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| **Author(s) Name:** | Takuya Kitano, **Mohammad Nasir Uddin**, Bingzhou Hong, Akio Tajima, Haisong Jiang and Kiichi Hamamoto | | |
| **Contact Email(s):** | drnasir@aiub.edu | | |
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| **Abstract:** |  |
| The recent rapid growth of data traffic is leading to high-speed communication for local areas, such as the fiber-to-the-home service. A semiconductor laser is used for such a purpose; however, there is the difficulty that an even higher frequency response occurs in only carrier-photon resonance. For this reason, it is effective to use a second resonance, such as a photon–photon resonance (PPR), for enhancing the frequency response, and the active multimode interferometer laser diode (active-MMI LD) is one of the candidates for achieving a high PPR frequency. In order to obtain an even higher PPR frequency, we have investigated the control scheme of enhancing PPR. In this work, we compared two types of active-MMI waveguide structures to confirm the scheme. As a result, a 3.8 GHz enhancement of the PPR peak, resulting in a 3 dB lower frequency response of 17 GHz, has been successfully achieved by waveguide geometry modification. | |