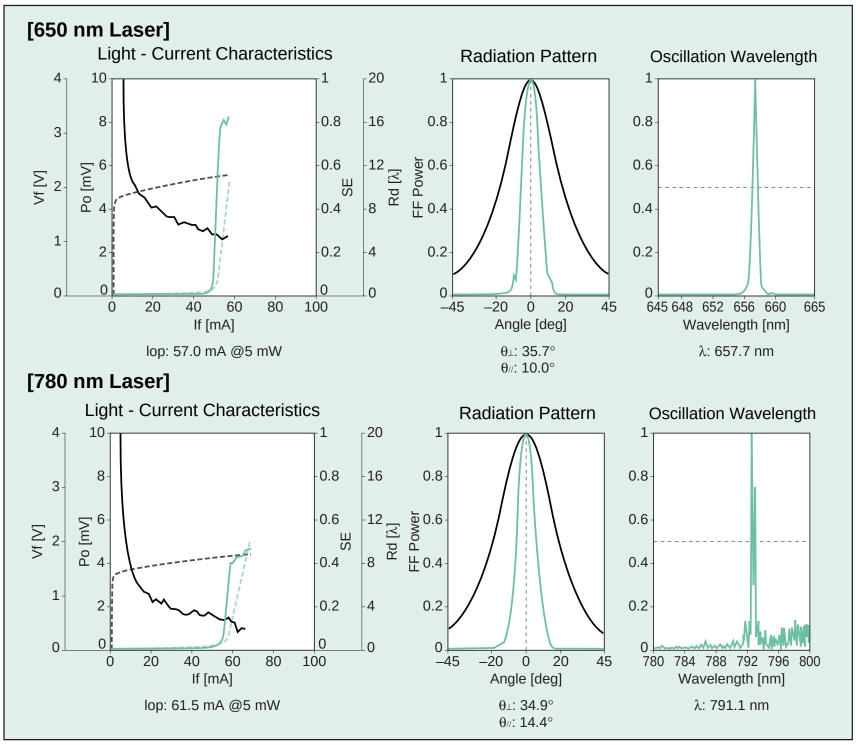
■ **Figure 2 Monolithic Integrated Two-Wavelength Laser Structure**



■ **Figure 5 LD Optical Output – Noise Characteristics <DVD>**



■ **Figure 3 Mounting Precision**



■ **Figure 6 Monolithic Integrated Two-Wavelength Laser Characteristics**