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I Watt, Quasi-CW, Diffraction Limited, Semiconductor Double Tapered Laser Oscillator

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Semiconductor laser source are compact and convenient. They can be easily integrated with other semiconductor devices. They are useful as the source for free space communications between satellites; for optical radar and for pumping fibre amplifiers in optical fibre communication systems. They are also useful for many other applications.

For free space communications, a single frequency high power light source of narrow line width and large band-width is required. Coherent communication systems a high power source, with a single transverse mode and single longitudinal mode.

The narrow stripe laser can give a single mode output of a few hundred milliwatts of optical power. It cannot be pumped by more than a few milliamperes due to catastrophic optical damage to its facts. At high pumping levels, the narrow stripe laser shows optical saturation caused by very high optical power density. Naturally, a broad-area device would eliminate the above problems. However, they create the undesirable properties in the quality of the output. In other word, broad-area devices excite several modes in the near-field and in the far-field. Various researchers have been conducting theoretical and experimental work in the search of a single mode high power semiconductor laser source.

Work was carried out with home made bow-tie lasers and double tapered lasers using gallium arsenide quantum well material as shown in fig:1(a), (b) and (c). The light-current characteristics, the near-field and the far-field patterns were measured under quasi-CW conditions. Over 1W of optical power of wavelength 0.85mm, was produced at a current of 4A with double tapered laser oscillators. This is a power higher than what is so far reported from a semiconductor tapered oscillator. The near-field was gaussian below threshold. The far-field at high currents was a narrow single lobe but at lower currents, it had minor side