

Industry's First High-Density Integrated Four-Beam Laser Diode for High-Speed LBP and DPPC

SLD262EP

As the printing speeds of modern LBP*1 and DPPC*2 increase, the needs for multi-beam laser diodes are increasing as well.

Sony has now succeeded in developing, for the first time in the industry, a four-beam laser diode for high-speed LBP and DPPC, the SLD262EP, that integrates the four beams at a 14 μm pitch on a monolithic substrate.

*1 LBP: Laser Beam Printers

*2 DPPC: Digital Plain-Paper Copiers

- Achieves increased printing speed in LBP and DPPC
- Four-beam laser diode
- High-density integration with a 14 μm pitch
- Common cathode design
- Provided in a 9 mm diameter 6-pin package
- Low crosstalk
- Closely matched laser diode characteristics

■ Speed Competition in Laser Printers and Copiers

Until recently, printing speeds in LBP and DPPC have been improved by increasing the speed of the polygon mirror used, or increasing the number of faces on the mirror. However, since this use of mechanical means to increase printing speeds has already reached its limit, recent products have adopted a two-beam writing technique in which the laser beams from two single-beam lasers are combined. However, while speeds can be increased by combining two laser beams, several new problems appear. In particular, lasers with extremely closely matched characteris-

tics must be used, and the need to combine the beams increases the number of optical components required. Furthermore, the positions of these components must be adjusted extremely precisely to align the axes of the laser beams, and this adjustment process is difficult and time consuming. As a result, the creation of an integrated device has been eagerly awaited.

■ Features of the SLD262EP

In the SLD262EP, four laser stripes are integrated together at high density with a 14 μm pitch. Since these lasers are integrated monolithically on the same substrate, the characteristics of the beams are extremely closely matched (See figure 3 and table 1.) and there is no need to adjust the optical axes between the beams. Furthermore, special techniques adopted in the structural design have suppressed inter-beam thermal and electrical crosstalk to the point that they are effectively nonexistent.

The SLD262EP not only resolves the problems of the combined beam technique, but also makes four-beam systems, which were previously impossible from an engineering standpoint, possible. (See figure 2.) Furthermore, since these are integrated in a small, narrow area, the SLD262EP allows an extremely compact optical system to be used.

Sony's laser design and manufacturing technologies accumulated over many

years and this newly-developed multi-beam laser manufacturing technology combine to make it possible to achieve high-density integrated multi-beam laser diodes.

■ Towards an Age of Multi-Beam LBP and DPPC

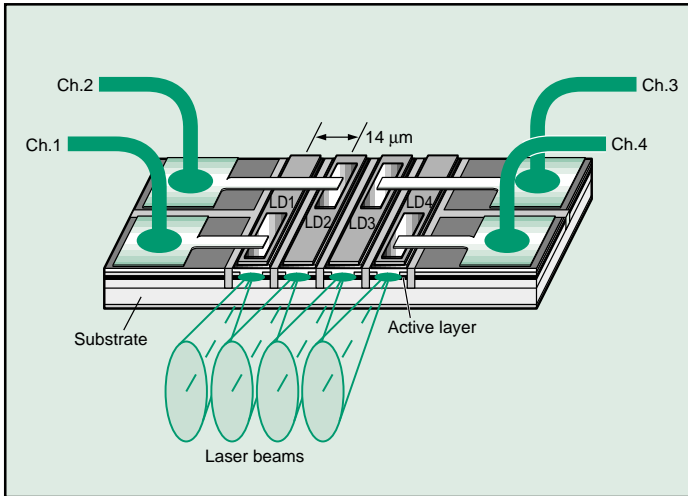
The needs for multi-beam laser diodes will surely increase further due to the competition for increased speed in LBP and DPPC. Sony will be putting full efforts into multi-beam laser diode development to expand the Sony product line and respond to our customers' needs. Keep your eye on Sony laser diode developments.

V O I C E

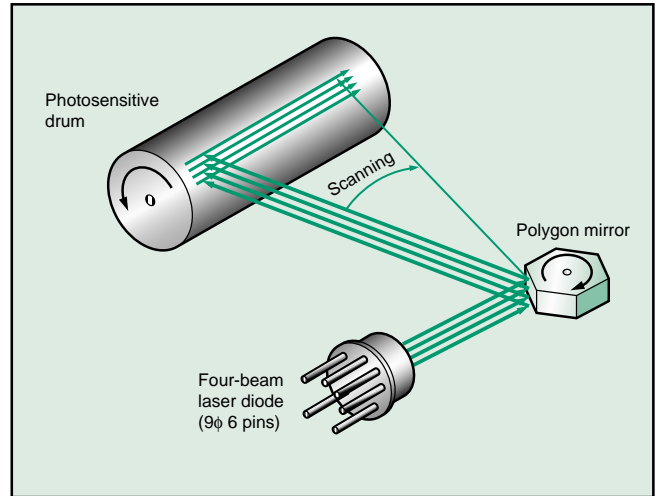
When we first started working on this device, everyone told us that it would be too difficult to mass produce. Even I wondered if it would be possible. And even though it was an unprecedented device, we were only given 6 months to develop it. We were deeply moved when, after working together as a tightly integrated team, our first test device worked perfectly. We are very pleased that the device we built became the start of the shift towards multi-beam LBP and DPPC.



