

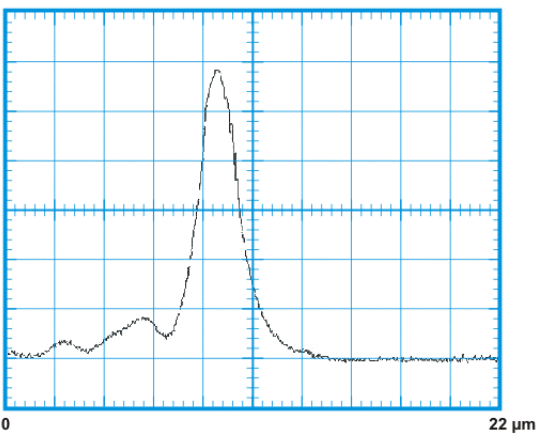
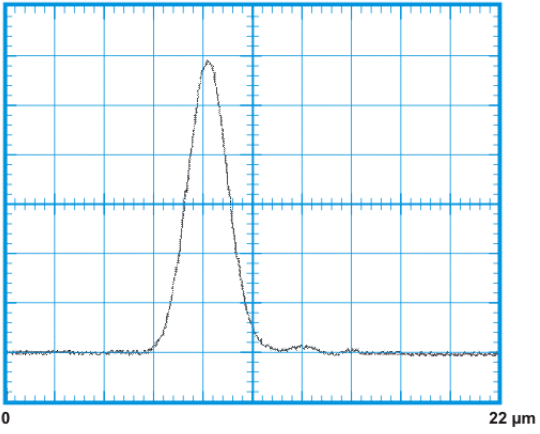


## The Importance of Laser Alignment and Beam Quality

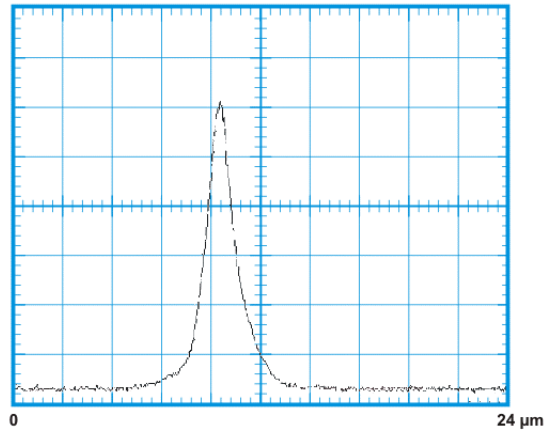
***Beam quality and precise laser alignment are crucial for the most accurate, safe, and reliable results.*** Because of this, our lasers are aligned and beam quality optimized only under strictly controlled and documented factory conditions, leaving nothing to chance.

All lasers undergo rigorous testing, following several precise protocols. The lasers are not released to production unless the beam alignment and quality meet the highest standards.

A thin slit transit fixture is one of the controlled tests used to optimize beam quality. Varying results (both unacceptable and acceptable) of this test are shown below.

<p><i>IMAGE 1: Unaligned beam produces unacceptable beam quality, as indicated by the several medium sized peaks recorded prior to the "main laser peak."</i></p>	 <p>The graph displays a laser beam profile on a grid. The x-axis is labeled from 0 to 22 μm. The profile shows a series of small, medium-sized peaks before a large, sharp main peak, indicating an unaligned beam.</p>
<p><i>IMAGE 2: Even very small peaks following the main laser peak are unacceptable.</i></p>	 <p>The graph displays a laser beam profile on a grid. The x-axis is labeled from 0 to 22 μm. The profile shows a large, sharp main peak followed by several very small peaks, indicating that even small secondary peaks are unacceptable.</p>

*IMAGE 3: An aligned beam showing acceptable beam quality. There are no observable peaks other than the main laser peak.*



Test results for each ZILOS-tk module are documented and recorded in the Device History Log (by serial number) according to FDA requirements. You may request a copy of the test for your ZILOS-tk laser at any time.

As an ISO 9001:2000 registered company, we are dedicated to providing the highest quality product and meeting our customers needs and expectations.

## The Mechanics of a Laser System

There are several vital components inherent to a laser microsurgery apparatus. In addition to the laser itself, a collimating lens, a dichroic mirror, and an objective that can transmit the beam are required:

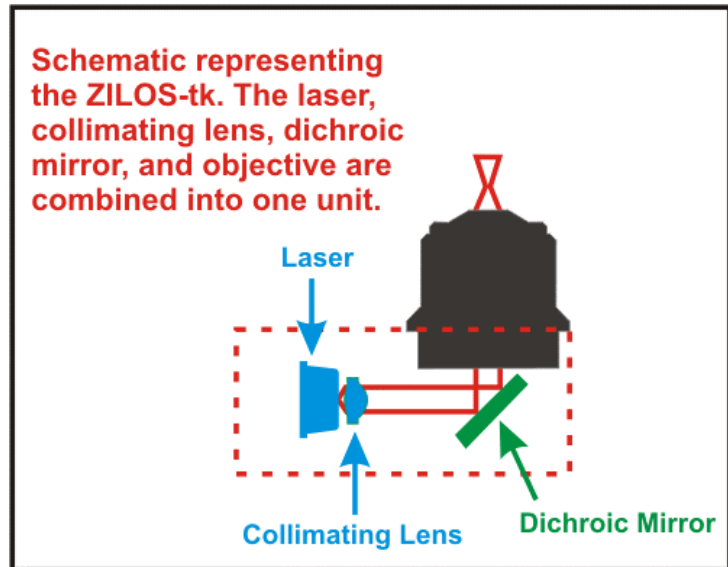
- **Laser:** 1480  $\mu\text{m}$ , Infrared Class 1
- **Collimating Lens:** A lens used to produce a beam of parallel light rays
- **Dichroic Mirror:** An optical device which acts like an optical gate to split light into two colors ("di" = two, "chroic" = pertaining to color). The dichroic mirror reflects the infrared laser beam up through the objective, while the visible light passes through.
- **Objective:** Must allow transmission of laser beam to the sample.

## Why does the end user not need to perform laser alignment on the ZILOS-tk?

Once the optimum alignment and beam quality are achieved, the laser is "locked" into place, and does not move position. We are able to do this because all the components of the laser system are integrated into a single unit (see image at top of next page).

This "locking" process is similar to that used for aligning and locking microscope objectives. Just like you do not have to align the inside components of your microscope objectives, you also do not need to align the internal components of the ZILOS-tk, even if you switch microscopes.

In the ZILOS-tk, these four components are housed in close proximity within the same module. Thus, once the laser is aligned and locked down, it stays aligned.



### Why do other lasers require alignment on-site by the end user?

The reason other laser systems need to be checked on-site for alignment is that two or three separate components are used to get the beam from the laser source to the sample. For example, laser modules that are inserted into the epi-fluorescence port also must have a dichroic mirror inserted in the filter cube port, and the objective attached to the turret (see illustration below). That makes three separate components that must stay aligned at all times. Every time the module or filter cube is removed and reinserted, or the microscope is moved, alignment must be checked.

In other laser systems, two or three separate components must be aligned at all times. Thus, whenever any one component is moved, realignment is needed.

