

Mode Crosstalk Evaluation in Mode Selective Active Multimode Interferometer Laser Diode

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The lateral mode selective light source has been demonstrated with over 40 GHz bandwidth [1]. As the emission wavelength of 0th and 1st order mode locates at different range, accurate crosstalk evaluation method is obtained from spectrum analysis [2]. In this work, mode crosstalk between 0th and 1st order mode was evaluated based on spectrum analysis. As a result, Mode crosstalk of -13.7 dB -12.5 dB for 0th and 1st mode have been confirmed, respectively.

Figure 1 shows the fabricated device structure. 0th mode and 1st mode have individual propagation paths [3]. The bending waveguides left side act as the mode selector each mode. The straight access waveguide and multimode section consist the pumping section. By controlling current injection into the mode selector region,

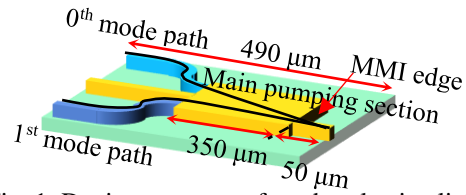


Fig. 1. Device structure of mode selective light source



Fig. 2 NFP of (a) 0th mode and (b) 1st order mode

output modes are selected [4]. Figure 2 (a) and (b) shows the measured near field pattern (NFP) of only 0th and 1st order mode operation. Figure 3 (a) and (b) show the emission spectrum of 0th mode and 1st order mode, respectively. As can be seen from the figures, the 0th mode component mainly locates at wavelength range shorter than 1560 nm. On the other hand, 1st order mode component locates at wavelength range longer than 1560 nm. Thus, for quick and simple evaluation method, wavelength components below 1560 nm are attributed to 0th mode. The range from 1560 nm to 1580 nm are attributed to component of 1st order mode. By integrating the wavelength components, power of each mode is evaluated. As a result, in Fig. 3 (a), mode crosstalk of 0th mode is -13.7 dB. In Fig. 3 (b), 1st mode mode crosstalk is -12.5 dB.

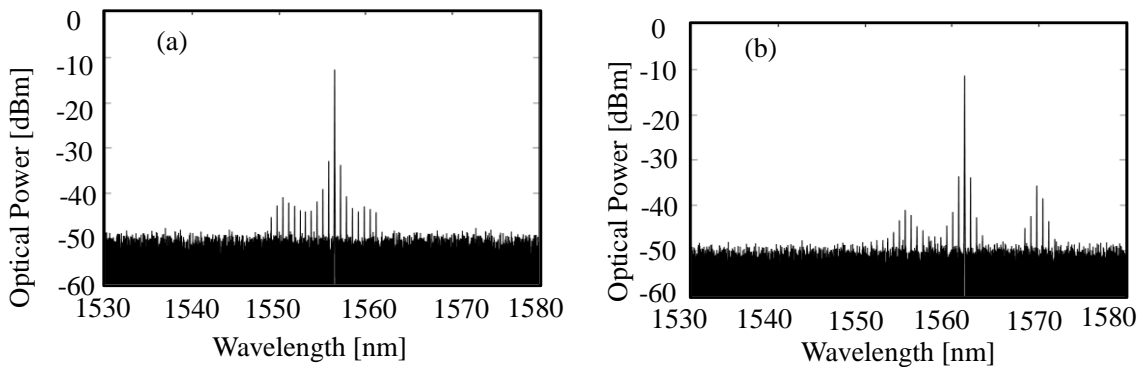


Fig. 3. Spectrum of single lateral mode lasing cases. (a) Measured 0th mode spectrum, and (b) measured 1st mode spectrum

References

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 [3] J. V. Roey, et al., JOSA, vol. 71,803, 1981. [4] B. Hong, et al., OECC/PS, TuD3, 2016.