Stradus™ Laser Diode Module Power Characteristics

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One of the primary concerns of a user of laser diode modules is how stable is the power level over time. The user wants to know that after setting the power level that this power level remains the same throughout the lifetime of the diode (typically 10,000 hours). Many things will affect the ability of the laser diode module to maintain the power level over time. The quality and the design of the internal light regulating loop is the main issue for power stability when using the laser diode module in the Constant Power mode of operation (as opposed to Constant Current mode). The light regulating loop requires that the percentage of pickoff power from the main beam that gets sampled remains constant over time. This means that nothing in the reflecting path (pickoff window, etc.) or the actual photo-detector is allowed to change over time. Any contamination that shows up as a film on these optical surfaces will change the loop's characteristics over time. Contamination can be caused by dust, smoke, or even outgassing from some of the electronic components and/or PC boards within the laser head. Even once the components and electronics are cleaned during manufacturing of the laser, outgassing of components will cause a film to be plated upon the optical surfaces – especially at violet and ultraviolet wavelengths. These cases do not occur within the Stradus™ laser diode modules because of the inclusion of a patent pending sealed optical module. The light regulation loop as well as all the other optical components are sealed from any outside contaminants and internal outgassing from the electronics. This feature has shown that the optical output power remains stable. The following graphs show actual, random lasers that were pulled off the production line and tested in the Q/A test facility at Vortran Laser Technology, Inc. These initial power stability graphs show just how quickly the output stabilizes from the moment it is turned on. The second set of graphs show the power stability over time during 60-80 hours of operation. These graphs show how absolutely stable these lasers are from a power vs. time consideration.

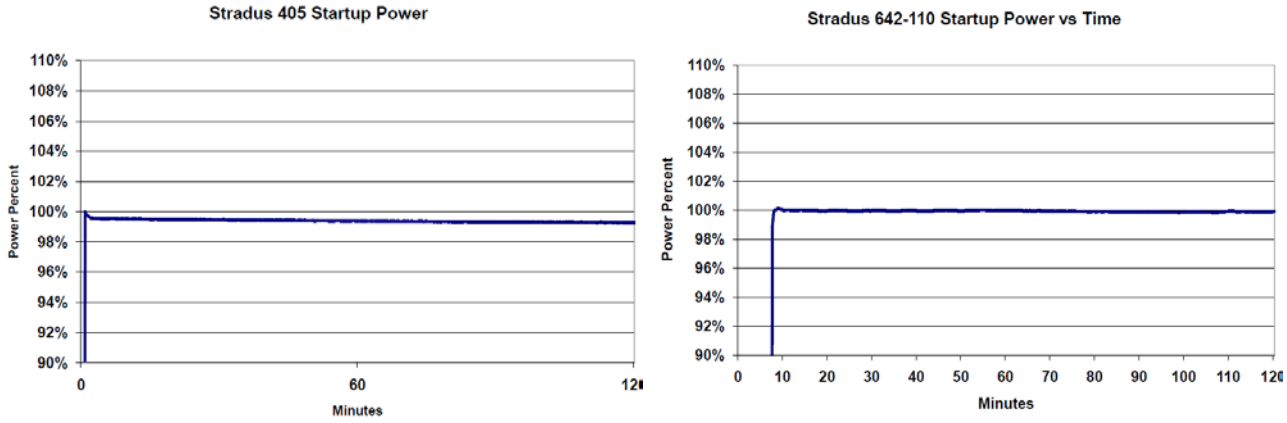

Figure 1

This figure shows power stability characteristics of the Stradus™ immediately after first turning on the laser. A maximum change in power output of less than 0.5% upon initial startup is practically unheard of. After this initial power change (if any) is adjusted-out, the power stays absolutely constant from that point forward (see Figure 2 below).

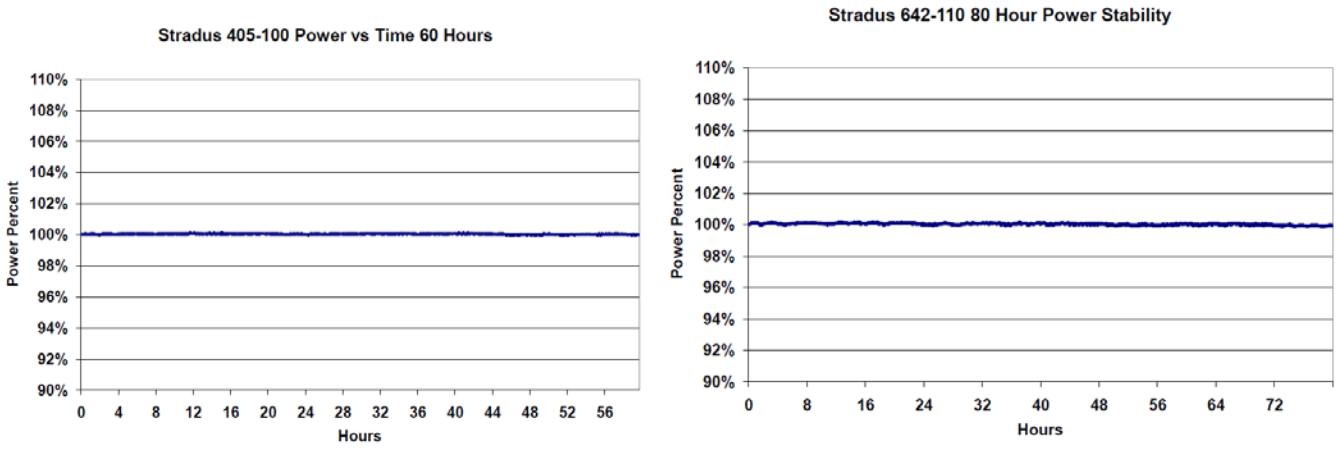

Figure 2

These two graphs show the power stability characteristics after the unit has been turned on for the initial time shown in Figure 1. One can see that the stability is absolutely solid and any instability or change is immeasurable.

These typical graphs have been recorded for all the Stradus™ laser diode modules manufactured to date. Longer term power stability has been recorded for the entire Stradus™ family since manufacturing began and shows constant output power throughout the performance measuring duration.