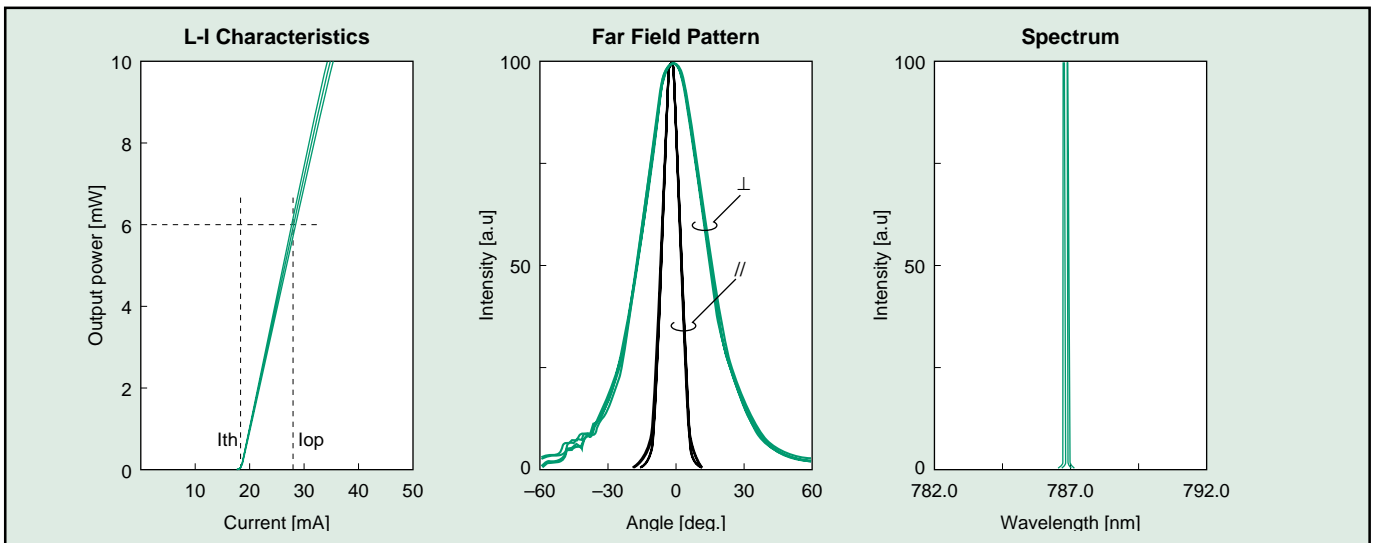
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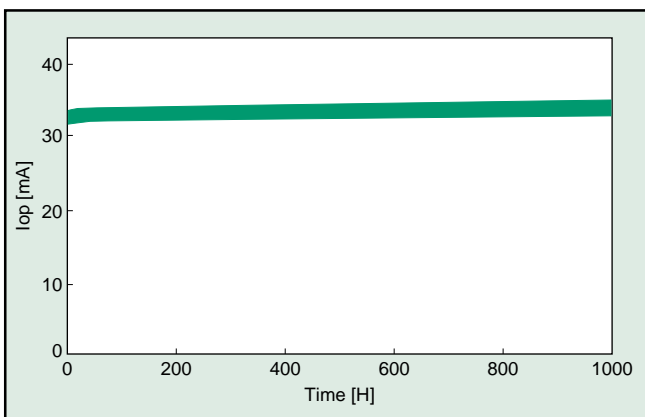
■ Figure 1 High-Density Integrated Four-Beam Laser Diode



■ Figure 2 Four-Beam Writing System



■ Figure 3 SLD262EP Representative Characteristics



■ Figure 4 SLD262EP Reliability Test Results
($T_c = 60^\circ\text{C}$, all beams continuously operating at 6 mW)

■ Table 1 SLD262EP Main Specifications

Item	Symbol	Typical value	Unit
Threshold current	I_{th}	18	mA
Differential efficiency	η	0.7	mW/mA
Operating current	I_{op}	27	mA
Operating voltage	V_{op}	1.8	V
Wavelength	λ_p	788	nm
Radiation angle	$\theta_{//}$	9	deg
	θ_{\perp}	31	

Condition: $T_c = 25^\circ\text{C}$
 $P_o = 6\text{mW}$