# Active Alignment and Reliable Pigtailing if Laser of Diode Transmitter

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Abstract:

In this paper we present theoretical and experimental analyses on Nd: YAG laser microwelding for pigtailing laser diode transmitter through two ball lenses that are employed for effectively matching the elliptical mode field of the laser diode with the circular on of the single mode fiber. The fiber attachment and the fixing of various coupling components have been performed in what is so called active alignment process, where the system continues measuring the coupled power during the process of alignment and attachment of various coupling components as well as the working distance and misalignment tolerances optimizations. Results of theoretical modeling of laser weld penetration depth agree with the experimentally measured results in the low laser pulse energy range. Moreover the laser pulse parameters such as, duration, energy, number of pulse shoots as well as the focusing position over the work piece and angle of laser pulse incidents are found to have very significant effects on the weld yields and greatly affect the laser weld depth to width ratio. Optimization of all the mentioned parameters found to be necessary for achieving strong laser microwelds with more penetration and less width in the attachments of the sensitive optical components inside the packaged photonic devices modules.

**Keywords:** Laser Microwelding, photonic devices pigtailing, penetration depth, laser weld aspect ratio, ball lenses.